UKKW 2023

ABSTRACTS

Posters

UK Kidney Week
5-7 June 2023
ICC Wales, Newport

Contents

Monday 5th June 16:00 – 17:00

Track A1 – Cardiovascular Disease & Diabetes 1

Poster: 080
Submission: 108

The insulin / IGF axis is critically important in the podocyte and controls gene transcription and spliceosome function.

Dr Jenny Hurcombe[1], Mr Lusyan Dayalan[1], Miss Fern Barrington[1], Dr Frederic Burdet[2], Mrs Lan Ni[1], Prof Paul Brinkkoetter[3], Prof Martin Holzenberger[4], Dr Aaron Jeffries[5], Dr Sebastian Oltean[5], Prof Gavin Welsh[1], Prof Richard Coward[1]

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Insulin signalling to the podocyte via the insulin receptor (IR) is crucial for kidney function and insulin-like growth factor 1 (IGF1) signalling through the structurally related insulin-like growth factor 1 receptor (IGF1R) is also known to directly affect the podocyte. Since the IR and IGF1R may act redundantly in some contexts, this study sought to elucidate the role of the insulin/IGF1 axis in podocyte function using mouse and cell culture models deficient in both receptors.

To examine the effects of combined receptor loss in vivo, a transgenic mouse model with conditional inactivation of podocyte IR and IGF1R was generated. In vitro, conditionally immortalised genetic IR/IGF1R dual knockout podocytes were characterised using global proteomic and transcriptomic analysis.

Podocyte specific IR/IGF1R knockout mice developed significant albuminuria and a severe renal phenotype with global sclerosis, renal failure and death occurring between 4 and 24 weeks.

>90% loss of IR/IGF1R in cultured mouse podocytes was also detrimental resulting in >50% cell death 7 days after gene knockdown. Enrichment analysis of total proteomic data revealed a striking downregulation of gene ontology terms associated with DNA repair, splicing and RNA processing activity in IR/IGF1R knockdown cells. Long-read RNA sequencing was performed to further explore the effect of dual receptor knockdown on spliceosome function. Analysis of this data revealed higher levels of intron retention and an increase in the proportion of transcripts containing premature termination codons in IR/IGF1R knockdown podocytes.

This work underlines the critical importance of podocyte insulin/IGF signalling and reveals a novel role for this extrinsic signalling axis in the maintenance of genomic integrity and in RNA processing by regulating spliceosome activity.

Monday 5th June 16:00 – 17:00

Track A1 – Cardiovascular Disease & Diabetes 1

Poster: 081
Submission: 111

Erectile dysfunction is a harbinger of chronic kidney disease.

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Introduction: Chronic kidney disease (CKD) shares similar cardiovascular risk factors with erectile dysfunction (ED). ED is an early warning sign for future cardiovascular events, however it is not yet known whether it also behaves as a harbinger of future CKD.

Methods: We identified cases of ED and CKD using diagnostic codes from primary care records, hospital episode statistics, Death Register records, and self-reported diagnoses in a prospective cohort of 104,476 male participants of UK Biobank who had linkage to primary care records, from 01/01/2000 until 15/09/2020. We excluded participants with CKD diagnosed prior to this period as well as before the age of 35. We compared risk of CKD using cause-specific Cox proportional hazards models with competing risk of death, using age as time scale and adjusting for time-fixed covariates (birth cohort, ethnicity, body mass index [BMI], Townsend deprivation index [TDI], and smoking status) and time-dependent covariates (hypertension, diabetes mellitus, ischaemic heart disease, and ischaemic stroke/transient ischaemic attack). We imputed missing values for BMI, TDI, and smoking status (percentage missing ranging between 0.16-0.72%) using multiple imputation with predictive mean matching. As a sensitivity analysis, we repeated the analyses in a propensity score matched cohort.

Results: Among 17,306 men diagnosed with ED, 1,484 developed CKD (73.9/10,000 person-years) median 5.6 years later (IQR 2.7-10.0), compared with 6,116 among 87,170 men without ED (33.0/10,000 person-years). Men with a diagnosis of ED had higher BMIs than men without (28.8 vs 27.8 kg/m2) and were more likely to have other diagnoses such as hypertension (39% at time of diagnosis of ED/57% at any time vs 41% at any time) and diabetes mellitus (21% at time of diagnosis of ED/31% at any time vs 12% at any time). A diagnosis of ED (without hypertension or diabetes mellitus) carried an increased risk of subsequent CKD (Figure 1), with an adjusted cause-specific hazard ratio of 1.56 (95% CI 1.40-1.74). There was significant interaction with hypertension ($p<0.001$), i.e. the increase in hazard of CKD by ED was smaller (adjusted hazard ratio 1.10, 95% CI 1.00-1.20). There was no significant interaction with diabetes mellitus; i.e. men with a diagnosis of ED had a similar hazard ratio for CKD regardless of presence of diabetes mellitus ($p=0.65$ for interaction). These results were numerically similar in a propensity score matched analysis.

Conclusions: Men who are diagnosed with ED are at a higher risk of developing CKD, independent of comorbidities such as diabetes mellitus. A diagnosis of ED should therefore prompt screening for CKD and its risk factors.

Monday 5th June 16:00 – 17:00

Track A1 – Cardiovascular Disease & Diabetes 1

Poster: 082
Submission: 129

Cost effective improvements in heart failure and CKD care by implementing a regional urgent ad hoc electronic advice and guidance service

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Introduction: The Salford Renal service covers 6 hospital sites in a hub and spoke model, with each hospital having a local heat failure (HF) service. Following the establishment of structured monthly HF-CKD MDT meetings between the Salford Renal specialist HF-CKD clinic and each of the regional HF services in 2021 it was then deemed necessary to provide a more rapid communication for patients at risk of decompensation and AKI, and for the benefit of immediate bilateral discussion to provide more joined up care.

Methods: In 2022 a bespoke advice and guidance service was introduced using email with Secure Email Accreditation for enhanced, rapid bilateral ad hoc communication between renal and HF services.

This report provides a review of the output from this advice and guidance service during the 12-month period of January to December 2022 in respect of quantifying referral types and outcomes.

Results: 212 referrals were made during 2022. 176 (83%) were from HF to HF-specialist Renal Consultant by 23 different HF nurses and 3 cardiologists. The most common reasons for referral were rapid update or enquiry (45%), hyperkalaemia (20%), referral for outpatient review per NICE NG203 criteria (16%), decline in eGFR (14%). Other reasons were diuretic resistance and hyponatraemia. 94% of email referrals received a same day response, and 6% the following day.

48% of patients were not previously known to renal services. Of these, 54% were managed with advice back to referrer with MDT meeting safety net follow up. 39% were offered new patient appointments in the HF-CKD clinic and 7% required telephone discussion.

Of HFrEF patients subsequently seen in the HF-CKD clinic, the mean HF “4-pillar” drugs prescribed per patient increased from 2.1 ± 0.9 at referral to 2.7 ± 1.0 at most recent appointment. Patients on all 4 therapies increased from 0% to 41%. 64% of patients achieved systolic blood pressure <130mmHg at most recent follow up and 100% showed improvement in uPCR (referral median 89 g/mol - range 31-802, follow up median 37g/mol - range 6- 145).

Of 91 patients known to renal services beforehand, 60% of referral response were email advice only, 19% were signposted to their known sub-specialty renal consultant, 17% were prescribed potassium binders using our remote telephone clinic and binder postal service.

36 referrals were from renal to HF services. 72% of these were answered same day. 83% of these referrals were for urgent enquiries or sharing of up-to-date information relevant to HF care. 14% were requests for new patient appointments in local HF clinics.

Discussion: Fewer than half of patients referred by HF teams to nephrology for urgent review require outpatient clinic appointments in the setting of a rapid A&G service, improving renal service cost effectiveness and capacity. Patients who do require review in the specialist nephrology-led HF-CKD clinic have improved care parameters in respect of both HF and CKD. There is added benefit to renal services in having rapid bilateral communication of therapeutic changes, clinical developments and up to date investigation results which may otherwise not be readily available.

Monday 5th June 16:00 – 17:00

Track A1 – Cardiovascular Disease & Diabetes 1

Poster: 083
Submission: 149

Mass spectrometry imaging as a novel method of characterizing glycosaminoglycans in renal pathologies.

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Introduction: The Glycocalyx is a carbohydrate rich mesh which coats the surface of endothelial cells and is responsible for glomerular permeability. Glycosaminoglycans (GAGs), are linear polysaccharides and are an essential component of the Glycocalyx. Disruption to this family of molecules is implemented in several renal diseases including acute kidney injury, diabetes mellitus and Alport Syndrome. The *in situ* analysis and detection of GAGs remains largely limited by the availability of appropriate tools with which to be able to gather both spatial and compositional data in the same sample, and therefor directly impacts our ability to collect suitable data by which to study renal disease.

Methods: Here we present the development of a new analytical tool, 3D Orbi-SIMS. A surface analysis technique which allows for the collection of both in-depth compositional data through the collection of high mass resolution mass spectra and spatial information by high spatial resolution imaging, in a single sample. The method also benefits from taking an unbiased and label free approach to analysis and provides extremely chemical rich data sets allowing for the analysis of proteins, lipids, metabolites and GAGs in a single data set. The technique has previously been used to distinguish between isolated GAG standards. We have translated this to an *in situ* method of GAG analysis.

SIMS data was collected for an STZ model of diabetes mellitus, a COL4A5 knockout model of X-linked Alport Syndrome and wild type controls.

Results: A novel reference library of in situ GAG discriminatory ions was produced and used to investigate GAG related changes occurring in renal pathologies. We show for the first time that SIMS can detect and map GAGs in tissue samples. SIMS was able to detect the known reduction of Heparan Sulphate associated with diabetes mellitus. Furthermore, it has been used to identify and image GAG changes directly in Alport Syndrome tissue, moving away from current literature which focuses on GAG excretion in urine. We show that SIMS can be used on a tissue wide scale, but also on the micro-scale to

collect detailed compositional and spatial information of GAGs in individual glomeruli of glomerular pathologies (Figure 1).

Discussion: 3D Orbi-SIMS greatly increases the amount of information which can be collected in a single sample compared to currently spatial methodologies and advances our understanding of GAG related renal pathologies. The long term applications of this work include the possibility of mapping GAG changes in individual patients biopsies, allowing for an improved understanding of human disease at a fundamental level and diagnosis, which in turn could provide the opportunity to take a more targeted therapeutic approach.

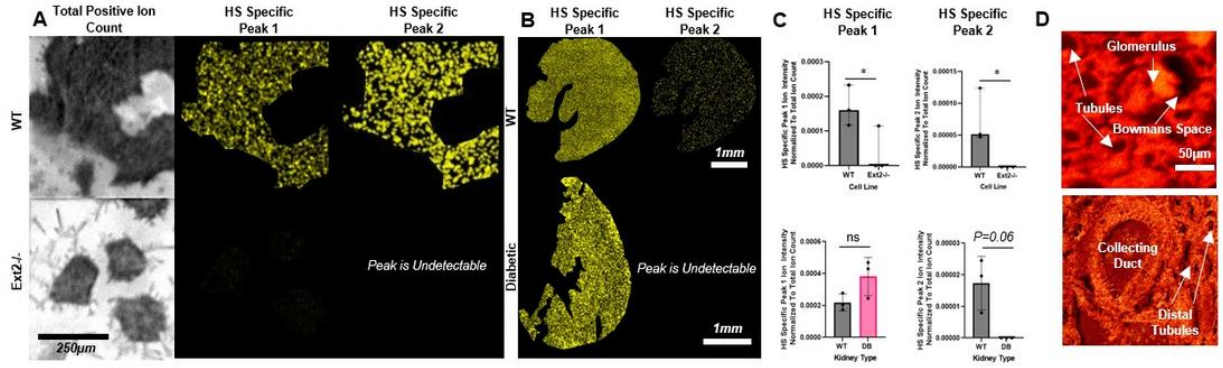

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Figure 1. Development of 3D Orbi-SIMS for in situ glycosaminoglycan detection. (A) Validation of Heparan Sulphate (HS) discriminatory ions using wild type and HS biosynthesis knockout human induced pluripotent stem cells (n=3). **(B)** Application of HS discriminatory ions to wild type and diabetic tissue (N=3). **(C)** Semi-quantitative analysis of HS in cellular and tissue samples. **(D)** Total positive ion count of individual components of the kidney including glomeruli.

Monday 5th June 16:00 – 17:00

Track A1 – Cardiovascular Disease & Diabetes 1

Poster: 084
Submission: 172

Frailty may explain reduced use of invasive management strategies post myocardial infarction in people with impaired kidney function.

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Introduction: Reduced estimated glomerular filtration rate (eGFR) is associated with lower use of invasive management and increased mortality after myocardial infarction (MI). It is unknown why this occurs and if it contributes to worse outcomes.

Methods: We performed a retrospective clinical cohort study using data from the English NIHR Health Informatics Collaborative (2010-2017) on patients from five hospital trusts with an ICD-10 discharge code (first or second position) for MI. We investigated whether reduced eGFR was associated with more conservative management post MI and tested the following hypotheses: (i) Could differences in clinical care be related to frailty? and (ii) Are associations between poor renal function and increased mortality related to differences in receiving revascularization? Renal function was categorized from the first serum creatinine within 24 hours of the initial troponin test to calculate the CKD-EPI eGFR into (i) normal eGFR >90, (ii) eGFR 60-89, (iii) eGFR 45-59, (iv) 30-44, and (v) <30 ml/min/1.73m2. We excluded people who died in the first 24 or 72 hours following ST-elevation myocardial infarction (STEMI) or non ST-elevation myocardial infarction (NSTEMI) respectively to avoid immortal time bias. We used multivariable logistic regression to determine the association between eGFR group and i) invasive management and ii) death at 30 days with adjustment for a 23-item frailty score and revascularisation status respectively as well as age, sex and comorbidities.

Results: Amongst 10,205 people, 3,397 (33.3%) had a normal eGFR (>90), 4,237 (41.5%) had eGFR 60-90, 1,149 (11.3%) had eGFR 45-59, 753 (7.4%) 30-44 and 669 (6.6%) <30 ml/min/1.73m2. NSTEMI was diagnosed in 6,451 (63.2%) and STEMI in 3,754 (36.8%) people. The odds ratio (OR) for receipt of coronary angiography following NSTEMI was 1.03 (95% CI 0.87-1.20), 0.92 (0.74-1.14), 0.79 (0.61-1.02) and 0.57 (0.44-0.75) in those with eGFR 60-90, 45-54, 30-45 and <30 respectively. After STEMI, the ORs for receipt of angiography were 0.96 (0.72-1.26), 0.71 (0.48-1.07), 0.41 (0.26-0.64) and 0.33 (0.21-0.53) ($p<0.001$ for linear trend in both STEMI and NSTEMI). Adjustment for frailty eliminated the associations between eGFR category and coronary angiography and revascularization after NSTEMI (test for linear trend $p=0.64$ and $p=0.40$ respectively), and attenuated the associations after STEMI (test for linear trend $p=0.02$ and 0.08).

We found inverse associations between eGFR category and death within 30-days (test for trend $p<0.001$). Compared with people with eGFR>90, ORs for death in those with an eGFR<30 were 7.5 (4.68-12.02) and 11.07 (6.20-19.75) following NSTEMI and STEMI respectively. The association between eGFR and 30-day mortality was attenuated after adjustment for frailty (OR for death if eGFR<30, 4.53 (2.78-7.38) and 4.85 (2.59-9.08) in NSTEMI and STEMI respectively, compared to eGFR>90), but not changed by adjustment for revascularization status.

Discussion: We describe for the first time how adjustment for frailty may mediate the observed association between worsening eGFR and reduced invasive coronary management. However, large relative mortality differences remain after accounting for revascularization though these weakened after adjusting for frailty.

Monday 5th June 16:00 – 17:00

Track A1 – Cardiovascular Disease & Diabetes 1

Poster: 085
Submission: 188

Investigating a podocyte-directed VEGFC gene therapy as a treatment of diabetic nephropathy in a type 1 diabetes mouse model

Dr Aldara Martin Alonso, Dr Carl May, Dr Monica Gamez, Dr Khadija Ourradi, Dr Wen Ding, Prof Gavin I Welsh, Prof Simon C Satchell, Dr Rebecca R Foster

University of Bristol, Bristol

Introduction: There is no cure for diabetic nephropathy and current interventions do not target the glomerulus, where the disease initiates. Novel treatments that prevent the progression of the kidney disease are required. In the glomerulus, vascular endothelial growth factor (VEGF)C is expressed by the podocytes and signals to the glomerular endothelial cells to improve barrier function. Importantly, we have previously demonstrated that podocyte-specific transgenic expression of VEGFC can protect from early diabetic kidney disease. We hypothesise that VEGFC gene therapy targeting the podocytes can be used as treatment of diabetic nephropathy.

Methods: Diabetes was induced in 10-week-old DBA2/J males by injecting (intraperitoneal) with streptozotocin (50 mg STZ/kg/day over 5 consecutive days). After four weeks (when all animals were hyperglycaemic (>15 mmol/l blood glucose)), adeno-associated viral particles expressing human VEGFC under a podocyte-specific promoter (AAV-VEGFC) were administrated to a group of mice by intravenous (tail vein) injection. Control animals received STZ but were not injected with AAV particles. Urine albumin and creatinine were measured. At the end of the experiment, an *ex vivo* isolated glomerular albumin permeability assay was performed.

Results: At the time of AAV-VEGFC administration, there were no differences in blood glucose or in body weight between the AAV group and control group. Human VEGFC mRNA relative expression was significantly increased in sieved glomeruli from mice injected with AAV-VEGFC (55.13 ± 10.08, n=7) compared to controls (1.54 ± 0.83, n=5) suggesting successful viral transduction ($p<0.05$ by two-tailed unpaired *t* test). Urine albumin-creatinine ratio (uACR) at baseline (4 weeks post-STZ), 4 weeks and 5 weeks after AAV-VEGFC injection were compared (n=8 animals from AAV group; n=7 controls). At 5 weeks post-AAV injection, relative (to baseline) uACR was significantly reduced in diabetic mice that received AAV-VEGFC (1.681 ± 0.474; absolute uACR: 184.6 ± 69.96 mg/mmol) compared with control diabetic mice (3.864 ± 1.772; absolute uACR: 295.1 ± 91.33 mg/mmol) ($p<0.05$ by two-way ANOVA followed by Bonferroni post-tests). In addition, isolated glomeruli from diabetic mice treated with the AAV-VEGFC showed reduced *ex vivo* glomerular albumin permeability compared to control diabetic mice ($p<0.05$ by two-tailed unpaired *t* test; AAV group (n=26 glomeruli from 4 mice): $3.742x10^{-7} \pm 3.599x10^{-8}$ cm/s; control group (n=21 glomeruli from 4 mice): $6.000x10^{-7} \pm 7.373x10^{-8}$ cm/s).

Discussion: These data suggest that our gene therapy approach induces human VEGFC expression in podocytes *in vivo* ameliorating the increase in glomerular permeability seen in diabetes. Therefore,

VEGFC gene therapy has novel therapeutic potential for diabetic patients at risk of developing kidney disease.

Monday 5th June 16:00 – 17:00

Track A2 – Cardiovascular Disease & Diabetes 2

Poster: 086
Submission: 193

Blocking the Calprotectin-TLR pathway reduces key atherogenic responses in chronic kidney disease.

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Chronic Kidney Disease (CKD) is associated with markedly increased cardiovascular (CV) morbidity and mortality, but the mechanisms are not fully understood. Atherosclerosis, an inflammation-driven thickening of the vascular wall which underlies most CV diseases (CVD), is aggravated in CKD. Damage-Associated Molecular Patterns (DAMPs) play critical role in the development of chronic inflammatory pathologies, including atherosclerosis, via their activation Toll-like receptors (TLRs). While DAMPs' involvement in CV risk in CKD has been suggested, the specific role of individual DAMPs, the extent to which they contribute to pathology and the mechanistic confirmation of their involvement have remained undescribed.

Here, we investigated these issues by: i) identifying the most promising target DAMPs by ELISA analysis of plasma samples from CKD patients and mice with chronic nephropathy, ii) demonstrating, by specific pharmacologic inhibition, the critical contribution of the selected DAMP candidate to the promotion of a range of systemic and vascular pro-atherogenic response in nephropathic (aristolochic-acid-induced) mice, using a range of biochemical and biomolecular techniques (ELISA, flow-cytometry, RT-qPCR, immunohistochemistry), iii) mechanistically characterising the pro-atherosclerotic potential of the DAMP candidate using a variety of in vitro cellular assays (cytokine production, transendothelial resistance measurements, foam cell formation, cholesterol uptake and efflux)

Specifically, we found 4 TLR DAMPs, namely Hsp70, Calprotectin, Hyaluronic Acid and HMGB-1, elevated in CKD patients' plasma. Calprotectin was further elevated in CVD-diagnosed CKD patients and in nephropathic mice. In mice, chronic nephropathy also resulted in increased plasma Calprotectin, and led to a range of systemic inflammatory, immune and vascular atherosclerosis-promoting responses that drive atherosclerosis. These responses were inhibited or abrogated by pharmacologic inhibition of Calprotectin with Paquinimod. Mechanistically, Calprotectin, promoted key cellular functions and responses in endothelial cells, monocytes and macrophages associated with worsening of atherosclerosis. The other CKD-elevated DAMPs could also differentially promote these responses. TLR2 and TLR4 mediated most Calprotectin and DAMPs'-induced responses, and a multi-TLR inhibition approach substantially reduced the chronic and systemic vascular consequences of chronic nephropathy

in mice. Thus, Calprotectin and TLRs showed major roles in promoting chronic inflammatory and atherogenic responses in CKD.

This study demonstrates the major role that Calprotectin and the DAMP-TLR pathway play in driving atherosclerosis in CKD and reveals their potential as therapeutic targets to reduce chronic inflammation and lower the atherosclerotic burden in CKD.

Monday 5th June 16:00 – 17:00

Track A2 – Cardiovascular Disease & Diabetes 2

Poster: 087
Submission: 265

Good Neighbours: Podocyte Gene Therapy to Support Endothelial Glycocalyx in Diabetic Kidney Disease

Dr Carl May, Dr Aldara Martin-Alonso, Dr Monica Gamez, Dr Khadija Ourradi, Dr Wen Ding, Professor Gavin Welsh, Professor Simon Satchell, Dr Becky Foster

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Introduction: It is estimated that between 18 and 30% of diabetes patients have Diabetic Kidney Disease (DKD). Given the sharp rise in type 2 diabetes prevalence we have seen and will likely see in the future, this is a considerable health burden. Currently there is no cure for DKD, therapies focus on controlling blood pressure and glucose levels. Treatments to protect the fine ultrastructure of the glomerulus in DKD are sorely needed. Previous work by the group shows that overexpression of VEGFC by the podocytes in diabetic mice improved albuminuria, decreased glomerular albumin permeability, and prevented glycocalyx damage (Onions et al 2019). With the aim of developing an AAV gene therapy using recombinant VEGFC, we wanted to see if we could transduce podocytes and if the podocytes could synthesise and secrete functional transgenic VEGFC. Furthermore, we wanted to transduce murine glomeruli ex vivo before moving on to treat control mice.

Methods: Human podocytes were grown in culture and treated with AAV VEGFC. The conditioned supernatant was collected and assayed for levels of VEGFC. GEnC were treated with the conditioned supernatant to study the transgenic VEGFC's ability to induce signalling and behavioural changes in the GEnC. As a step towards using this AAV in vivo we treated mouse glomeruli ex vivo. SV129 control mice were treated with AAV VEGFC at a dose of 7.5 x 1013 genome copies/kg via tail vein injection.

Results: We have been able to show that AAV VEGFC at a range of MOIs can transduce human podocytes in vitro and lead to the expression and secretion of transgenic VEGFC. Additionally, treatment of human GEnCs with the conditioned supernatant, containing the transgenic VEGFC, stimulated phosphorylation of VEGFR2 (over a 30-fold increase compared to untreated control $p = 0.0042$) and resulted in a significant reduction of GAG shedding over a 48-hour period suggesting a retention of the endothelial cell glycocalyx.

Furthermore, we have been able to transduce murine glomeruli ex vivo using AAV VEGFC (a nearly three-fold increase compared to untransduced control $p = 0.0091$). SV129 control mice were treated with AAV VEGFC at a dose of 7.5 x 1013 genome copies/kg via tail vein injection. The treatment was well tolerated, and no adverse effects were seen.

Discussion: We are confident that the AAV VEGFC is functioning as predicted. We can detect transgenic VEGFC produced by transduced podocytes. This transgenic VEGFC can stimulate VEGFR2 in the GEnC and eliciting a response by the GEnC to reduce glycocalyx turnover. A pilot study in mice suggested that

the AAV treatment is safe, and we can expand the study to include diabetic disease models. This work was funded by Diabetes UK.

Monday 5th June 16:00 – 17:00

Track A2 – Cardiovascular Disease & Diabetes 2

Poster: 088
Submission: 282

The safety and efficacy of GLP-1 receptor agonists in kidney transplant recipients with diabetes: A single centre retrospective analysis

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Bart's Health NHS Trust, London

Introduction: GLP-1 receptor agonists (GLP-1 RA) are promising second-line treatments for type 2 diabetes mellitus(T2D). Their efficacy and safety in kidney transplant recipients (KTR) have not been fully assessed.

Methods: All incident KTRs at a tertiary transplant centre started on a GLP-1 RA post-transplant for the management of T2D were included in the study. Data were collected retrospectively and analysed using[CT(HNT1] R. Changes in HBA1c, weight, proteinuria and blood pressure (BP) at 6 and 12 months were assessed. Parameters including immunosuppression doses, doses of insulin and immunosuppressive medications, and graft function were measured as predictor variables.

Results: 36 patients (age 57 [48.50, 64.00] years, 55.6% male) were included in the study, 17 were on dulaglutide, 13 semaglutide, and 6 liraglutide.

The entire cohort experienced significant weight loss, both at 6-month (-3.80 [-5.50, -0.60] kgs, p 0.000) and 12-month (-5.65 [-6.88, 0.60] kgs p 0.011) intervals. This finding was replicated individually in the semaglutide cohort, at six (-5.00 [-6.45, -2.25], p 0.014) and twelve months (-6.00 [-8.20, -3.25], p 0.047) and partially in the dulaglutide cohort at six months (-3.90 [-4.50, -0.07], p 0.012). The liraglutide group likely failed to achieve statistical significance due to the small sample size.

The HBA1c of the whole cohort improved by 8.00 [2.00,17.00] mmol/mol] at 6 months (p 0.035) and by 9.00 [1.00, 27.50] mmol/mol at 12 months (0.003). Individual analyses showed only dulaglutide had a statistically significant difference in HBA1c at six and twelve months (0.011 & 0.011).

There was no significant difference in systolic BP or changes in urine protein creatinine ratio at the 6- and 12-month intervals between or within the individual cohorts. There were no statistically significant differences in any other measured variables between the three groups at the observed time points.

There was no observed increase in the number of patients who were not on mycophenolate (MMF), nor was there a reduction in the total daily dose of MMF over time, implying that the initiation of GLP-1 agonist did not have an adverse signal.

Conclusion: Our study demonstrates that GLP-1 RAs are safe and effective in KTRs, and demonstrate clinically important weight loss and improvement in glycaemic control. Given the lack of statistically significant difference between the three drug groups, it seems to be a class effect. Our study was limited given its retrospective nature and small sample size, and only three of the cohort were on an SGLT2 inhibitor. A prospective study with a larger sample size is warranted to consider differences between agents in KTR populations.

Monday 5th June 16:00 – 17:00

Track A2 – Cardiovascular Disease & Diabetes 2

Poster: 089
Submission: 370

Association and progression of multi-morbidity with chronic kidney disease stage 3a grouped by albuminuria status in a longitudinal study of the multi-ethnic population of Northwest London: A real-world study.

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Introduction: The prevalence of Type 2 Diabetes Mellitus (T2DM) is rising worldwide. This will invariably be associated with an increase in micro- and macro- vascular complications including Chronic Kidney Disease (CKD). Whilst the link between albuminuria and CKD and cardiovascular disease (CVD) progression is well-established, real-world data linking CKD by both glomerular function and albuminuria to the degree of multi-morbidity is lacking. In this study we utilised the Discover dataset consisting of 2.3 million patients from Northwest London, to determine the association between CKD stage 3a and varying degrees of albuminuria with multimorbidity in a longitudinal study.

Method: Patients with a known background of T2DM prior to 1st January 2015 without a diagnosis of CKD were included. Patients with newly coded CKD3a (eGFR 59-45ml/min/1.73m2) were grouped by the degree of albuminuria (CKD3aA1 i.e., uACR <3mg/mmol, CKD 3aA2 ie uACR 3-30mg/mol and CKD 3aA3 ie. uACR >30mg/mol). Patients without an uACR performed during the study entry year were excluded. Baseline and 5-year co-morbidity was determined to 31st December 2021, as were prescribing practices with regards to prognostically beneficial medication.

Results: We identified 56,261 unique patients with a diagnosis of T2DM prior to 1st January 2015, of which 1082 patients had CKD stage 3a diagnosed between 1st January to 31st December 2015. 224 patients were identified to have CKD3aA1, 154 CKD3aA2 and 93 CKD3aA3. 611 of 1082 patients, did not have a uACR available between January-December 2015. Diabetic eye complications, hypertension, and ischaemic heart disease (IHD) were the three most common co-morbidities, with no statistically significant difference in the degree of co-morbidities at baseline between CKD3aA1 Vs CKD3aA3 and CKD3aV2 Vs CKD3aA3. A statistically significant difference in the degree of hypertension, eye complications, IHD and vascular disease from baseline compared to study end point was observed for all 3 study groups. Comparing co-morbidities developed at study end point, highlighted a statistical difference between CKD3aA1 Vs CKD3aA3 for eye complications alone and for hypertension and heart failure between CKD3aA2 Vs CKD3aA3. (Table1) 40.8% of patients with CKD3aA2 or A3 were prescribed RAASi therapy between June-December 2021. Survival analysis showed CKD3aA1 and CKD3aA2 to be associated with a low degree of progression to CKD 4/5, with 15% of patients with CKD3aA3 developing CKD stage 5 within 5 years of diagnosis.

Discussion: Diabetic Kidney Disease (DKD) is associated with significant multimorbidity at baseline and 5 years post diagnosis, with CKD3aA3 most strongly associated with CKD progression to CKD 5 and more strongly associated with diabetic eye complications, heart failure and hypertension compared to normo- or micro-albuminuria at 5 years post CKD diagnosis. The lack of uACR testing upon diagnosis and poor prescribing of RAASi in those with CKD3aA2/A3, raises significant cause for concern and shows the amount of work needed to improve diagnosis and management of DKD.

Conclusion: DKD is associated with significant multimorbidity. Significant work is needed to be done to ensure patients undergo testing for uACR, to allow for future risk stratification and ability to be started on prognostically beneficial medication.

Pearson's Chi-squared test with Yates' continuity correction, p values
Statistically significant if $p<0.05$

Comorbidity	3Aa1 Baseline vs	3Aa1 vs 3Aa2 Baseline	3Aa1 vs 3Aa3 Baseline	3Aa1 vs 3Aa2 EndPoint	3Aa1 vs 3Aa3 EndPoint
Hypertension	<0.001	0.3508	1	1	0.8817
Eye complication	<0.001	0.7261	0.4015	0.8815	***0.03944***
IHD	<0.001	0.8222	1	0.5498	0.4619
Heart Failure	<0.001	0.2589	1	0.3626	0.3626
Vascular Disease	<0.001	1	1	0.7402	0.8952

Comorbidity	3Aa2 Baseline vs EndPoint	3Aa2 vs 3Aa3 Baseline	3Aa2 vs 3Aa3 EndPoint
Hypertension	<0.001	0.3805	***0.0453***
Eye complication	<0.001	1	0.1337
IHD	<0.001	0.3185	0.909
Heart Failure	0.3738	0.5096	***<0.001***
Vascular Disease	<0.001	1	0.3112

Comorbidity	3Aa3 Baseline vs EndPoint
Hypertension	<0.001
Eye complication	0.001955
IHD	0.001508
Heart Failure	<0.001
Vascular Disease	0.0002507

Monday 5th June 16:00 – 17:00

Track A2 – Cardiovascular Disease & Diabetes 2

Poster: 090
Submission: 441

Macrophage accumulation precedes the development of diabetic kidney disease in a mouse model of diabetes.

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Introduction: Diabetic kidney disease (DKD) is a major complication of diabetes and a significant cause of renal failure. Given the increasing prevalence of diabetes globally, there is an urgent need to better understand the mechanisms that lead to the development of DKD to inform new treatments. Increased numbers of macrophages are found in the kidneys of patients with DKD and in rodent models of DKD. The aim of this project was to characterise macrophage accumulation in the mouse kidney following the initiation of type I diabetes.

Methods: Six-week-old male DBA/2J mice were administered streptozotocin (STZ, 40mg/kg for five days) or vehicle only. Blood glucose levels were monitored weekly. Urine and kidneys were collected five (vehicle n=5, STZ n=6) or twelve (vehicle n=5, STZ n=9) weeks after streptozotocin administration. Single cell suspensions from control and diabetic kidneys were analysed by flow cytometry to assess the prevalence of bone marrow-derived (CD11b+F4/80lo) and kidney-resident (CD11b+F4/80hi) macrophages and the expression of markers relevant to their function (Ccr2, Timd4, Lyve1, Cd206).

Results: All STZ-administrated mice developed diabetes (blood glucose levels >250mg/dL) within three weeks. Five weeks post STZ, there was no difference in body weight, kidney weight or glomerular area, but kidney to body weight ratio was significantly increased ($p<0.01$) in diabetic compared to control mice. Urinary albumin levels were 142.0 ±9.0 µg/24h in diabetic mice compared with 52.3 ±22.6 in control mice ($p<0.05$). There was a significant increase in the number of bone marrow-derived macrophages in diabetic compared with control kidneys ($p<0.05$) with a concomitant reduction in the proportion of bone marrow-derived macrophages that were CCR2+ ($p<0.01$). The number of kidney-resident macrophages was also increased in diabetic compared with control kidneys ($p<0.05$) with no changes in the proportion of kidney-resident macrophages expressing Timd4, Lyve1 or Cd206. Twelve weeks post STZ, diabetic mice had reduced body weight ($p<0.0001$) and kidney weight ($p<0.05$) and increased kidney to body weight ratio ($p<0.01$) and glomerular area ($p<0.05$) compared with control mice. Urinary albumin levels in diabetic mice increased to 337.5 ±16.0 µg/24h and were significantly higher than in control mice (62.7 ±15.3; $p<0.0001$). There was no difference in the number of bone marrow-derived macrophages in the kidney. The number of kidney-resident macrophages was significantly increased ($p<0.001$) and there was a reduction in the proportion of kidney-resident macrophages expressing Timd4 ($p<0.05$), Lyve1 ($p<0.01$) or Cd206 ($p<0.05$) in diabetic compared with control kidneys.

Discussion: The onset of type I diabetes in mice is associated with accumulation of bone marrow-derived and kidney-resident macrophages in the kidney. Increased numbers of kidney-resident macrophages persist in the early stages of disease progression and are accompanied by changes in marker expression that may be associated with distinct macrophage functions. Macrophages may therefore represent an ideal target for early therapeutic intervention in diabetic kidney disease.

Monday 5th June 16:00 – 17:00

Track A2 – Cardiovascular Disease & Diabetes 2

Poster: 091
Submission: 448

Safety of SGLT2 inhibitors in patients with heart failure and chronic kidney disease

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Introduction: Heart failure (HF) is increasingly common in patients with chronic kidney disease (CKD), with increased mortality and hospital admissions.

Sodium glucose cotransporter 2 (SGLT2) inhibitors have gained popularity in the treatment of patients with HF and CKD. However, there has been little research into the safety of SGLT2 inhibitors on renal function in this cohort of patients, particularly in those with severe CKD (eGFR<30 ml/min/1.73m2).

Methods: Data on all patients with both HF and CKD who were initiated on SGLT2 inhibitors since January 2021 to September 2022, followed till January 2023, from a novel CKD heart failure clinic were retrospectively collected from patient's electronic records, including baseline renal function and HbA1c, the medication start date, and recent renal function and HbA1c values. Patients who died between the initial and most recent assessments were excluded from the data analysis. The aim was to assess any significant decline in renal function and any adverse events from the drug e.g., UTI, diabetic ketoacidosis, and amputations, particularly in patients with eGFR<30 ml/min/1.73m2. The study was approved as a clinical audit by the hospital clinical unit department.

Results: A total of 67 patients with HF and CKD were included in the study with a median follow up of 371 (IQR 266-462) days. Within this cohort, 31 patients had CKD stage 4, five patients had CKD stage 5, and five were renal replacement therapy (four on haemodialysis, one on peritoneal dialysis.)

Death from cardiovascular events, recurrent ventricular tachycardia and dilated cardiomyopathy, occurred in two of the 67 patients (3.0%). Adverse reactions such as infection occurred in six of the 67 patients (9.0%), with four being urogenital tract infections (6.0%).

There were no significant changes in renal function among the patients, with the mean baseline creatinine being 196 mmol/L and the recent creatinine being 203 mmol/L (95% CI, -24.04 to 11.17; P=0.468). However, there was a numerical decrease in HbA1c in 44 patients, particularly among patients with eGFR< 30 ml/min/1.73m2, with a difference in the mean of 9.88 mmol/mol (95% CI, -1.02 to 20.78; P=0.073), however the data was not statistically significant. There were no other adverse events such as amputations or diabetic ketoacidosis during this follow-up.

Conclusion: On approximately a year of follow-up, SGLT2 inhibitors had no significant changes in renal function among patients with CKD and HF, including the cohort of patients with CKD stages 4 and 5, with numerical improvement in blood glucose levels and a low rate of diabetic adverse events.

Monday 5th June 16:00 – 17:00

Track B1 – Case Reports 1

Poster: 092
Submission: 106

Disseminated Mycobacterium chelonae infection in kidney transplant patients: A case series.

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Introduction: Mycobacterium chelonae(M.chelonae), a member of the rapidly growing non-tuberous mycobacteria, can cause localised skin, joint and soft tissue infections in immunocompetent patients. In immunocompromised patients, M.chelonae tends to cause disseminated infection of soft tissue, predominantly in the limbs. However, these are rare with an estimated prevalence of 0.2 cases per 100,000. We present two cases to highlight this.

Methods: Records of two patients with kidney transplants were reviewed. We describe the background kidney disease and transplantation characteristics, along with the use of immunosuppressive medication. We also discuss presentation of M.Chelonae infection and the treatment received by those patients.

Results: Both patients are Caucasian, the first male, aged and the second female, aged . They both received deceased brain dead donor (DBD) kidney transplants for end stage kidney disease. They both developed skin manifestations of M.Chelonae and subsequently disseminated infections. Time from kidney transplantation to disease presentation for the two cases were three months and seventeen years, respectively.

Case one was on a low dose of prednisolone (2mg) and tacrolimus, whereas case 2 received higher varying doses of prednisolone(5mg-40mg) and Sirolimus. Immunosuppression regimen consisted of tacrolimus for case 1 and Sirolimus for case 2. Patients received antibiotics regimens as advised by infectious disease within one month of skin lesion appearance and diagnosis. This consisted of clarithromycin, moxifloxacin and azithromycin. Other antibiotics used during spread or flare ups included doxycycline, Linezolid and Tigecycline.

Discussion: These two cases highlighted an important infectious complication in transplant patients and features associated with M.Chelonae infection, including the disseminated nature of infection in immunocompromised patients and skin manifestations with pustular, erythematous rashes and swelling. It is interesting to note that despite rarity, M.chelonae has been reported to cause pulmonary infections as demonstrated in the second case.

In addition these two cases support the efficacy of clarithromycin and azithromycin as long-term antibiotic treatment. They also highlight the benefit of linezolid and tigecycline in symptom management during acute dissemination.

Monday 5th June 16:00 – 17:00

Track B1 – Case Reports 1

Poster: 093
Submission: 122

A single dose of Rituximab as a treatment for Lupus Nephritis (LN) during pregnancy: A case report

Dr Li Jin Ooi, Dr Arvind Ponnusamy, Dr Yuva Ravindran, Dr Charlotte Cox

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Introduction**:** Pregnancy in women with lupus is at higher risk for complications such as pre-eclampsia, preterm birth, stillbirth, intrauterine growth restriction, or thrombosis. Active lupus at the time of conception is known to be the strongest predictor of adverse pregnancy outcomes. We report a case of LN in a pregnant woman who has been treated with a single dose of 1gm Rituximab during the first trimester.

Case report: A 28-year-old woman with known lupus on Azathioprine was referred for a renal biopsy. Following the termination of her pregnancy due to ill health 4 months earlier, she presented to rheumatology with an acute flare-up of lupus with arthralgia, pitting oedema, frothy urine and was found to have proteinuria of 212mg/mmol despite normal renal function.

Renal biopsy showed evidence of Class 3 LN with NIH activity index 3/24 and chronicity index 0/12. However, 2 days after the consultation, she informed us that she was pregnant and was keen to continue the pregnancy. Her complements were low with high dsDNA titre and Urine PCR of 300mg/mmol. Despite discussions regarding concerns that the treatment could affect her pregnancy, she agreed to the risks and proceeded with treatments. Azathioprine was continued and she was given one dose of 1gm Rituximab on the 6th week of her pregnancy without prednisolone.

Complement levels normalized with a reduction of proteinuria (0.6 g) and reduction in dsDNA titer after one dose of 1gm Rituximab around 8 weeks. Her pregnancy remained uneventful. She delivered at 36 weeks and there were no intrapartum or peripartum complications.

The baby's B cells were checked as fetal B cell depletion post-Rituximab therapy in pregnancy is quite a notorious complication. The baby's vaccination was deferred as his B cell count was low.

Discussion: Treatment of LN in pregnancy poses an ongoing challenge as the chances of presumed toxicity and concerns over efficacy in conventional therapies usually lead to discontinuation of treatment.

B cells play a key role in the pathogenesis of lupus. Novel biological therapies, based on B cell elimination, are used in the management of lupus in pregnancy, enabling the reduction of steroid and immunosuppressive treatment. Rituximab, a chimeric anti-CD 20 monoclonal antibody has been proven successful in treating resistant lupus and LN. It depletes B cells which are quintessential for the formation of autoantibodies thereby controlling disease activity.

Rituximab can cross the placenta as it contains an immunoglobulin construct like human IgG. There is a smaller foetal concentration of IgG in the first trimester of pregnancy when compared to the latter two, as mother-to-infant transfer of IgG only begins at week 16 of gestation. Thus, Rituximab was administered in the first trimester. The optimal dosing for rituximab is not known in LN. Our case demonstrated that the use of single-dose Rituximab 1gm with Azathioprine without the need for prednisolone in active LN pregnant women appears to be effective and not harmful as in our case. The single dose appears to deplete CD19 cells throughout the pregnancy.

Monday 5th June 16:00 – 17:00

Track B1 – Case Reports 1

Poster: 094
Submission: 125

Hyper eosinophilia: a multispeciality diagnostic approach

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Aims: Severely increased blood eosinophils (ie, > 5 × 109/L), whether discovered incidentally on a full blood count or found with signs and symptoms of associated organ involvement, warrant diagnostic workup and often therapeutic interventions. Our aim was to systematically evaluate Hyper-eosinophilia and its secondary effects in a patient with Chronic kidney disease.

Methods: The multiple causes of hyper-eosinophilia were grouped by specialty and required a different complement of diagnostic tests (Figure 2)

The initial approach was to screen for secondary causes of hyper-eosinophilia including helminth parasite infections, varied types of adverse reactions to medications, and allergies. This was followed by the evaluation of primary causes such as eosinophil-associated syndromes, such as Eosinophilic granulomatosis with polyangiitis (EGPA), and myeloid and lymphoid neoplasms.

Importantly, we carried out further investigations to assess the eosinophilia-induced injury in the respiratory, cardiovascular, and hepatic systems of this patient. The 2008 WHO diagnostic algorithm of eosinophilic disorders was followed (Figure 1)

Results: Following the exclusion of reactive eosinophilia and primary malignancy with the relevant investigations, the diagnosis of Idiopathic hypereosinophilia syndrome was made.

Importantly, the high eosinophil count in this patient led to secondary effects including pulmonary infiltrates, mild aortic dilatation, and high transaminase levels which were closely followed up.

Discussion: Eosinophils are not to be thought of as unimportant. High eosinophil count and its secondary effects led to the temporary removal of the patient from the renal transplant list. This can have a significant impact on patients' morbidity.

Taking a structured approach to assessment and looking for secondary consequences of hyper-eosinophilia on organ systems is necessary.

Figure 1:

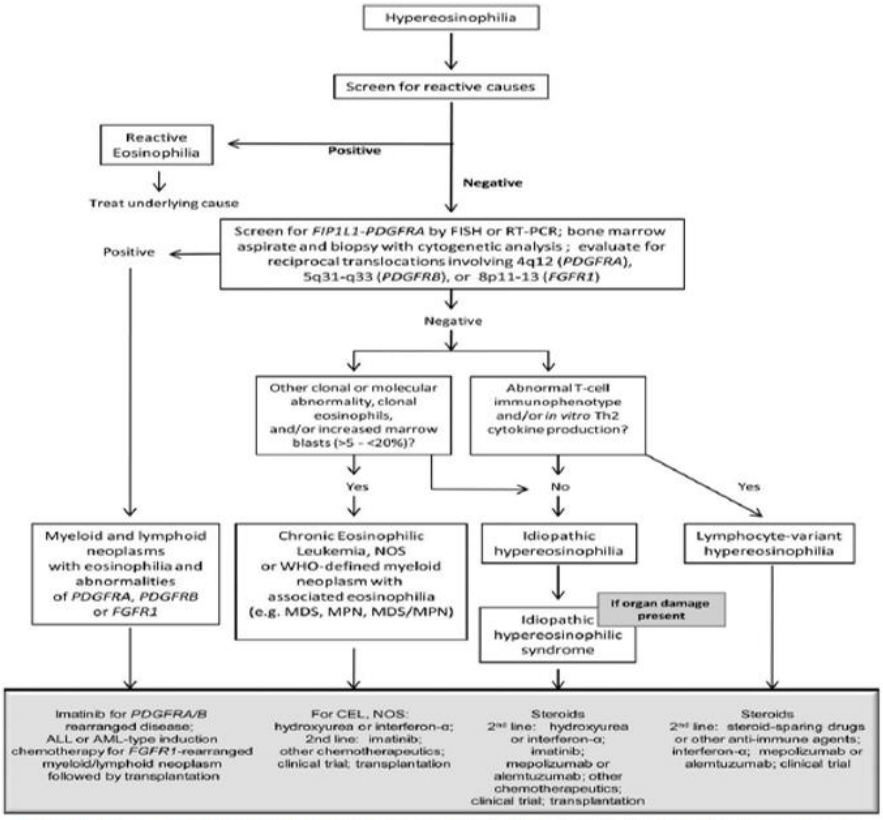

Figure 1. Diagnostic and treatment algorithm based on 2008 WHO classification of eosinophilic disorders.

Figure 2:

Infectious disease
- Strongyloidiasis serology – negative
- Stool MC&S – no parasites or ova seen
- CMV/EBV/Adenovirus PCR negative
- Hepatitis A/B/C serology negative
- HIV serology negative
- Toxoplasma serology negative
- Hepatitis B surface Antigen negative
- Quantiferon negative
- Beta-glucan antigen test negative
- Aspergillus PCR and antigen test negative

Haematology
- Eosinophils 25.99 x 109/L
- ESR 15mm/hour, 40mm/hour
- Ferritin 836 microgram/L
- Serial blood films – normal morphology

Allergy
- Elevated, and increasing total IgE conc. 804 - 495
- Elevated Mast cell Tryptase 19.9 microgram/L

Immunodeficiency
- Total IgG concentration 11.17 (normal)
- IgG subclasses normal
- IgA 1.91 g/L (normal)
- IgM 0.97 g/L (normal)

Rheumatology
- LDH 392 u/L
- p-ANCA negative
- c-ANCA negative
- Atypical ANCA screen negative
- Anti-nuclear, anti-parietal, anti-mitochondrial antibodies – negative
- Anti LKM negative
- Rheumatoid factor <10 IU/L
- C3 and C4 concentration normal

Broncho-alveolar lavage –
- BAL sample (left upper lobe) direct stain for acid/alcohol fast bacilli – not seen, culture negative
- BAL MC&S – Staph Aureus, Haemophilus Influenzae, Moraxella Catarrhalis, Streptococcus pneumoniae, pseudomonas species and Yeast/fungal species – not isolated.
- Pneumocystis Jirovecci screen negative, TB screen negative

Bone marrow aspirate
- No evidence of Myelo-proliferative/Myelo-dysplastic syndrome
- No evidence of acute leukemia

FISH genetic analysis
- FIP1L1-PDGFRA (as suggested by Haematology) – negative

Previous genetic investigations
- Fragile X array – normal
- DFNB1 normal
- NF-1 analysis – no pathogenic variant detected

Echocardiogram
- April 2021 – normal biventricular function
- July 2021 – no LVH, normal function, mild aortic root dilatation
- Ongoing cardiology follow up

Ultrasound abdomen
- Normal appearances of liver, spleen and pancreas

CT Thorax
- June 2021 – right sided diffuse ground glass opacification most marked at lung apex and sub pleural right lower lobe. The findings are not classical for an acute Eosinophilic pneumonia. A drug related etiology may be likely.
- April 2022 – almost complete resolution of previous parenchymal abnormality. No chronic feature of eosinophilic lung disease identified.

Spirometry April 2022 – normal

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Monday 5th June 16:00 – 17:00

Track B1 – Case Reports 1

Poster: 095
Submission: 126

Hepatic peliosis in a renal transplant patient secondary to the oral contraceptive pill

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Introduction: Hepatic Peliosis (HP) is a rare condition characterized by the presence of multiple cyst-like, blood-filled cavities within the liver parenchyma. It can be rarely associated with use of estrogen containing contraceptive pills (EOCP). Here we report a case of HP in a young transplant patient on Norethisterone, which belongs to progestogen class but undergoes partial conversion to ethinylestradiol in vivo. The lesions regressed in size after the medication switch to Desogestrel (progestogen only pill).

Case report: A 24 year-old woman had a background medical history of VACTERL syndrome-associated Mullerian agenesis, imperforate anus and cross-fused renal ectopia leading to end stage renal failure. She had received two renal transplants, in 2005 and 2019 respectively. The immunosuppression comprised Tacrolimus, Mycophenolate Mofetil, and Prednisolone but never included Azathioprine. She was also on Norethisterone to suppress menstrual bleeding as she was born without a cervix. 18 months after her second transplant she presented with abdominal pain and fullness associated with a drop in haemoglobin (Hb) of 24 g/l but no evidence of overt bleeding. Liver function tests were normal. CT angiogram of the splanchnic circulation showed multiple hepatic lesions enhancing in the arterial phase and with evidence of venous bleeding in some. These lesions had been known to the team at the transplant centre following her second graft and deemed to be transplant-related HP. On comparing with those previous images, the lesions appeared to be progressive both in size and number and felt likely contributing to her anaemia. Hepatology and gynaecology opinions were taken, and a clinical diagnosis of HP secondary to Norethisterone was made. It was switched to Desogestrel and repeat imaging at 6, 12, and 24 months showed regression of her lesions; her Hb remained stable.

Discussion: Conditions known to be associated with HP include chronic infectious diseases (e.g. Brucellosis, Tuberculosis, AIDS, Bartonella, leprosy), chronic alcoholism, malignancy, intravenous drug abuse, organ transplant-related immunosuppression (particularly azathioprine), and sex steroids (androgens, EOCPs). Clinical manifestations range from incidental findings to advanced liver failure. Histopathology can confirm the diagnosis but carries a significant bleeding risk. In the appropriate clinical context imaging techniques (including ultrasound, CT, MRI, hepatic scintigraphy, hepatic angiography) can be sufficient to establish the diagnosis. Hypothesised pathogenetic mechanisms include: congenital malformation of vessels, microcirculatory disturbances precipitated by alterations in local intravascular pressure, or acquired vascular disorders triggered by toxin exposure. HP is well described in renal transplant patients, but no reliable data are available regarding prevalence. Amongst transplant medications, the published literature suggests Azathioprine to be the commonest associated agent. There is no specific treatment for HP apart from treating any identified underlying cause including removal of offending toxins. Vascular intervention such as embolization and surgery may be required in patients with bleeding complications.

Conclusion: The likely cause of HP in this case was Norethisterone use rather than transplant-related immunosuppression. This is supported by the fact that she had never been on Azathioprine and the lesions regressed significantly after Norethisterone withdrawal.

Monday 5th June 16:00 – 17:00

Track B1 – Case Reports 1

Poster: 096
Submission: 128

AL amyloidosis: An unusual case of crescentic glomerulonephritis

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Introduction: Renal amyloidosis typically presents with nephrotic-range proteinuria and may be confirmed by the presence of Congo Red positive fibrils deposited within glomeruli +/- interstitium and blood vessels. In extremely rare cases, amyloid deposition can be associated with crescentic GN, presenting as rapidly progressive glomerulonephritis (RPGN).

Case: A 64 year old man with a history of maternally-inherited cutaneous amyloid manifesting as a waxy, papular rash over his legs since his teens, presented with severe acute kidney injury, nephrotic syndrome and microscopic haematuria. No other symptoms or signs of systemic amyloid were elicited.

Investigations**:** Initial serologic testing for causes of RPGN were negative. Renal biopsy showed 90% active cellular crescents with Congo red–positive staining in glomeruli, with an associated foreign body macrophage response. Electron microscopy demonstrated sub-endothelial deposits and amyloid fibrils traversing the Glomerular Basement Membrane (GBM). Haematological investigations demonstrated 10-fold excess of serum Lamda light chains and 11% plasma cell infiltration on bone marrow aspirate. Serum amyloid P-component (SAP) scan confirmed amyloid deposit limited to the kidneys with no other visceral uptake.

Management and outcome: The patient was treated with high dose oral prednisolone followed by 2 cycles of Velcade, Cyclophosphamide and Dexamethasone (VCD) chemotherapy. Renal function continued to deteriorate despite treatment and he was commenced on haemodialysis four months after initial presentation.

Discussion**:** Only 5 previous cases of renal amyloid presenting as RPGN and crescentic GN have been reported; mostly associated with rheumatoid arthritis and AA amyloid. This is the first description in AL amyloidosis associated with cutaneous amyloid. In previous cases the crescentic GN is postulated to occur as a consequence of amyloid infiltration of the GBM resulting in rupture of the membrane and serum exudation into the urinary space. Histological findings in this case support this aetiology.

Conclusion**:** Renal amyloidosis can present as RPGN with crescent formation and should be considered in crescentic GN without serological markers of vasculitis.

Monday 5th June 16:00 – 17:00

Track B1 – Case Reports 1

Poster: 097
Submission: 153

Safe use of secukinumab as an alternative to adalimumab in a patient with adalimumab-induced Immunoglobulin A (IgA) nephropathy: A case report

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A wide variety of biological agents is available to treat immunological diseases. They include anti-tumour necrosis alpha (TNF-α) such as adalimumab, anti-interleukin (IL)17-A antibody-like secukinumab. This case report describes the use of secukinumab in a patient with psoriatic arthritis who previously had adalimumab-induced IgA nephropathy.

Case Scenario: A 53-year-old female with psoriatic arthritis was treated with adalimumab (Humira)® in October 2013 under the care of the rheumatology team. (Humira)® was changed to Imraldi® (a brand of adalimumab) from May – June of 2019. She presented to the local hospital in July 2019 with bilateral lower limb rashes, pedal oedema, and acute kidney injury. Serum creatinine level was 131mmol/l (from baseline 73mmol/l).The patient was referred to the renal team for further opinion.

On review by the renal team, urine dipstick was positive for protein (3+) and blood(3+). Further investigations revealed a urine protein creatinine ratio (UPCR) of 277mg/mmol. Autoimmune screen and myeloma screen were negative. The ultrasound imaging of both kidneys was normal.

Renal biopsy was done. Adalimumab, sulphasalzine and omeprazole were stopped. The renal biopsy was performed and showed IgA nephropathy, acute tubular injury, and tubulointerstitial nephritis on a background of moderate chronic tubular interstitial damage.

The rheumatology team restarted (Imraldi®) in October 2019 as the patient's rheumatology symptoms were not controlled. On restarting adalimumab, serum creatinine increased to 248 mmol/l. She was reviewed in the renal clinic in November 2019, her UPCR was 397 mg/mmol . She was started with high dose steroid (Prednisolone 60mg OD) and an angiotensin-converting enzyme (ACE) inhibitor (ramipril) started after creatinine improved.

Subsequently, the decision of stopping adalimumab was made after a discussion between the rheumatology and the renal teams. On subsequent renal clinic review, Her proteinuria improved and became negative (UPCR 39 mg/mmol). Also, serum creatinine improved to around 180 mmol/l. Her steroid dose was slowly weaned down to a maintenance dose 5 mg.

She was asymptomatic until August 2020, when she presented to the rheumatology clinic with multiple joint pain. The rheumatology team discussed with the renal team regarding the treatment of choice of her psoriatic arthritis in the context of previous adalimumab-induced IgA nephropathy.

The patient was started on secukinumab in September 2020 upon advice from the renal team. Regular follow-ups with both teams were done to monitor her symptoms, kidney function, and proteinuria. Since treatment initiation until now (29 months), there was good control of symptoms, stable kidney function, and no proteinuria. Serum creatinine levels were around 160-180 mmol/l and urine protein creatinine ratio < 30 mg/mmol.

Conclusion: Secukinumab use did not cause a flare of IgA nephropathy over 29 months of treatment. It was effective as well in controlling symptoms of psoriatic arthropathy. It was a good substitute for adalimumab which induced IgA nephropathy. Monitoring of renal function and urine testing are highly recommended during biological drug therapy. A registry is needed to collect more data about biological drug renal complications and safety .

Monday 5th June 16:00 – 17:00

Track B1 – Case Reports 1

Poster: 098
Submission: 186

Tacrolimus and clarithromycin co-prescribing in renal transplant patients: a case series highlighting the impact of this drug-drug interaction.

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Introduction: Tacrolimus is a first line anti-rejection drug prescribed for kidney transplant recipients. It has a narrow therapeutic window, necessitating regular monitoring of blood levels to prevent organ rejection and minimise drug toxicity, and is known to have multiple potential drug interactions.

The drug interaction between the macrolide antibiotic clarithromycin and tacrolimus is clinically significant, and well established. The Summary of Product Characteristics advises that when potential inhibitors of CYP3A4, such as clarithromycin are combined with tacrolimus, tacrolimus blood levels should be monitored, and its dose adjusted appropriately.

We investigate whether this represents safe practice and if a move towards avoiding this combination is warranted.

Method: Retrospective review of 12 incidents of clarithromycin/tacrolimus co-prescription using clinical databases and medical notes.

Measured outcomes:

- Tacrolimus and creatinine levels pre/post antibiotic.
- Impact on kidney function long term, compared to pre-antibiotic baseline.
- Prescriber setting.
- Adverse event management.

Results: Pre-antibiotic baseline tacrolimus levels: 3.3 - 9.4 mcg/l (local reference range 5-8mcg/l).

Concomitant treatment with clarithromycin 500mg bd (course lengths: 1 dose to 14 days) resulted in:

Change in tacrolimus level.	Number of patients (n=12)
Severe (level > 20mcg/l)	7
Moderate (level 15-20mcg/l)	3
Mild (level 10-15mcg/l)	1
Unrecorded tacrolimus level	1

Of the 12 patients 10 had increases in creatinine, ranging from 20% to 110% change from baseline. Of the remaining 2 patients 1 had no discernible change in kidney function and 1 was a dialysis patient prior to treatment.

Kidney function recovered in all 10 patients with cessation of the antibiotic, appropriate monitoring and tacrolimus dose adjustment.

Antibiotic treatment for 5 patients began in a hospital setting and 7 in an outpatient setting.

Of the 7 that were commenced in an outpatient setting 3 were further managed during hospital admission and 4 were managed via transplant clinic.

Prolonged hospital admission, associated with this interaction, was required in 4 patients.

Discussion: Whilst the interaction between clarithromycin and tacrolimus is well documented and there is evidence of an increased risk of hospitalisation when the two are co-prescribed, the drug combination continues to be employed in both primary and secondary care settings.

Our investigation showed that even short courses can result in unpredictable and at times severe changes in tacrolimus levels and lead to a substantial increase in creatinine levels.

In our cohort kidney function did return to baseline but, in some cases, management required hospitalisation and/or a prolonged hospital stay, a substantial impact for an avoidable drug interaction.

This interaction also has implications for specialties outside of renal transplantation, and for patients on alternate calcineurin (CNI) inhibitors such as ciclosporin or sirolimus.

It would be our recommendation that co-prescribing of clarithromycin and CNI inhibitors be contraindicated. Greater awareness of the serious effects of this interaction is needed amongst patients and healthcare professionals in all sectors. Cases of patients affected by this drug-drug interaction must be raised at a national level by reporting to an adverse drug reaction reporting scheme.

References

Available on application.

Monday 5th June 16:00 – 17:00

Track B1 – Case Reports 1

Poster: 099
Submission: 192

A case report: Caecum perforation secondary to migration and erosion from dormant peritoneal dialysis catheter

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Peritoneal dialysis (PD) is an effective home-based dialysis therapy for patients with end-stage renal disease (ESRD), and accounts for 11% of all dialysis globally. Bowel perforation is a recognised serious complication, usually associated with PD catheter insertion. Delayed bowel erosion by PD catheter is extremely rare with only few cases reported in literature to date. We herein present an unusual case of caecum perforation secondary to migration and erosion from dormant PD catheter following hernia repair.

A 72-year-old gentleman with ESRD secondary to polycystic kidney disease was commenced on PD a year ago. His other significant medical history included myocardial infarction requiring coronary stents and diverticular disease. As he developed right inguinal hernia 10 months after commencement of PD, he underwent an elective surgical repair of the hernia that necessitated temporary suspension of his PD treatment. He was advised to perform weekly catheter flushes at home. Six weeks following hernia repair, he developed mild abdominal pain with PD catheter flush. He subsequently noticed faecal contents in PD effluent fluid and watery 'diarrhoea' immediately after PD catheter flush. His PD effluent fluid was cultured positive for enterococcus faecium and Eschericia coli.

He was therefore admitted to the renal ward with sepsis but had no clinical signs of acute abdomen or bowel obstruction. CT scan showed PD catheter coiled in right iliac fossa along the caecal pole with a small fluid collection suspicious of bowel communication. Methylene blue dye injected into PD catheter was noted immediately per rectum, confirming bowel erosion by PD catheter.

He was treated with intravenous antibiotics for caecum perforation secondary to migration and erosion of dormant PD catheter and PD peritonitis. Haemodialysis (HD) was commenced via right internal jugular catheter. Due to his recent cardiac event, he was initially managed conservatively as the anaesthetic and surgical risks were considered to be excessive.

However, his sepsis worsened despite escalating antimicrobial treatment throughout his two-week admission. Repeat CT scan and catheterography showed no intra-abdominal collection but confirmed persistent erosion of PD catheter into caecum. He underwent mini laparotomy, PD catheter removal and formation of a controlled caecostomy at day 19 of admission. Post operatively, the caecostomy had minimal output. His recovery was uneventful, with his pyrexia and inflammatory markers settling after extended course of antibiotics. He was eventually discharged home after 38 days and transitioned to in-centre maintenance HD.

In summary, delayed bowel perforation by PD catheter was an uncommon complication that often presents with watery diarrhoea at time of PD inflow and PD peritonitis. Dormant PD catheter and polycystic kidney disease in our case might have contributed to the increased risk of the bowel erosion, in line with findings of previous studies. Despite high anaesthetic risks, surgical intervention was crucial for the recovery of the case.

Monday 5th June 16:00 – 17:00

Track B1 – Case Reports 1

Poster: 100
Submission: 243

Case Series: Successful treatment of Ganciclovir-resistant (GCV-R) Cytomegalovirus (CMV) infection in three kidney transplant recipients by reduction of immunosuppression and discontinuation of Valganciclovir.

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Cytomegalovirus (CMV) infection is a frequent opportunistic infection following kidney transplantation. Both CMV disease and asymptomatic replication are associated with increased morbidity, mortality and graft loss. Resolution of infection is a consequence of the synergistic action of anti-viral drugs and an efficient immune response. Ganciclovir (GCV) and its oral pro-drug Valganciclovir (VGCV) are currently first-line agents to prevent and treat CMV infection. Ganciclovir resistant (GCV-R) CMV has been increasingly reported in solid organ transplantation, however there is currently no clinical trial data on optimal management. The two common gene mutations conferring resistance are UL97 and UL54. Studies have shown that the risk of developing GCV-R CMV is associated with several factors including prolonged exposure to Ganciclovir. The usual strategy for treating GCV-R CMV infection is to use the second-line agents Cidofovir and Foscarnet (both associated with significant toxicities) and more recently Maribavir. However, a therapeutic strategy involving withdrawal of (Val)ganciclovir along with reduction in immunosuppression in patients with refractory CMV replication has not been explored.

We describe three patients who underwent kidney transplantation from CMV-positive deceased donors. One seronegative recipient received prophylaxis with Valganciclovir post-transplantation. All developed CMV syndrome, on average 40 days post-transplant. One patient developed a chronic inflammatory demyelinating polyneuropathy requiring treatment with intravenous immunoglobulin (IVIG). In all cases, immunosuppression was adjusted with withdrawal of Mycophenolate mofetil. The initial episode of viremia was treated with eGFR-adjusted doses of intravenous GCV or oral VGCV. A persistent/increasing viral load following > 4 weeks treatment led to resistance testing. A UL97 mutation was identified in all three cases, one recipient demonstrating an additional UL54 mutation. GCV-R was diagnosed on average 160 days post-transplantation. Given the persistent CMV viraemia despite prolonged treatment with adequate doses of VGCV, we decided to withdraw VGCV while closely monitoring CMV viral load. The mean time to a 50% reduction in viral load following withdrawal of VGCV was 60 days. Figure 1 demonstrates changes in CMV viral load in the patients after initial treatment, development of GCV resistance and clearance of CMV viraemia following cessation of VGCV. These cases demonstrate that in patients who have been treated for CMV disease but have persistent GCV-resistant viraemia without evidence of invasive CMV disease, VGCV withdrawal could be an initial therapeutic strategy rather than commencement of second-line drugs. Since Ganciclovir resistance is an adaptive process, we propose that discontinuing Ganciclovir significantly reduces selection pressure for UL97 mutants. As resistance mutations are often not maintained in the population after drug cessation, we believe the patients' own immune system was able to clear CMV viraemia, perhaps aided by the improvement in white cell count

on termination of Valganciclovir. This approach potentially promotes re-population with 'wild type' Ganciclovir-sensitive strain which may respond to subsequent challenge with GCV. Further studies are needed to explore these observations to inform our understanding of CMV drug resistance and enable judicious use of available therapeutics.

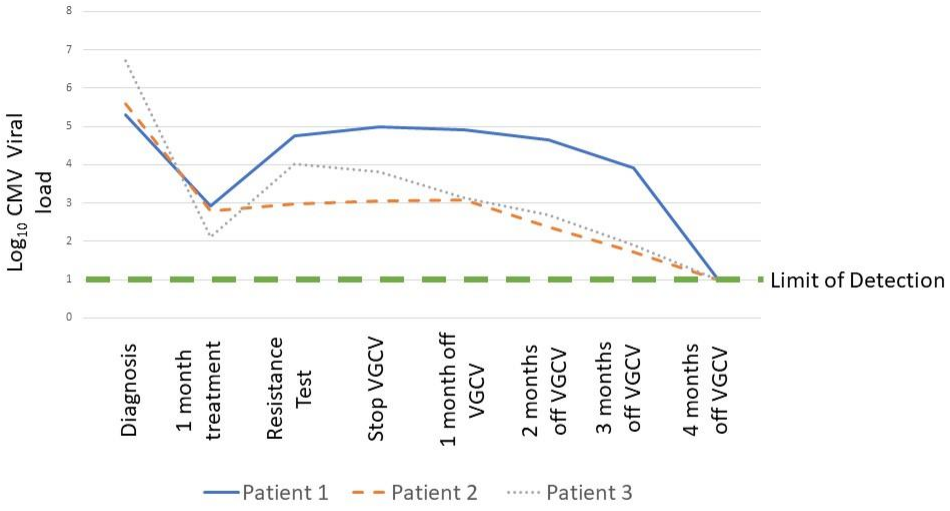

Figure 1: Changes in CMV viral load on treatment with Valganciclovir, development of GCV-R and withdrawal of VGCV in 3 patients.

Monday 5th June 16:00 – 17:00

Track B1 – Case Reports 1

Poster: 101
Submission: 244

"Modified" Euro-Lupus regime

Dr Shaw Kang Liew, Dr Li Jin Ooi, Dr Arvind Ponnusamy

Royal Preston Hospital, Preston

Background: Systemic lupus erythematosus (SLE) is an autoimmune disease, characterized by the formation of autoantibodies that subsequently leads to end-organ damage. Lupus nephritis is one of the most common complications of SLE. We report a case of lupus nephritis in a woman who was treated with a novel treatment regimen (4 doses of Cyclophosphamide and 2 doses of Rituximab).

Case: A 16-year-old female was referred to the renal department following a presentation with chest pain and decline in renal function. Her serum creatinine on presentation was 120 µmol/L from baseline creatinine of 60 µmol/L and she had haematoproteinuria (urine PCR 245 mg/mmol). CT imaging and echocardiogram showed pericardial and pleural effusion suggestive of serositis. Other extrarenal manifestations include arthralgia and skin rash a couple of years ago. Her immunology screen was positive (anti-dsDNA >379 IU/ml) and complement levels were low (C3 0.38 g/L and C4 <0.03 g/L). SLE was suspected and subsequently confirmed on renal biopsy which demonstrated Class IV Lupus nephritis with an activity index of 4/24 and chronicity index of 0/12.

She was given one dose of IV Methylprednisolone (250 mg) on the day of her renal biopsy, followed by 30mg Prednisolone once daily. With the results of her biopsy, she was counselled and then commenced on a modified Euro-Lupus regime, whereby the four doses of Cyclophosphamide 500mg were given every two weeks followed by two doses of Rituximab 1g fortnightly. Prednisolone dose was then weaned gradually after the 4th dose of Cyclophosphamide. Shortly after the course of treatment, her renal function returned to baseline with resolution of proteinuria (12 mg/mmol) and hypocomplementaemia (C3 0.78 g/L and C4 0.15 g/L). She was commenced on Mycophenolate Mofetil (500 mg twice daily) with plans to titrate it up to 750 mg twice daily.

Discussion: Standard induction therapy for lupus nephritis class III/IV comprises glucocorticoid and selection of either calcineurin inhibitors, mycophenolic acid analogs, Cyclophosphamide or B-cell depleting agents. Conventionally, Rituximab is usually considered for patients with persistent disease activity or repeated flares. In our case, the presence of multisystem involvement prompted an aggressive approach amidst patient's concerns regarding fertility at her young age. Instead of the standard Euro-lupus regimen, we opted to replace the last 2 doses of Cyclophosphamide with Rituximab due to a preferable side effect profile and a reduced dose accumulation of Cyclophosphamide. She received a dose of leuprorelin prior to treatment whilst anti-Mullerian hormone was satisfactory. She achieved serological remission after treatment without major adverse events.

Conclusion: This combined therapy could be considered as an alternative to standard induction regimen but further prospective studies would be required to evaluate its long term outcome.

Monday 5th June 16:00 – 17:00

Track B2 – Case Reports 2

Poster: 102
Submission: 246

Rituximab + Cyclophosphamide in PLA2R membranous nephropathy (MN)

Dr Shaw Kang Liew, Dr Li Jin Ooi, Dr Arvind Ponnusamy

Royal Preston Hospital, Preston

Background: Membranous nephropathy (MN) is among the most common causes of nephrotic syndrome (NS) in non-diabetic adults. Anti-phospholipase A2 receptor (PLA2R) antibodies are present in approximately 70-80 % of patients with primary MN. High antibody levels are associated with an increased risk of progressive renal impairment and a lower risk of spontaneous remission. We report 2 cases of PLA2R positive membranous nephropathy that were treated with 2 doses of Rituximab and 4 weeks of oral Cyclophosphamide.

Case 1: A 66-year-old gentleman with known membranous nephropathy since 2009 was referred to the renal department after moving to the UK from Hong Kong. Initial investigations showed urine PCR of 20 mg/mmol, negative anti-PLA2R antibodies, creatinine of 98 µmol/L and albumin of 42 g/L. He previously had a negative PET CT scan and relapsed once in 2014, requiring high-dose Prednisolone. Since then, remission was maintained with Tacrolimus 1 mg OD, Prednisolone 5 mg OD and Enalapril 15 mg OD.

Given that he was in prolonged remission, we decided to wean his immunosuppression by stopping Tacrolimus and gradually reducing his Prednisolone. Unfortunately within the next month, he relapsed with new onset ankle swelling, urine PCR of 211mg/mmol, anti-PLA2R antibodies of 82 RU/ml, creatinine of 111 µmol/L and albumin of 33 g/L. He was given two doses of Rituximab 1g fortnightly but did not enter remission. There was ongoing proteinuria (urine PCR 459 mg/mmol), anti-PLA2R 21 RU/ml and an albumin of 25 g/L. A decision was then made to give 4 weeks of 100 mg oral Cyclophosphamide. Following the combined course of treatment, his anti-PLA2R antibodies were undetectable (5 RU/mL) and urine PCR was 129 mg/mmol. He also had leucopenia 1 month after completion of treatment, but this resolved spontaneously.

Case 2 : A 56-year-old lady presented with NS (urine PCR 2894 mg/mmol, albumin 29 g/L and anti-PLA2R antibodies 305 RU/ml). She was initially treated conservatively owing to normal renal function. Anti-PLA2R antibodies and urine PCR progressively worsened to 447 RU/ml and 1352 mg/mmol respectively after 2 months of conservative management. She was given 2 doses of Rituximab 1 g fortnightly and 4 weeks of 100 mg oral Cyclophosphamide and subsequently her anti-PLA2R antibodies became negative (8 RU/mL).

Discussion: Many patients with primary MN and NS will develop spontaneous remission. Decision for immunosuppressive therapy is guided by the risk evaluation of disease progression using both clinical and immunological parameters. Both of our patients are deemed high risk owing to high anti-PLA2R antibodies (ELISA titres) which are associated to lower likelihood of spontaneous remission and higher

likelihood of non-response to Rituximab. Therefore, we considered 4 weeks of oral Cyclophosphamide therapy after 2 doses of Rituximab. The combination was reasonably well tolerated with no major adverse events experienced to date.

Conclusion: This experimental combined therapy could pave the way for consideration of alternative induction regimen but would require further prospective studies to evaluate its long term efficacy.

Monday 5th June 16:00 – 17:00

Track B2 – Case Reports 2

Poster: 103
Submission: 259

Favipiravir for the treatment of Chronic Norovirus Infection in Kidney Transplantation – a case study describing clinical experience with a new option for drug therapy

Mr Rob Bradley, Dr Sarah Browne, Dr Pramod Nagaraja, Dr Sian Griffin, Mrs Sharon Warlow, Mrs Beth Travers, Dr Jaisi Sinha, Dr Susie Froude, Mrs Sam Ray

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Introduction: Norovirus infection is the most common cause of acute gastroenteritis worldwide. For immunocompromised hosts, chronic infection can follow, with months to years of persistent diarrhoea, malabsorption and weight loss.

In kidney transplant recipients, chronic norovirus infection is associated with reduced allograft function.

Current treatment options have minimal evidence base; reduction in immunosuppression intensity is most common intervention.

Favipiravir has demonstrated activity against Norovirus in vitro and in animal models.

A case study using Favipiravir (dose 6000mg day one then 1200mg BD) in an immunology patient outlined benefits in terms of symptoms and viral load.

Our patient is a 56 year old female who received HLA incompatible live donor kidney transplant June 2012. She first experienced diarrhoea in 2018; Norovirus was detected in stool samples August 2019 and has persisted since then. This has led to weight loss and, at worst, severe daily exacerbations such that she was unable to leave the house due to unpredictable watery diarrhoea and abdominal pain.

Methods: This complex case was discussed extensively with virology and immunology. A Favipiravir trial was agreed after other Norovirus treatment options were unsuccessful or ruled out – eg, we agreed with patient a mycophenolate dose reduction but further immunosuppression changes regarded as too high risk for rejection.

Results:

Date	*Creatinine (micromol/L)*	*eGFR (ml/min)*	*Tacrolimus (ng/ml)*	*Weight (Kg)*	*LFTs*
23/08/19	92	55	9.3	71	N
07/09/20	105	47	7.3	-	N
29/10/21	98	51	5.8	-	N

25/07/22	138	34	5.2	64	N
11/11/22	107	46	5.7	63	N
22/12/22	115	42	5.2	63	N
06/01/23	115	42	4.8	65	N
Aug 2019	Norovirus RNA detected on molecular enterics				
11/11/22	Urate 530 micromol/L (range 140 – 360)				

Date	*Antirejection drugs*	*Norovirus therapy*
Baseline	Tacrolimus 3.5mg BD plus Mycophenolate Sodium 360mg BD plus Prednisolone 5mg OD	
April 2021		Cholestyramine 4mg BD then OD then stopped as not tolerated
30/06/2022		Nitazoxanide 500mg BD for 1 month (no benefits seen)
22/08/2022	Reduce Mycophenolate 360mg am 180mg pm	
29/09/2022	Reduce Mycophenolate 180mg BD	
14/11/2022		**Start Favipiravir 3000mg BD for 1 day then 1200mg BD**

The patient reported significant improvement in diarrhoea symptoms within a week of commencing Favipiravir and by January 2023 had complete resolution accompanied by a 2kg gain in weight. She has described the treatment as transformative for her quality of life.

No abnormalities on blood tests and drug well tolerated. Patient noticed a green/yellow colour in the urine and the nail beds since starting treatment. Also joint pain in hand – gout is a possibility as blood urate levels were high pre-Favipiravir and the drug is reported to increase uric acid.

Discussion: Primary outcome of resolving chronic norovirus related diarrhoea has been achieved indicating Favipiravir efficacy. However, it must be acknowledged that immunosuppression had been reduced in the preceding months which could be contributing to the clinical picture.

Favipiravir therapy continues, to target clearance of the norovirus from the patient's gut. Stool samples will be checked at future clinic appointment and if norovirus RNA not detected consistently, treatment will stop.

Monday 5th June 16:00 – 17:00

Track B2 – Case Reports 2

Poster: 104
Submission: 273

Nephrotic syndrome (minimal change disease) in a patient treated with Ustekinumab for ulcerative colitis

Dr Mohammedelnour Ishag, Dr Mukesh Kumar, Dr Hemali Kanji

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Introduction: Ustekinumab is a targeted monoclonal antibody against interleukin (12 & 23). It is approved for psoriasis, Crohn's disease, and Ulcerative Colitis (UC). It may increase the risk of infection, and cause some skin cancers, allergic reactions, and a rare condition called Posterior Reversible Encephalopathy Syndrome (PRES). Although there is no case report about Ustekinumab-induced Minimal Change Disease (MCD), there are case reports of Crescentic IgA nephropathy and Focal Segmental Glomerulonephritis (FSGN) associated with Ustekinumab use.

Case Report: 31-year-old male with a history of multiple autoimmune diseases: Type 1 Diabetes Mellitus, Ulcerative Colitis, Coeliac disease, Graves' disease with radioiodine-induced Hypothyroidism, and history of transient Myasthenia gravis. He has had active colitis that failed to respond to Adalimumab, hence he was commenced on eight-weekly Ustekinumab for six months. He remained symptomatic on the standard dose of Ustekinumab with high faecal Calprotectin. The disease was proved by colonoscopy. A baseline liver function and renal function tests were normal, and a urine albumin creatinine ratio (U ACR) of 11 milligrams/ millimole. The Gastroenterology team escalated the dose of Ustekinumab to four-weekly subcutaneous injections. One month after the last dose of Ustekinumab, he was admitted with shortness of breath and features of fluid retention. His investigations showed UACR of 477.4 milligrams/ millimole, creatinine of 78 micromole/liter, serum albumin of 24 grams/liter, serum cholesterol of 8 millimole/liter, TSH of 23 milliunit/ Litre, HbA1C of 44 millimole/mole and CRP of <4 milligrams/liter. The kidney Ultrasound was unremarkable. At that stage, the renal team was involved, and a diagnosis of nephrotic syndrome was made. He was commenced on high-dose Prednisolone (60 milligrams daily), low molecular weight heparin, intravenous Furosemide, and fluid restriction (FR). In Addition, the Ustekinumab was held. The immunological screenings were negative [ANA, ANCA (MPO/ PR3), Anit-glomerular basement membrane (GBM) antibody, Lupus serology, myeloma screening, phospholipase A2 receptor antibody, and Complement levels]. His IgA was 3.34 grams/liter (0.8-2.8). An urgent renal biopsy was done, which showed features of MCD. He responds very well, and his symptoms have improved with the regression of pedal oedema and weight reduction. He was discharged on high-dose steroids. Follow-up investigations showed a U ACR of < 0.2 milligram/millimole, serum Albumin 38 gram/liter, and normal Cholesterol, TSH, and UEs.

Result: Light microscopy showed no glomerular abnormality. Electron microscopy shows severe foot process effacement consistent with minimal change disease. Immunohistochemistry showed a negative IgA, IgG, C3, and C1q on specific background staining.

Discussion: Given a negative immunological screen test, the absence of nephrotoxins, the development of nephrotic syndrome that coincided with increased dose frequency for Ustekinumab, and the dramatic response to discontinuation of the Ustekinumab as well as the high dose steroids, we speculated that Ustekinumab induced MCD.

Monday 5th June 16:00 – 17:00

Track B2 – Case Reports 2

Poster: 105
Submission: 286

Oncogenic osteomalacia: a series

Dr Elizabeth Wan, Dr Stephen Walsh

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Oncogenic osteomalacia is a paraneoplastic syndrome usually associated with mesenchymal tumours. Phosphatonins (such as FGF23) cause reduced renal resorption of phosphate and low levels of activated vitamin D, leading to muscle weakness and osteomalacia. Most tumours are located in bone and soft tissue, are usually small, solitary, and rarely cause local symptoms making them notoriously difficult to find.

Here we present what we believe is the largest reported European case series of oncogenic osteomalacia. Over a period of 10 years, 5 patients were referred to our tertiary nephrology service for hypophosphatemia and symptoms related to this: extreme myalgia and fragility fractures. All cases had a raised fractional excretion of phosphate (FE_{PO4}) on presentation, with normal excretion of low molecular weight protein, urate and glucose ruling out the renal Fanconi syndrome. Investigations identified stereotypical ^{68}Ga DOTATATE PET/CT images, raised serum FGF23 levels and histology consistent with mesenchymal tumours. In those cases where complete resection has been possible, we can demonstrate complete resolution of phosphate wasting.

Monday 5th June 16:00 – 17:00

Track B2 – Case Reports 2

Poster: 106
Submission: 304

A case of dense deposit disease treated with plasma exchange

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Treatment of dense deposit disease is mostly based on case reports. There are reports of recovering kidney function in acute kidney injury in dense deposit disease patients with plasmapheresis. Even with anti cellular therapy the evidence is not of best quality. Steroid therapy also has not been effective in dense deposit disease

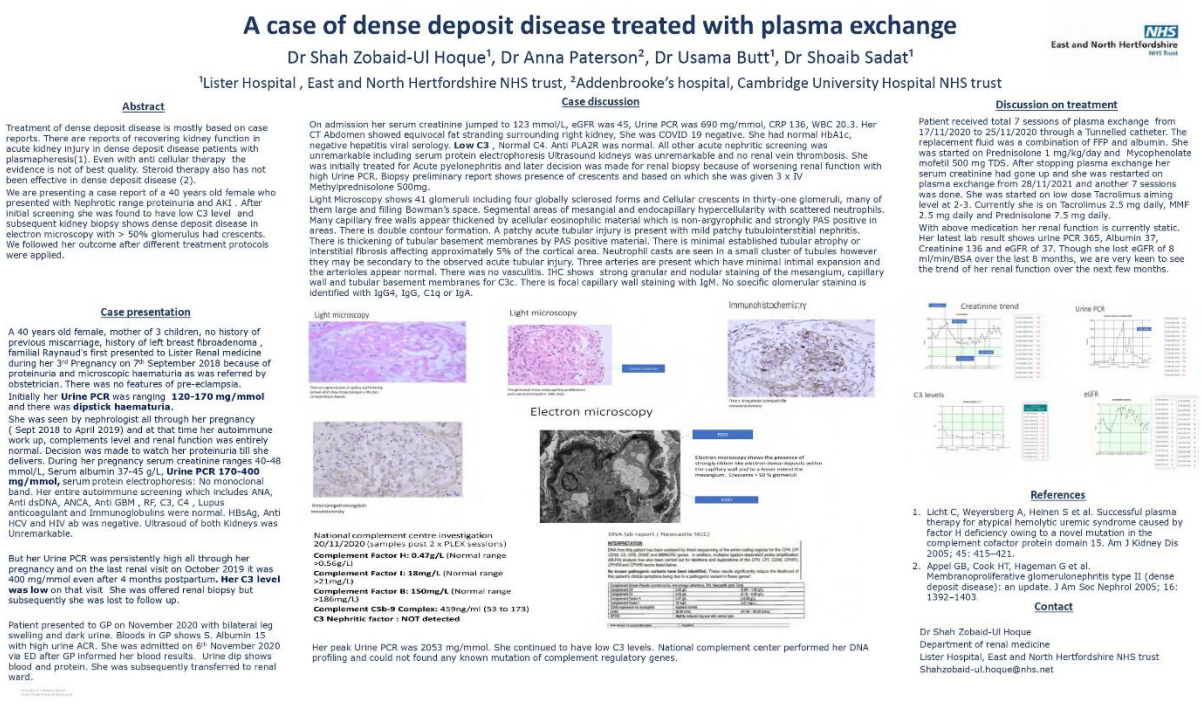
We are presenting a case report of a 40 years old female who presented with Nephrotic range proteinuria and AKI . After initial screening she was found to have low C3 level and subsequent kidney biopsy shows dense deposit disease in electron microscopy with > 50% glomerulus had crescents. We followed her outcome after different treatment protocols were applied.

On admission her serum creatinine jumped to 123 mmol/L, eGFR was 45, Urine PCR was 690 mg/mmol, CRP 136, WBC 20.3. Her CT Abdomen showed equivocal fat stranding surrounding right kidney, She was COVID 19 negative. She had normal HbA1c, negative hepatitis viral serology. Low C3 , Normal C4. Ultrasound kidneys was unremarkable and no renal vein thrombosis.

Light Microscopy shows 41 glomeruli including four globally sclerosed forms and Cellular crescents in thirty-one glomeruli, many of them large and filling Bowman's space. Segmental areas of mesangial and endocapillary hypercellularity with scattered neutrophils. Many capillary free walls appear thickened by acellular eosinophilic material which is non-argyrophilic and strongly PAS positive in areas. There is double contour formation. A patchy acute tubular injury is present with mild patchy tubulointerstitial nephritis. There is thickening of tubular basement membranes by PAS positive material. There is minimal established tubular atrophy or interstitial fibrosis affecting approximately 5% of the cortical area. Neutrophil casts are seen in a small cluster of tubules however they may be secondary to the observed acute tubular injury. Three arteries are present which have minimal intimal expansion and the arterioles appear normal. There was no vasculitis. IHC shows strong granular and nodular staining of the mesangium, capillary wall and tubular basement membranes for C3c. There is focal capillary wall staining with IgM. No specific glomerular staining is identified with IgG4, IgG, C1q or IgA. Her peak Urine PCR was 2053 mg/mmol. She continued to have low C3 levels. National complement center performed her DNA profiling and could not found any known mutation of complement regulatory genes.

Patient received total 7 sessions of plasma exchange from 17/11/2020 to 25/11/2020 through a Tunnelled catheter. The replacement fluid was a combination of FFP and albumin. She was started on Prednisolone 1 mg/kg/day and Mycophenolate mofetil 500 mg TDS. After stopping plasma exchange her serum creatinine had gone up and she was restarted on plasma exchange from 28/11/2020 and

another 7 sessions was done. She was started on low dose Tacrolimus aiming level at 2-3 with MMF 2.5 mg daily and Prednisolone 7.5 mg daily. Her renal function was static with S creatinine hovering around 150 mmol/L for 1 year and then it rapidly declined and patient ended up on haemodialysis on June 2022. No repeat kidney biopsy was performed.



A case of dense deposit disease treated with plasma exchange

Dr Shah Zobaid-Ul Hoque[1], Dr Anna Paterson[2], Dr Usama Butt[1], Dr Shoaib Sadat[1]

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NHS East and North Hertfordshire NHS Trust

Abstract

Treatment of dense deposit disease is mostly based on case reports. There are reports of recovering kidney function in acute kidney injury in dense deposit disease patients with plasmapheresis(1). Even with anti cellular therapy the evidence is not of best quality. Steroid therapy also has not been effective in dense deposit disease (2).

We are presenting a case report of a 40 years old female who presented with Nephrotic range proteinuria and AKI . After initial screening she was found to have low C3 level and subsequent kidney biopsy shows dense deposit disease in electron microscopy with > 50% glomerulus had crescents. We followed her outcome after different treatment protocols were applied.

Case presentation

A 40 years old female, mother of 3 children, no history of previous miscarriage, history of left breast fibroadenoma , familial Raynaud's first presented to Lister Renal medicine during her 3rd Pregnancy on 7th September 2018 because of proteinuria and microscopic haematuria as was referred by obstetrician. There was no features of pre-eclampsia.

Initially her **Urine PCR** was ranging **120-170 mg/mmol** and there was **dipstick haematuria.**

She was seen by nephrologist all through her pregnancy (Sept 2018 to April 2019) and at that time her autoimmune work up, complements level and renal function was entirely normal. Decision was made to watch her proteinuria till she delivers. During her pregnancy serum creatinine ranges 40-48 mmol/L, Serum albumin 37-45 g/L, **Urine PCR 170-400 mg/mmol,** serum protein electrophoresis: No monoclonal band. Her entire autoimmune screening which includes ANA, Anti dsDNA, ANCA, Anti GBM , RF, C3, C4 , Lupus anticoagulant and Immunoglobulins were normal. HBsAg, Anti HCV and HIV ab was negative. Ultrasoud of both Kidneys was Unremarkable.

But her Urine PCR was persistently high all through her pregnancy and on the last renal visit on October 2019 it was 400 mg/mmol even after 4 months postpartum. **Her C3 level was low** on that visit She was offered renal biopsy but subsequently she was lost to follow up.

Patient presented to GP on November 2020 with bilateral leg swelling and dark urine. Bloods in GP shows S. Albumin 15 with high urine ACR. She was admitted on 6th November 2020 via ED after GP informed her blood results. Urine dip shows blood and protein. She was subsequently transferred to renal ward.

Case discussion

On admission her serum creatinine jumped to 123 mmol/L, eGFR was 45, Urine PCR was 690 mg/mmol, CRP 136, WBC 20.3. Her CT Abdomen showed equivocal fat stranding surrounding right kidney, She was COVID 19 negative. She had normal HbA1c, negative hepatitis viral serology. **Low C3** , Normal C4. Anti PLA2R was normal. All other acute nephritic screening was unremarkable including serum protein electrophoresis Ultrasound kidneys was unremarkable and no renal vein thrombosis. She was initially treated for Acute pyelonephritis and later decision was made for renal biopsy because of worsening renal function with high Urine PCR. Biopsy preliminary report shows presence of crescents and based on which she was given 3 x IV Methylprednisolone 500mg.

Light Microscopy shows 41 glomeruli including four globally sclerosed forms and Cellular crescents in thirty-one glomeruli, many of them large and filling Bowman's space. Segmental areas of mesangial and endocapillary hypercellularity with scattered neutrophils. Many capillary free walls appear thickened by acellular eosinophilic material which is non-argyrophilic and strongly PAS positive in areas. There is double contour formation. A patchy acute tubular injury is present with mild patchy tubulointerstitial nephritis. There is thickening of tubular basement membranes by PAS positive material. There is minimal established tubular atrophy or interstitial fibrosis affecting approximately 5% of the cortical area. Neutrophil casts are seen in a small cluster of tubules however they may be secondary to the observed acute tubular injury. Three arteries are present which have minimal intimal expansion and the arterioles appear normal. There was no vasculitis. IHC shows strong granular and nodular staining of the mesangium, capillary wall and tubular basement membranes for C3c. There is focal capillary wall staining with IgM. No specific glomerular staining is identified with IgG4, IgG, C1q or IgA.

National complement centre investigation 20/11/2020 (samples post 2 x PLEX sessions)

Complement Factor H: 0.47g/L (Normal range >0.56g/L)

Complement Factor I: 18mg/L (Normal range >21mg/L)

Complement Factor B: 150mg/L (Normal range >186mg/L)

Complement C5b-9 Complex: 459ng/ml (53 to 173)

C3 Nephritic factor : NOT detected

Her peak Urine PCR was 2053 mg/mmol. She continued to have low C3 levels. National complement center performed her DNA profiling and could not found any known mutation of complement regulatory genes.

Discussion on treatment

Patient received total 7 sessions of plasma exchange from 17/11/2020 to 25/11/2020 through a Tunnelled catheter. The replacement fluid was a combination of FFP and albumin. She was started on Prednisolone 1 mg/kg/day and Mycophenolate mofetil 500 mg TDS. After stopping plasma exchange her serum creatinine had gone up and she was restarted on plasma exchange from 28/11/2021 and another 7 sessions was done. She was started on low dose Tacrolimus aiming level at 2-3. Currently she is on Tacrolimus 2.5 mg daily, MMF 2.5 mg daily and Prednisolone 7.5 mg daily.

With above medication her renal function is currently static. Her latest lab result shows urine PCR 365, Albumin 37, Creatinine 136 and eGFR of 37. Though she lost eGFR of 8 ml/min/BSA over the last 8 months, we are very keen to see the trend of her renal function over the next few months.

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Monday 5th June 16:00 – 17:00

Track B2 – Case Reports 2

Poster: 107
Submission: 305

A rare case of Nannizziopsis spp disseminated fungal infection in an immunosuppressed renal transplant recipient in the UK

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Nannizziopsis is a fungal zoonosis which in rare cases can cause disseminated infection in immunosuppressed individuals. More commonly, it is known to cause dermatological disease in reptiles. The common features of disseminated infection in humans include skin, pulmonary and central nervous system disease. The reported individuals are usually immunocompromised (either due to deliberate immunosuppression or as a result of disease progression in HIV) and have a history of travel to Africa where the species is endemic. Until now there has been only one reported case of disseminated infection in humans in the UK.

S is a 64-year-old male of African ancestry with a history of diabetic kidney disease and deceased donor kidney transplant in 2021. S received anti-thymocyte globulin for induction and the initial post-transplantation period was mostly uneventful other than an episode of borderline rejection for which he received pulsed methyprednisolone. He was maintained on triple therapy with Tacrolimus, Mycophenolate Mofetil and Prednisolone. Tacrolimus trough levels ranged between 8-12 ng/mL and there was no lymphopenia reported other than at induction.

S initially presented to hospital eight months post-transplantation with cough and haemoptysis. His chest x-ray showed a concerning opacity in the right hilum and he underwent a two-week wait referral. The area was dismissed as a chest infection and S was discharged with a course of oral antibiotics. Soon after, S began to notice several cutaneous lesions developing on his body and a painful swelling on his right tibia.

The following month, S presented again with worsening haemoptysis. Serological testing showed a positive beta-D-glucan and negative galactomannan. The first bronchoalveolar lavage (BAL) microscopy showed no bacterial or fungal elements. A subsequent BAL showed occasional hyphae suggestive of Aspergillus spp with some atypical features such as budding, irregular hyphae and non-45-degree angle branching.

The impression at this point was that S had disseminated Aspergillosis which was responsible for the pulmonary, cutaneous and tibial lesions. He was started on IV Amphotericin. However, shortly after this, the Nannizziopsis species was identified using 18S PCR from the biopsies of the cutaneous lesions.

The Nannizziopsis was determined to be sensitive to Amphotericin and treatment was continued for a total of seven weeks. As cerebral lesions had been found in previous cases of disseminated Nannizziopsis, S underwent an MRI head which was clear. Following this, S was stepped down to oral

Posaconazole. As the cutaneous lesions were improving and the CT chest showed an almost complete resolution of the lung lesion treatment was stopped. His graft function remained stable throughout the treatment.

Whilst S had been born in West Africa he had not travelled there for many years and denied any contact with animals. He did, however, report the presence of black mould in his accommodation immediately prior to his initial presentation. It has not been possible to confirm this as the source of his infection however it does highlight, amongst other recent high profile cases, the potential detrimental impact of substandard housing on population health.

Monday 5th June 16:00 – 17:00

Track B2 – Case Reports 2

Poster: 108
Submission: 363

How common are paediatric metastatic phaeochromocytomas and paragangliomas?

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Introduction: Paragangliomas (PGL) and phaeochromocytomas (PCC) are rare neuroendocrine tumours in children. Paragangliomas arise from the chromaffin cells of extra-adrenal sympathetic or parasympathetic ganglia. Sympathetic paragangliomas secrete catecholamines, while parasympathetic paragangliomas are usually non-secretory. Phaeochromocytomas arise from the adrenal medulla and are typically secretory. Metastatic disease is rare in children, but often associated with a genetic mutation, including mutations in *NF1*, *VHL*, *SDH* and *RET*.

Cases: We present two cases of paediatric patients with metastatic paraganglioma.

Case 1

A 9-year-old girl presented with headache and generalised tonic-clonic seizures and was found to be hypertensive (168/112mmHg). Abdominal ultrasound, CT and MRI revealed a lesion between the left lower pole of the kidney and the aorta with compression of the left renal vein, and a right-sided subpleural nodule. A diagnosis of PGL was made with elevated plasma and urinary metanephrines / catecholamines and a positive ^{68}Ga-DOTATATE PET/CT scan (after negligible uptake on MIBG imaging).

Following successful catecholamine blockade with phenoxybenzamine and the addition of propranolol, she underwent radical resection of the primary tumour including nephro-ureterectomy. Thoracoscopic resection of the right-sided subpleural nodule was performed two months later with histology confirming a completely resected metastatic PGL.

Genetic testing revealed a mutation in the succinate dehydrogenase flavoprotein subunit (*SDHA*); the same mutation was detected in her father and younger brother.

The patient was followed-up with annual urinary and plasma metanephrines / catecholamines and abdominal ultrasounds. She remained disease-free for four years when biochemical surveillance and ^{68}Ga-DOTATATE PET/CT scan detected a multiple metastatic relapse with widespread bony and retroperitoneal disease for which she commenced ^{177}Lu-DOTATATE molecular radioisotope therapy.

Case 2

An 11-year-old girl presented with dizziness, headache and vomiting. She had been symptomatic for one year and was hypertensive on initial assessment, with a systolic blood pressure of 190mmHg.

Abdominal MRI revealed a heterogenous aorto-caval mass extending from the right kidney inferiorly to below her renal veins, also detected on SPECT-CT with ^{131}I-MIBG. Plasma normetadrenaline levels were elevated. Subtotal resection of the primary tumour and right nephrectomy was performed with histology confirming paraganglioma; no genetic cause was identified.

Follow-up ^{68}Ga-DOTATATE PET/CT scans four months later identified two metastatic lesions in the skull. On retrospective imaging review, the right frontal bone lesion had been present at diagnosis. The patient received four courses of treatment with ^{177}Lu-DOTATATE and at four years post-initial presentation is clinically stable with no evidence of disease progression.

Discussion: PGL and PCC are a rare but important cause of hypertension in children, and up to 60% of cases are associated with a germline mutation. Although metastatic disease is rare, it can occur in up to 12% of children and up to 70% with *SDHB* mutations. Genetic testing is recommended for all paediatric patients and family members, and can result in earlier tumour detection and treatment. While isolated disease is usually treated with surgical resection, metastatic disease requires additional treatment modalities. ^{177}Lu-DOTATATE molecular radioisotope therapy targets ^{68}Ga-DOTATATE-avid lesions, providing a promising treatment option for challenging disease with early studies suggestive of favourable outcomes.

Monday 5th June 16:00 – 17:00

Track B2 – Case Reports 2

Poster: 109
Submission: 369

An atypical presentation of leptospirosis complicated by thrombotic microangiopathy

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A 53-year-old woman from Guernsey was admitted to hospital locally with a 2-day history of headaches, myalgia, diarrhoea and vomiting. Her blood tests showed a Stage III acute kidney injury (AKI) in addition to features suggestive of microangiopathic haemolytic anaemia (MAHA). Her liver function tests were mildly deranged with a hepatocellular pattern of injury. She was started on intravenous Ceftriaxone and commenced continuous haemofiltration. On the advice of the local haematology team, she was given pulsed methylprednisolone before being transferred to a tertiary centre for plasma exchange. Her autoimmune, myeloma and virology screen were negative. Imaging of her renal tract was unremarkable. Further results showed that ADAMTS13 activity was low (29 IU/dL) but not deficient and her stool samples were negative for faecal pathogens including shiga-toxin producing Escherichia coli, suggesting that this was neither thrombotic thrombocytopenic purpura (TTP) nor haemolytic uraemic syndrome (HUS). A renal biopsy was performed on Day 15 of her admission which demonstrated areas of cortical necrosis, which is within the spectrum of findings in thrombotic microangiopathy (TMA). There were also adjacent areas with tubulointerstitial inflammation and monocytic tubulitis. Serum was sent for leptospirosis testing on Day 6 and 13 of her admission. 16s DNA and IgM were initially negative but became positive on the second test. On direct questioning, it emerged that though she lived in an urban area, she lived with her son who worked in agriculture, and she often did his laundry for his soiled clothes. Throughout the admission she remained anuric and was dialysis dependent at time of discharge. Leptospirosis is a rare zoonotic infection in the UK, with about 50 cases reported annually in recent years. According to Public Health England, approximately half of these are acquired overseas and up to 95% had identified an occupational, animal or water exposure. Renal involvement in leptospirosis is more commonly found in icteric leptospirosis, or Weil's disease, in which renal replacement therapy may be required in up to half of patients. The most common biopsy findings in leptospirosis-associated AKI are acute tubulointerstitial nephritis or acute tubular necrosis. The treatment required for renal involvement is usually supportive. This case is notable because TMA is rarely associated with leptospirosis. Additionally, severe renal involvement is more commonly associated with icteric leptospirosis instead of its non-icteric form.

Monday 5th June 16:00 – 17:00

Track B2 – Case Reports 2

Poster: 110
Submission: 375

Enabling a patient with learning difficulties to continue dialysis by proving peritoneal dialysis with the support of nursing home – a case report

Dr Sarah Yoon Ai Ng, Dr Bhrigu Sood

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Clinical history: A 51-year old man with kidney failure secondary to adult dominant polycystic kidney disease and learning difficulties was initially commenced on haemodialysis in January 2020. He lived in sheltered accommodation. His other significant past medical history included epilepsy and hypertension. He required slow transitioning to an outpatient haemodialysis programme and attempts were made to establish him on a routine that favoured his compliance. Despite that, he had poor attendance to haemodialysis sessions and as a result, required multiple hospital admissions due to hyperkalaemia and symptoms of uraemia. In a multi-disciplinary meeting, a trial of peritoneal dialysis (PD) was suggested to assess if a treatment regime that doesn't require repeated hospital attendances would result in improved compliance.

He proceeded to have a laparoscopic peritoneal dialysis catheter inserted in October 2021. Choosing a less restrictive modality, he was established on continuous ambulatory peritoneal dialysis, with four exchanges a day (three 2 litre exchanges of 1.36% Physioneal bags and a 1 litre Extraneal bag as daytime fill). He allowed the ward team to do PD exchanges regularly as an inpatient in hospital. With the reassurance that PD was working well, he was discharged to a nursing home. Staff at the nursing home were trained to perform exchanges for him. He continues to be dialysed regularly at his nursing home and has not needed any further hospital admissions. He achieves ultrafiltration of 1.2 to 1.5L per day and has no ongoing issues with symptoms of uraemia and hyperkalaemia (potassium of 3.1 to 3.3 mmol/L). He maintains a good urine output of around 500 ml per day. He has not had any episodes of peritonitis.

Learning point: Peritoneal dialysis is usually seen as a modality for able patients who are self-caring and engaged with their treatment. This case report has shown the successful outcome of peritoneal dialysis provided with assistance of a trained staff from nursing home -- which has not only enabled this patient with significant learning abilities to carry on with dialysis, but also improved his quality of life by avoiding symptoms of missed dialysis sessions and repeated hospital admissions. This case highlights the use of peritoneal dialysis beyond “home therapy” to help enable dialysis in patients with challenging needs.

Monday 5th June 16:00 – 17:00

Track B2 – Case Reports 2

Poster: 111
Submission: 385

A rare case of co-existence of nephrogenic systemic fibrosis and calciphylaxis in a patient with end stage renal disease on maintenance haemodialysis.

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Introduction: We present a case of a 44 year old maintenance haemodialysis patient presenting with nephrogenic systemic fibrosis (NSF) with co-existing calciphylaxis in the absence of exposure to gadolinium based contrast agents.

Methods: This patient who has been on maintenance haemodialysis for over 20 years presented with reduced mobility, bilateral leg pain, skin thickening and ulceration in upper and lower limbs. Past medical history included End Stage Renal Disease secondary to IgA nephropathy, failed renal transplant, parathyroid carcinoma with partial parathyroidectomy and hypertension. Notable medication included erythropoietin and vitamin D analogue.

Blood tests were unremarkable except for elevated corrected calcium with suppressed parathyroid hormone levels.

Results: Incisional biopsy of skin and ulcers showed histological features consistent with NSF with extensive skin involvement with features of calciphylaxis.

Initial treatment plan included daily dialysis sessions and IV sodium thiosulfate. His dialysis was complicated by vascular access issues and fibrosis rapidly progressed rendering him bed bound with in two weeks of admission and diagnosis and he passed away shortly before further treatment options could be explored.

Discussion: NSF is a rare disorder of skin seen in patients with ESRD usually in association with gadolinium based contrast agents used in magnetic resonance imaging. There have been 2 prior case reports with co-existing histological features on biopsies with both NSF and Calciphylaxis out of which only 1 case has clinical features of both disease and interestingly they did not have history of Gadolinium contrast exposure.[1]

Other factors that may be associated with NSF are pro-inflammatory events, erythropoietin, hyperphosphataemia, acidosis, and b-blockers.[2]

NSF remains a rare condition with high mortality and morbidity risk and limited treatment options. Calciphylaxis although more prevalent is still considered a life threatening vasculopathy and is managed with frequent dialysis sessions and intravenous sodium thiosulfate.

There are reports of improvement in skin on improvement of renal function or transplantation.[3] Other treatments postulated include corticosteroids, PUVA, UVA-1 therapy, immunomodulatory drugs, pentoxifylline, Sodium thiosulfate and extracorporeal photopheresis.[4]

This case highlights the importance of identifying rare skin manifestations in haemodialysis patients, which require prompt examination, diagnosis and management.

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Monday 5th June 16:00 – 17:00

Track B3 – Case Reports 3

Poster: 112
Submission: 388

Acute confusion post haemodialysis treatment due to excessive ultrafiltration

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Introduction: Haemodialysis (HD) population encounter multiple complications during and post HD, I am presenting an unusual presentation of acute sudden loss of consciousness post HD treatment and look into different differential diagnosis.

Case presentation: 70 years old Female on chronic haemodialysis presented with acute onset confusion post dialysis. She has been dialysis dependent over the past eight months via the right internal jugular tunneled line with no compliant concern. Her renal disease is secondary to thrombotic microangiopathy, other medical history includes well controlled non-insulin dependent diabetes.

On initial assessment, she was found confused, blood pressure was 147/67 mmHg, afebrile, SO2 > 94 % on room air and no focal neurological deficit on examination. ECG showed sinus rhythm with no evidence of ischemia or prolonged QTc. Her blood results showed CRP 1 mg/L and blood glucose of 8.6 mmol/L and other electrolytes were normal. She had an urgent CT head that did not show evidence of acute intracranial abnormalities. She had four hours of HD with ultrafiltration (UF) of 4 L and her target dry weight was 41.5 Kg.

She remained confused for two days and on the third day she regained consciousness. She had an MRI head on day five after the event that showed no evidence of acute intracranial abnormalities and there was slight parietal predominance.

The differential diagnosis for acute confusion post HD includes the following:

1. Stroke or Transient Ischemic attack, excluded by clinical examination and neuro images.
2. Transient global amnesia (TGA) can be a differential diagnosis, it is supported by the memory loss and regain of full events on the day of dialysis, but the duration is more than 24 hours which not in line with TGA
3. Dialysis disequilibrium, there was no compliance issue reported in our patient to support that.
4. Posterior Reversible Encephalopathy Syndrome (PRES) it is felt the most likely cause given the MRI findings with parietal prominence and clinical scenario
5. Other causes like arrhythmia and seizure, air embolism, sepsis, migraine, drugs and electrolyte imbalance were excluded by careful assessment.

Discussions**:** Given the limitation of the case report and the late MRI results, the changes look like resolving PRES which could be attributed to excessive ultrafiltration. PRES is characterized by acute

neurological changes and symptoms can vary from simple headache, seizure to altered mental state. The later accompanied by a unique pattern of vasogenic oedema in the brain; predominantly in the parietal and occipital region (1) It is commonly reported in association with severe hypertensive, chronic kidney disease with uncontrolled hypertension, drug intoxication and organ transplantation. (2)

Conclusion**:** Frequent dry weight monitoring and individualizing the rate of fluid removal is crucial for all dialysis populations. Excessive UF can contribute to serious conditions like PRES in vulnerable dialysis people.

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Monday 5th June 16:00 – 17:00

Track B3 – Case Reports 3

Poster: 113
Submission: 401

Hairy Kidneys – An Unusual Diagnosis in Nephrology Clinic

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Introduction: Erdheim-Chester disease is a rare disease, which presents in adulthood and affects multiple organs. It is a non-Langerhans form of histiocytosis, which is characterised by infiltration of tissues by histiocytes. The varied presentation of the disease makes diagnosis difficult. The most common symptom of the disease is bone pain, due to the infiltration of histiocytes to the bones. Renal involvement is rare and is either due to retroperitoneal fibrosis causing ureteric obstruction or histiocytic infiltration into the perirenal fat causing the characteristic 'hairy kidney' sign on imaging. The disease has been associated with mutations in the BRAF gene that codes for a protein involved in the signalling of the RAS/MAPK pathway. Diagnosis is made on biopsy with tissue staining positive for CD68 and negative for CD1a. In 2016 the World Health Organisation reclassified Erdheim-Chester disease as a histiocytic neoplasm.

Clinical Case: A fifty-year-old Turkish gentleman with no apparent medical history was referred to the Nephrology team with a background of recurrent urinary tract infections, which were all culture negative. He had recently undergone an appendicectomy and a stump appendicectomy at his local district general hospital that had shown 'appendix tip showing collections of foamy macrophages, focal chronic inflammation, some siderophages, haemorrhages and vascular congestion'. His CT scan at this time showed 'dense bilateral, perinephric stranding confined to the perirenal fascia' and was summarised as 'in keeping with bilateral pyelonephritis'.

He had normal excretory renal function, preserved serum albumin and no haematoproteinuria. A possible differential was IgG4 disease. On multidisciplinary discussion a decision was made to proceed to kidney biopsy with radiology guidance to involve the peri renal tissues. The renal biopsy did not show a significant proportion of IgG4 positive plasma cells, compared to IgG, which refuted the diagnosis of IgG4 disease.

A literature review of such findings postulated a diagnosis of Erdheim-Chester disease.

It became apparent that this patient had been diagnosed with Erdheim-Chester disease a few years previously by the orthopaedic team of a differing hospital. He had initially presented with knee pain, had some abnormal imaging and then a needle biopsy. The language barrier had limited his disclosure of this pertinent information, as he had not felt this was relevant until directly questioned with an interpreter.

He subsequently went on to develop bony pain and blurred vision, which was thought to be secondary to the Erdheim-Chester disease and has since commenced interferon alpha treatment. His kidney function remains normal.

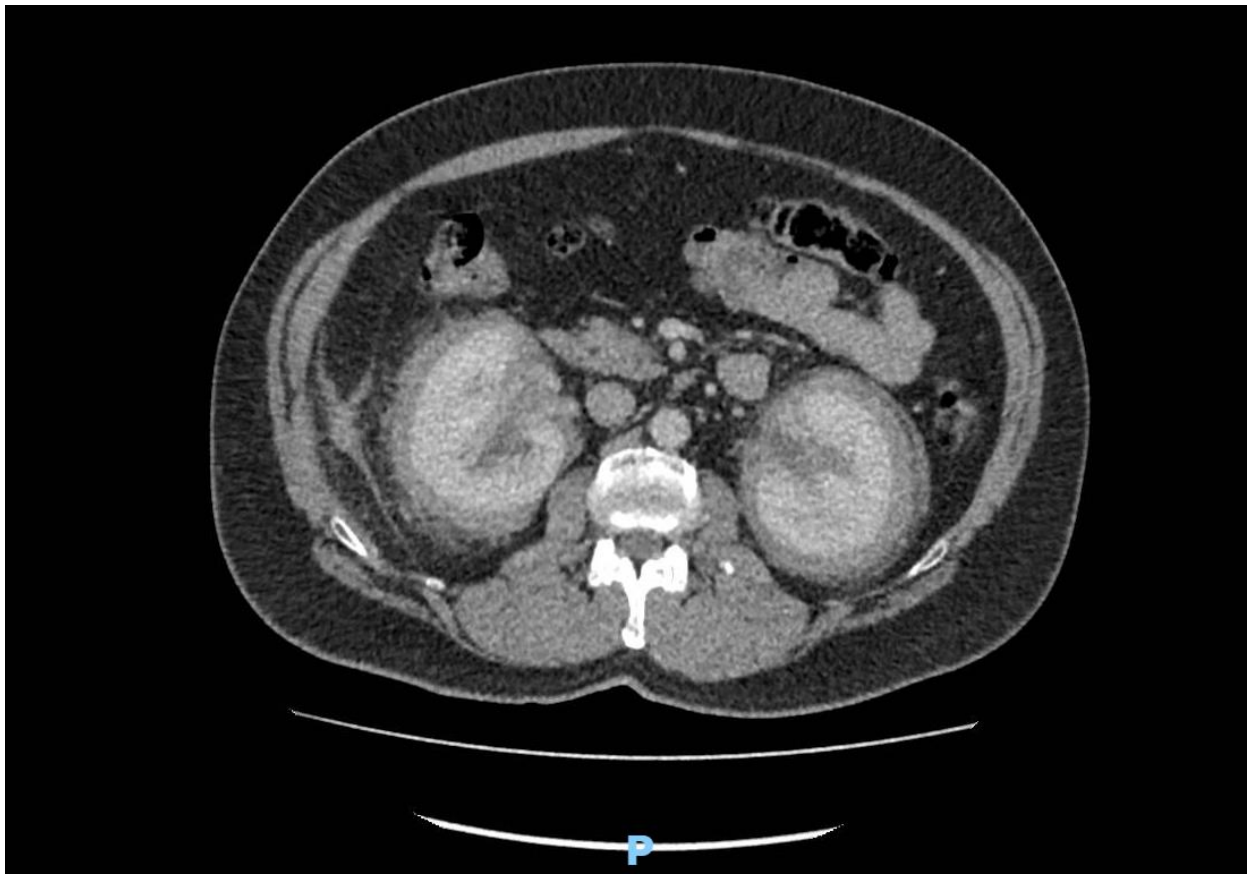

Image 1: CT scan with contrast showing the characteristic ‘hairy kidney’ sign

Discussion: This gentleman was treated with recurrent courses of antibiotics due to his findings of ‘bilateral pyelonephritis’ on multiple CT scans. However, this was not linked with his physical and laboratory findings. This highlights the importance of using imaging in conjunction with all clinical information when coming to a diagnosis. Furthermore, it emphasizes the importance of taking a comprehensive history and clear inter-specialty communication especially when patients are looked after at multiple sites.

Monday 5th June 16:00 – 17:00

Track B3 – Case Reports 3

Poster: 114
Submission: 414

Macroamylase: A possible tumour marker in lymphoproliferative disease?

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Introduction: Normal or α-amylase has a molecular weight of approximately 54 KDa and 25-30% of α-amylase is filtered by the kidneys. Increased levels of serum amylase have been reported in patients with chronic kidney disease (CKD) due to decreased rate of amylase clearance (CAm) in proportion to creatinine clearance (CCr). This renders amylase a somewhat less specific test for the diagnosis of pancreatitis in patients with CKD.

Macroamylase is a macromolecular complex formed as a result of amylase being bound to immunoglobulin. It has a molecular weight of about 200 KDa. Its large size impairs renal filtration and in contrast to α-amylase, only 1-2% of macroamylase is filtered by the kidneys.

The case: We present the case of a 49-year-old Caucasian female end with stage renal failure due to ANCA vasculitis, who had a live donor kidney transplant in 2000. She presented in 2021 with abdominal pain and elevated amylase levels. CT scans showed no evidence of pancreatitis. The pancreatic lipase was normal and further biochemical testing revealed that she had elevated macroamylase levels.

She continued to have unexplained abdominal symptoms and in 2022, she presented with severe abdominal pain and a low haemoglobin. She had a rapid deterioration in her general health, her renal transplant function declined, and she required haemodialysis.

A jejunal biopsy confirmed a diagnosis of a high-grade T-cell lymphoma and she was treated with an R-CHOP chemotherapy regimen.

Her condition continued to deteriorate, she developed pleural effusions and ascites and was transferred to ICU for ventilatory and vasopressor support. She underwent bowel resection surgery for an intussusception which was attributed to the lymphoma. She developed severe upper GI bleeding and died shortly afterwards.

Her macroamylase levels which had remained elevated prior to and during her admission, fell significantly after she started chemotherapy (see figure 1).

Discussion: Macroamylasemia is one of several immunoglobulin-complexed enzyme (ICE) disorders. The prevalence of macroamylasaemia in the population is around 1 - 2%. There are three types of

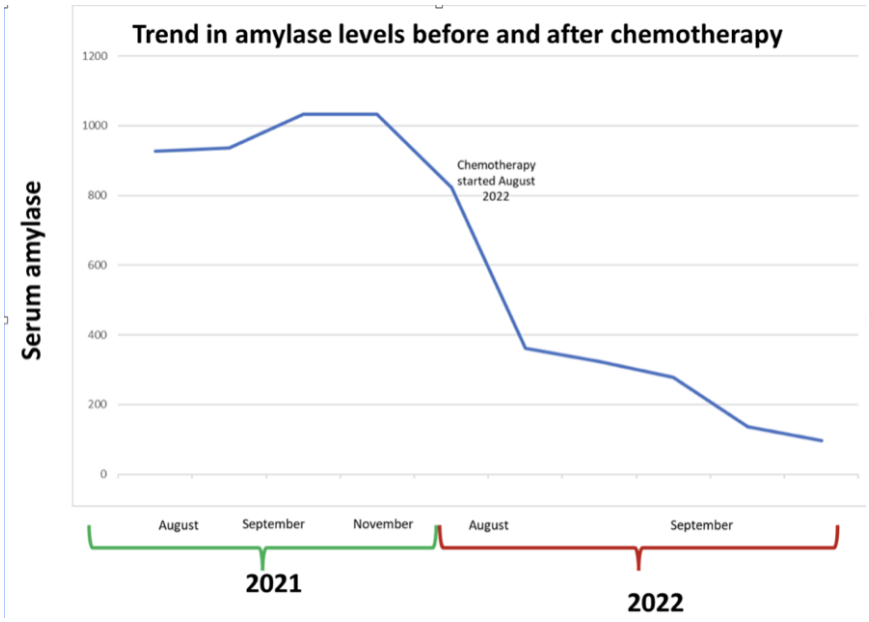
macroamylasaemia, differentiated by high (type 1), moderately high (type 2), and trace (type 3) levels of serum macroamylase. The Cam/CCr ratio is low in all three, but very low in type 1.

Several conditions have been described in association with macroamylasaemia, including coeliac disease, HIV infection, ulcerative colitis, rheumatoid arthritis, monoclonal gammopathy, mucosa-associated lymphoid tissue (MALT) lymphoma and non-Hodgkin's lymphoma.

Our patient's unexplained abdominal pains months before her last admission remained quite a conundrum and it was not clear how/if the macroamylasaemia tied in with this.

The fall in her macroamylase level so soon after starting treatment for the lymphoma suggests that it is likely to have been due to a reduction in the serum immunoglobulins by the chemotherapy. It raises the possibility that the elevated macroamylase might have been due to the underlying lymphoma and that it could be described as a 'tumour marker' in her case.

Figure 1



Monday 5th June 16:00 – 17:00

Track B3 – Case Reports 3

Poster: 115
Submission: 468

Undetectable vitamin K levels in a patient with severe calciphylaxis

Dr Tim Scale[1,2], Dr Sharan Chugani[1], Dr Aled Williams[1]

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We present the case of a 60 year old man who developed aggressive calciphylaxis 2 months after starting unit haemodialysis. He had type 2 diabetes, diagnosed 11 years before he started dialysis which was felt to be the cause of his renal failure. 7 years before starting dialysis he underwent a right hemicolectomy and small bowel resection for Crohn's disease when he had ruptured his jejunum. Subsequent to the hemicolectomy, he developed an enterocutaneous fistula which was repaired 4 years before starting dialysis and resulting in the removal of a large part of his ileum and jejunum. His other past medical history includes pernicious anaemia, hypertension and ankylosing spondylitis. He was not on a vitamin K antagonist. 2 months before presentation he was started on thrice weekly unit haemodialysis for oedema with end stage kidney failure.

He was on B12 supplementation (intramuscular), thiamine, vitamin- B co strong and magnesium supplementation. His diet was low in green vegetables. He was on colecalciferol and calcium (adcal d3) which did result in a short period of severe hypercalcaemia which promptly settled on cessation of the supplement. This occurred 3 months before his presentation with calciphylaxis. Just prior to the admission he was on calcium acetate 950mg three times daily as a phosphate binder.

After two months of dialysis treatment, he presented with severe calciphylaxis, with widespread skin break down and pain. He was treated with sodium thiosulfate 25g on dialysis, daily dialysis treatments and analgesia. On the basis of the history, vitamin K levels were sent and then it was immediately treated. The vitamin K levels came back below detectable range. Unfortunately, he died from this illness. His next of kin is keen that we present this case to aid the understanding of this awful condition.

Presentation blood tests;

Corrected Calcium	2.25 mmol/L	Haemaglobin	96 g/dL
Phosphate	2.45 mmol/L	White Cell count	19.3 x10^9/L
Alkaline Phosphatase	166 U/L	Platelets	174 x10^9/L
Parathyroid Hormone	11.2 pmol/L	Prothrombin time	19.3 seconds
Albumin	24 g/L	Activated partial thromboplastin time	42.2 seconds

Table 1 - Presenting blood tests

Vitamin K1 <0.10 ug/l Reference range (0.15-1.55 ug/l)

Discussion: Vitamin K is a lipid soluble vitamin that plays an important role in the blood coagulation pathway, cell proliferation and regulating the way calcium binds to tissues and blood vessels. Humans do not produce Vitamin K endogenously, so its derived from our diet and is synthesised by gut flora. It is absorbed in the ileum and jejunum. Vitamin K exists in two forms, K1 found in green & leafy vegetables, and K2, which is produced by bacteria but also found in meat and dairy products.

Calciphylaxis is a rare condition that results in vascular calcification. It has been postulated that patients receiving haemodialysis who develop calciphylaxis have low Vitamin K levels specifically K2. There is a case report of successfully treating calciphylaxis with vitamin K supplementation. Clinical trials investigating vitamin K supplementation for calciphylaxis are scant and further trials are needed.

Monday 5th June 16:00 – 17:00

Track B3 – Case Reports 3

Poster: 116
Submission: 474

An unusual case of STEC-HUS in a paediatric patient with a kidney transplant

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Background: Acute kidney injury in a patient with a kidney transplant is a serious concern, requires prompt management and often multi-faceted investigation. We report an unusual case of a patient with a kidney transplant who developed a bowel obstruction and severe renal dysfunction.

Case**:** A 12-year-old patient with a kidney transplant presented to hospital following a seizure and recurrent vomiting. She had a background of chronic kidney disease secondary to neonatal cardiac collapse but had normal kidney function following her living kidney transplant at 2 years of age. Shortly after admission she developed profuse bilious vomiting and developed a severe acute kidney injury associated with a mild thrombocytopenia. A blood film from presentation was reported as not consistent with microangiopathic haemolytic anaemia, but was not repeated. She was diagnosed with a bowel obstruction and intraoperatively was found to have multiple adhesions, Ladds band and a malrotation.

Despite careful fluid management and intravenous immunosuppression, her renal function deteriorated and she was commenced on haemodialysis. A kidney biopsy showed acute thrombotic microangiopathy (TMA) with minimal acute tubular necrosis (ATN) and negative C4d staining. Due to her history of vomiting and not tolerating oral immunosuppression this was thought to be antibody-mediated rejection. She was started on a course of plasma exchange and IV immunoglobulins before her donor specific antibody result was reported as negative.

Despite a normal platelet count and haemoglobin level, further testing revealed positive makers for haemolysis with a low haptoglobin level (<0.10g/l) and a raised lactate dehydrogenase (765unit/l). A rectal swab was PCR positive for Shiga toxin-producing Escherichia coli (STEC) despite being sent over 1 month after her initial presentation. The patient later made a good recovery and haemodialysis was discontinued, although kidney function has so far not returned to normal.

Conclusions**:** Haemolytic uraemic syndrome is one of the commonest causes of acute kidney injury in childhood and classically presents with acute kidney injury, thrombocytopenia and a microangiopathic haemolytic anaemia. In more than 90% of cases the haemolytic uremic syndrome (HUS) is caused by Shiga toxin-producing Escherichia coli (STEC-HUS) and classified as ‘typical HUS’. In our case, intestinal inflammation from STEC in conjunction with the post-transplant adhesions and predisposition for malrotation, culminated in our patient presenting with intestinal obstruction. Consideration for the transplanted kidney made the case all the more challenging.

This case did not present with the typical clinical, haematological or biochemical markers for STEC-HUS and highlights the importance of screening for STEC in TMA. Furthermore rectal swabs can be a valuable tool in confirming a diagnosis of STEC-HUS, even when significant time has passed from the initial presentation. Additionally, it is important to emphasise that the extra-renal manifestations and complications related to HUS, may also cause a child to present in an unusual fashion, such as with neurological sequalae.

Monday 5th June 16:00 – 17:00

Track B3 – Case Reports 3

Poster: 117
Submission: 486

Chromogranin A Tubulopathy: a rare cause of kidney failure in a patient with a neuroendocrine tumor

DR YUSUF JINADU, DR Dr Konstantinos Koutroutsos

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Introduction: Neuroendocrine tumours comprise cells capable of secreting peptides. Chromogranin A (CGA) is one such peptide. One mechanism of kidney injury described is intracellular deposition within the proximal cells or the formation of cast and deposition within the tubules. Case studies describing direct involvement of the kidney, especially with histological correlation are uncommon. In this case report, we describe a middle-aged gentleman with a neuroendocrine tumour and kidney dysfunction.

Case Presentation: A 67yr old man presented with 6 weeks of non-radiating right-sided abdominal pain and a rash in both of his legs. These were associated with loss of appetite and loss of weight of about 2 stones. The patient had a skin biopsy which showed subcutaneous pancreatic fat necrosis.

Cross-sectional imaging revealed extensive portal vein thrombus with metastatic disease in the liver and splenomegaly. A Liver biopsy showed a metastatic poorly differentiated large cell neuroendocrine carcinoma of possible intestinal origin.

On presentation, the patient had haemoproteinuria and normal kidney function. (creatine 69umol/l with an eGFR > 60ml/min / 1.73 sqm). However, his renal function progressively deteriorated over a period of 3 weeks with a creatinine of 515 umol/min and eGFR of 10ml.min. An autoimmune screen showed a negative ANCA with normal C3, C4, and normal myeloma screen. He had a renal biopsy which revealed acute tubular injury with thinning of epithelium, vacuolization of cytoplasm and luminal surface disruption with no evidence of glomerulopathy. Several tubules contained eosinophilic casts. and CGA was found positive in the brush borders of several clusters of proximal tubular epithelial cells.

This pattern of acutely injured proximal tubular cells with CGA on immunohistochemistry has been described in only a few cases and is characteristic of CGA Tubulopathy.

Conclusion: This case illustrates that patients with neuroendocrine tumours may develop an acute kidney injury secondary to CGA renal tubular deposition and highlights the importance of including this rare insult in the differential diagnosis

Monday 5th June 16:00 – 17:00

Track B3 – Case Reports 3

Poster: 118
Submission: 503

Decades of dialysis, donor kidneys and deteriorating vision – delivering a definitive diagnosis

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Introduction**:** A precise diagnosis in medicine is vital to allow appropriate patient management. Kidney failure of unknown aetiology is still a frequent diagnostic label within the haemodialysis unit and renal transplant clinic accounting for 15-20% of patients. Modern genetic approaches mean that a more precise diagnosis is available to patients and their families, given that nearly around 10% of such cases are likely to have a monogenic cause of kidney failure. Here, we present a case where molecular genetic testing in a long standing kidney failure patient provided a diagnosis.

Methods**:** Following patient consent we reviewed clinical, histological and molecular data in a patient with kidney failure of unknown cause.

Results**:** The patient initially presented around 40 years ago, as a 13 year old male with a one year history of lethargy, increased thirst and reduced kidney function. A renal biopsy revealed chronic damage with some tubulointerstitial nephritis. This was treated with supportive measures. By the age of 16 years, he had evidence of progressive chronic kidney disease resulting in kidney failure and he required renal replacement therapy in the form of haemodialysis. Then followed many years of renal replacement therapy and 4 kidneys transplants over the years. Reduction in vision prompted an ERG examination which revealed bilateral rod and cone dysfunction.

The original diagnosis of kidney failure was revisited and genetic tests were performed using whole genome sequencing. This revealed homozygous whole gene deletions of the NPHP1 gene encoding nephrocystin-1, which is the most frequent cause of nephronophthisis. A unifying diagnosis of Senior-Løken syndrome type 1 was made over 4 decades following his initial presentation.

Discussion**:** Molecular genetic testing was informative in this case of kidney failure of unknown aetiology. More timely genetic investigations in patients with kidney failure are now available through whole genome sequencing and allow for improved pre- and post-transplant management, help in assessing the risk of kidney disease in relatives, and precision medicine approaches to investigation and management.

Monday 5th June 16:00 – 17:00

Track B3 – Case Reports 3

Poster: 119
Submission: 582

Granulomatous tubulointerstitial nephritis after BCG instillation for bladder transitional cell carcinoma

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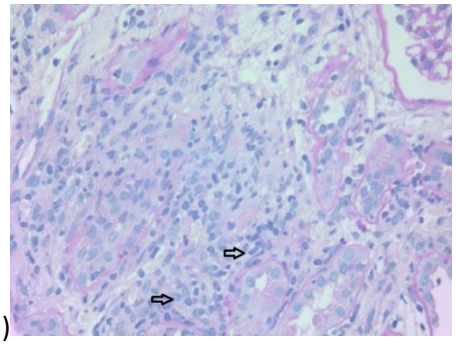
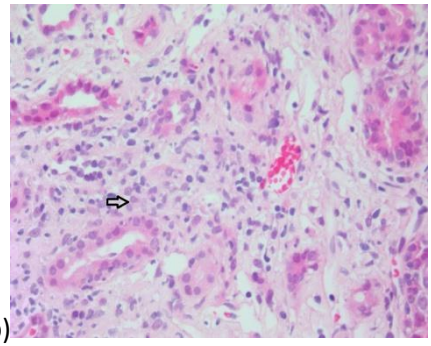
Background: Intravesical BCG instillation for bladder cancer has been resulted in viable organism observed in a variety of tissues outside the bladder [1]. This is a case report of granulomatous tubulointerstitial nephritis after intravesical BCG instillation.

Clinical Case: 72 years old gentleman of white origin was diagnosed with bladder transitional cell carcinoma (G2-G3 pTa with CIS muscle) .TURBT was performed and BCG instillation was started with 6 weeks of induction and later 6 monthly maintenance BCG cycles. All BCG instillation cycles were uneventful.

Past medical history included hypertension. Medications were doxazosin,atorvastatin.

Patient presented 7 days after last BCG instillation with vomitings and abdominal pain. He was found to have stage 3 AKI(creatinine 1833 umol/l) with unexplained pancytopenia. Haematinics were normal. Haemolytic and acute nephritic screens were negative . Urine dip : blood 1+ , protein 2 + , leukocyte trace . Urine PCR 72 mg/mmol. Ultrasound kidneys and urinary tract was normal.

He was treated with CVVHD for 48 hours .Renal function started to improve , though creatinine remained higher than baseline(140-180 umol/l).Renal biopsy revealed moderate interstitial scarring with associated diffuse chronic inflammatory cell infiltrate with scattered non necrotising granulomas. Eosinophils were not a feature of the infiltrate. Biopsy was negative for ziehl neelsen or congo red stain. Immunofluorescence was negative.

(a)  (b) 

(a, b renal biopsy : arrows show interstitial granulomatous inflammation)

In context of exposure to BCG instillation tuberculosis was included in differentials. CT chest abdomen and pelvis did not show any evidence of TB , malignancy or adenopathy. Serum ACE level was normal. Hepatitis and HIV screen was negative. Urine for AFB was sent and awaited.

He was discharged with plan to investigate for TB further. At the time of discharge creatinine was 400 umol/l, pancytopenia remained.

3 weeks later he presented with oligoanuric AKI with creatinine of 553 umol/l (GFR 8 ml/min) and worsening pancytopenia. urine ACR 18.1 mg/mmol.

Haematologists in view of frailty and poor prognosis deemed him unsuitable for bone marrow biopsy. He was empirically started on steroids prednisolone 30mg in view of kidney biopsy result. It resulted in benefit in terms of renal function and haematological picture. Creatinine improved to 266umol/l (GFR 20 ml/min).

Later his urine showed growth of acid fast bacilli. The case was discussed in TB MDT and it was concluded that he has acquired renal tract TB. Therefore, steroids were tapered over 6 weeks time and antituberculosis therapy was started, that resulted in further clinical improvement in term of renal function.

Conclusion: Renal tuberculosis is a rare but expected complication after intravesical BCG instillation. Favourable clinical response to systemic corticosteroids in addition to antituberculous treatment is suggestive of hypersensitivity reaction caused by renal tuberculosis.

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Monday 5th June 16:00 – 17:00

Track B3 – Case Reports 3

Poster: 120
Submission: 354

Familial anti-neutrophil cytoplasmic antibody (ANCA) associated vasculitis (AAV): two siblings presenting with AAV with different ANCA specificities.

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[3]UK Renal Registry, Bristol

Background**:** Anti-neutrophil cytoplasmic antibody (ANCA) associated vasculitis (AAV) is the name given to a group of rare, multi-system diseases characterized by necrotizing inflammation of small blood vessels that is usually accompanied by the presence of an ANCA in the serum.

Pathogenic ANCAs are directed at two different proteins: myeloperoxidase (MPO) and proteinase-3 (PR3), and AAVs are commonly divided into three syndromes based on ANCA specificity, in combination with clinical and histological findings. These are: granulomatosis with polyangiitis (GPA), microscopic polyangiitis (MPA) and eosinophilic granulomatosis with polyangiitis (EGPA). The exact aetiology of AAV is not known, but infectious, genetic and environmental factors have been implicated in its pathogenesis.

We present the case of two sisters, one with MPA, and the other with GPA, and use this to highlight the uncertainties around the aetiology of AAV.

Case Presentation:

Patient 1: A 55 year old woman presented to the respiratory service in 2017 with breathlessness and nasal congestion. Routine blood tests revealed creatinine 122 umol/L (no prior result for comparison), haemoglobin 138 g/L, and c-reactive protein 37 mg/L. Urinalysis showed 2+ blood and 2+ protein, and spot urine protein creatinine ratio was 270.2 mg/mmol. PR3-ANCA titre was >100 U/ml and a diagnosis of GPA with pulmonary, renal, and ear nose and throat involvement was made. She did not undergo a kidney biopsy due to her concern about the risks of the procedure. She did not wish to have any treatment other than prednisolone. She died 2 years after initial presentation of acute kidney injury, heart failure and severe active vasculitis.

Patient 2:A 46 year old woman presented in 2020 with a four month history of fatigue, fevers, weight loss, and right eye pain. Routine blood tests revealed creatinine 260 umol/L (56 umol/L three months previously), haemoglobin 91 g/L and c-reactive protein 19 mg/L. Urinalysis showed 3+ blood and 2+ protein, and spot urine protein creatinine ratio was 154.4 mg/mmol. MPO-ANCA titre was 69.5 U/L . Renal biopsy showed pauci-immune, non-necrotizing, crescentic glomerulonephritis affecting 70% of glomeruli. A diagnosis of MPA with renal and ocular involvement was made. She was treated with

pulsed cyclophosphamide and glucocorticoids. She remains in remission on maintenance azathioprine and glucocorticoids with excellent recovery of renal function.

Discussion**:** Familial clusters of AAV are very rare worldwide, and most reports are of family members presenting with the same disease and with the same ANCA specificity. To our knowledge there are only two previous reports of familial AAV presenting with a different disease and different ANCA specificity.

Genome wide association studies have confirmed that AAV has a genetic component, and that the different ANCAs and different syndromes have different genetic associations. It may be expected that familial cases share the same ANCA specificity and disease syndrome.

Our cases highlight that the aetiology is more complex, and add to current knowledge that further research is required to understand the genetic and environmental factors that lead to the development of AAV.

Monday 5th June 16:00 – 17:00

Track C1 – Haemodialysis 1

Poster: 121
Submission: 077

Dual Dialyser Haemodiafiltration: a new extracorporeal dialysis treatment modality for patients with end stage kidney disease

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Introduction: The introduction of High Flux (HF) haemodialysers and their application in single dialyser haemodiafiltration (sdHDF) for patients on extracorporeal dialysis (ECD) therapy has improved the extraction of uraemic toxins including the low molecular weight protein (LMWP) beta 2 microglobulin (β2M, 11.6kDa). Similar increases in the extraction of protein-bound uraemic toxins (PBUT) and larger LMWP (15-50kDa) remain elusive. High concomitant losses of albumin prohibit the use of Medium Cut-Off (MCO) or protein-losing haemodialysers in sdHDF to increase the convective transfer of these molecules.

Methods: A new extracorporeal dialysis treatment modality, dual dialyser haemodiafiltration (ddHDF), has been designed together with an accompanying mathematical model to compare its predicted performance to that of sdHDF in the extraction of solute. The extra process that distinguishes ddHDF from sdHDF is the secondary ultrafiltration and partial re-infusion of the effluent haemodiafiltrate from the initial or primary haemodialyser. This allows MCO and protein-losing haemodialysers to be used to increase the extraction of both LMWP and PBUT without excessive concomitant loss of albumin.

Results: Data from the mathematical model show that ddHDF could increase the extraction of smaller and larger LMWP by an extra 102% and 220% respectively compared to standard HF sdHDF whilst restricting the loss of albumin to 0.83 grams per hour of treatment. In using albumin as a recyclable carrier molecule for the extraction of PBUT from plasma ddHDF has the potential to increase PBUT reduction ratios (RR's) to 49% by convection alone. Even higher RR's are possible if the dialysate volume flow rate can be increased beyond 600ml/min.

Conclusion: ddHDF provides an opportunity for a step change increase in the level of extraction of both larger LMWP and PBUT in patients with end stage kidney disease.

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Monday 5th June 16:00 – 17:00

Track C1 – Haemodialysis 1

Poster: 122
Submission: 147

Monocyte-to-lymphocyte ratio (MLR) and the systemic inflammation response index (SIRI) as surrogate inflammatory markers: associations with mortality in an adult incident haemodialysis population

Dr Kaitlin Mayne[1,2,3], Dr Jennifer Lees[1,2], Dr Peter Thomson[2], Dr Jamie Traynor[2], Dr Elaine Rutherford[1,4], Dr Vishal Dey[5], Dr Ninian Lang[1], Prof Patrick Mark[1,2]

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Introduction: Inflammation plays a key role in chronic kidney disease (CKD) and associated cardiovascular morbidity. Cost and availability of specific biomarkers limit utility. Leukocyte counts can be combined as ratios reflecting immune dysregulation and used as inexpensive surrogate biomarkers. The neutrophil-to-lymphocyte ratio (NLR) is strongly associated with all-cause and cardiovascular mortality in CKD 1-3 however the long-term prognostic role of the monocyte-to-lymphocyte ratio (MLR) has not been studied in a European CKD population. Leukocytes are differentially affected by uraemia and their roles in inflammation and vascular dysfunction are indistinct 4. The systemic inflammation response index (SIRI) incorporates both neutrophils and monocytes 5 and may therefore add value over NLR or MLR.

Methods: Incident haemodialysis patients between 2010-2021 were included in a retrospective cohort (N=1735). MLR and SIRI were calculated from routine results at haemodialysis initiation: MLR = monocytes ÷ lymphocytes; SIRI = neutrophils x monocytes ÷ lymphocytes. The primary outcome was death from any cause. MLR and SIRI were analysed by quartiles and separately as log-transformed continuous variables. Kaplan-Meier analysis was used to compare survival across MLR and SIRI quartiles. Cox regression analyses assessed associations with mortality adjusted for age, sex, diabetes, cardiovascular disease, albumin and haemodialysis access modality. Receiver operating characteristic (ROC) curve analyses assessed risk discrimination of 2-year all-cause mortality for MLR and SIRI versus leukocyte counts.

Results: The analysed cohort included 1721 participants followed for a median of 21.9 (IQR 9.1-42.9) months. Mean age was 62.2 (SD 14.6) years, 1042 participants (60.6%) were male, 377 (21.9%) had prior cardiovascular disease and 749 (43.5%) had diabetes.

Over a median follow-up period of 23.6 (IQR 8.5-45.9) months, 840 individuals died from any cause. Across increasing quartiles of MLR and SIRI, there were higher rates of all-cause mortality (log rank $\chi 2$ for trend = 53.97, $P<0.001$ for MLR; 65.52, $P<0.001$ for SIRI; figure 1). On multivariable Cox

regression analysis, individuals with the highest MLR quartile (Q4≥0.835) had 69% increased hazards of death from any cause (hazard ratio [HR] 1.69, 95% confidence interval [CI] 1.23-2.32) versus Q1 (<0.375). The highest SIRI quartile (Q4≥5.75) was associated with 59% increased hazards relative to Q1 (<1.72) (adjusted HR 1.59, 95% CI 1.29-1.96, table).

The area under the ROC curve (AUROC) was greater for leukocyte ratios (MLR: 0.63, 95% confidence interval [CI] 0.60-0.66; SIRI: 0.64, 95% CI 0.60-0.67) than for leukocyte counts alone (monocytes: 0.56, 95% CI 0.53-0.59; lymphocytes: 0.40, 95% CI 0.37-0.43; neutrophils: 0.58, 95% CI 0.55-0.62; total WCC: 0.56, 95% CI 0.53-0.60; figure 2).

Discussion: MLR and SIRI are both independently associated with all-cause mortality and are better predictors of adverse outcome than individual cell counts. This suggests that the balance between proinflammatory and anti-inflammatory leukocytes is more informative than neutrophilia, monocytosis or lymphopenia in isolation. Leukocyte ratios are cheap, accessible surrogate markers of inflammation and vascular dysfunction which may have a role in risk stratification. Refining understanding of leukocyte ratio associations may elucidate immune dysfunction in CKD and inform therapeutic targets.

PLEASE SEE ATTACHED TABLE, FIGURES AND REFERENCES

Table: Cox proportional hazard model estimates for all-cause mortality

	Univariable		Multivariable †	
	HR (95% CI)	p	HR (95% CI)	p
Monocyte-to-lymphocyte ratio (MLR)				
Log MLR*	1.54 (1.38-1.71)	<0.001	1.28 (1.14-1.43)	<0.001
MLR quartiles				
Q1 <0.375	1.00 (reference)		1.00 (reference)	
Q2 ≥ 0.375 to <0.546	1.10 (0.90-1.35)	0.361	1.25 (0.90-1.73)	0.186
Q3 ≥0.546 to <0.835	1.53 (1.26-1.86)	<0.001	1.38 (1.01-1.90)	0.045
Q4 ≥0.835	1.91 (1.57-2.31)	<0.001	1.69 (1.23-2.32)	0.001
Systemic inflammation response index (SIRI)				
Log SIRI*	1.33 (1.24-1.43)	<0.001	1.16 (1.08-1.25)	<0.001
SIRI quartiles				
Q1 <1.72	1.00 (reference)		1.00 (reference)	
Q2 ≥1.72 to <3.04	1.37 (1.11-1.69)	0.003	1.19 (0.97-1.48)	0.102
Q3 ≥3.04 to <5.75	1.53 (1.25-1.89)	<0.001	1.33 (1.08-1.65)	0.007
Q4 ≥5.75	2.26 (1.85-2.76)	<0.001	1.59 (1.29-1.96)	<0.001

* per one unit increase

† adjusted for age, sex, diabetes, cardiovascular disease, albumin and initial mode of haemodialysis access

Figure 1: Kaplan-Meier survival plots for all-cause mortality by baseline (A) MLR and (B) SIRI quartile

(A) **(B)**

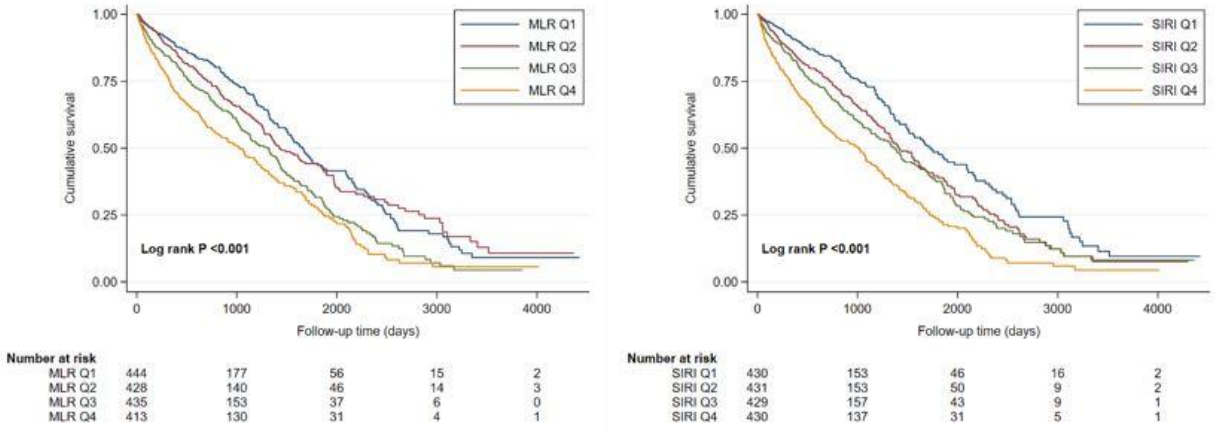
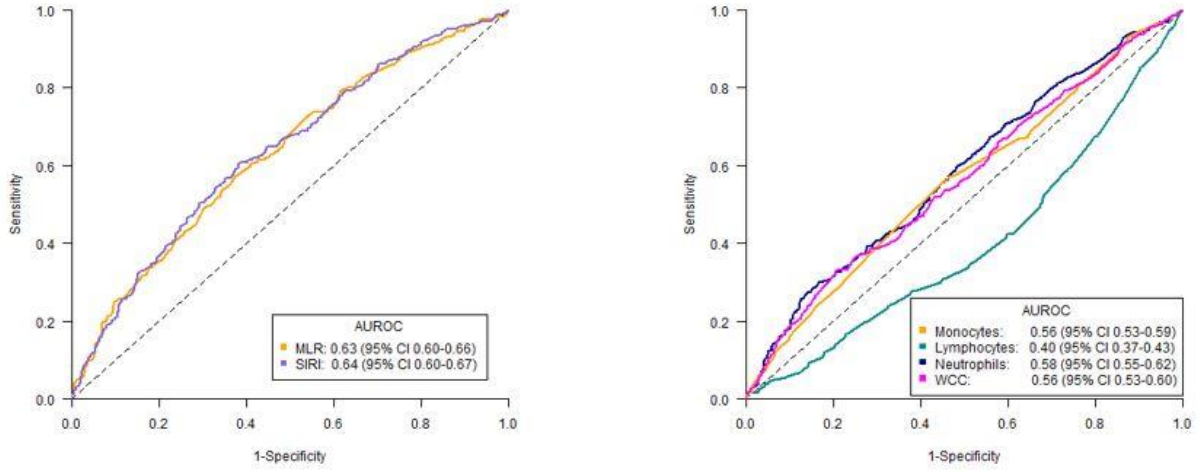


Figure 2: Receiver operating characteristic (ROC) curve analyses for prediction of all-cause mortality by (A) leukocyte ratios and (B) leukocyte counts

(A) **(B)**



AUROC = area under the receiver operating characteristic curve; MLR = Monocyte-to-lymphocyte ratio; CI = confidence interval; SIRI = Systemic inflammation response index

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Monday 5th June 16:00 – 17:00

Track C1 – Haemodialysis 1

Poster: 123
Submission: 182

Improving seating comfort and experience during haemodialysis.

Mrs Jo Hamilton, Mr David Willgoose, Professor Maarten Taal

UHDB, Derby

Introduction: Current guidelines recommend that patients should be seated in a chair rather than lying in a bed during haemodialysis to help avoid a feeling of dependency and facilitate engagement and activity during treatment. The number of beds on the unit has increased dramatically over the past few years and is becoming a health and safety issue for the staff and patients. Due to the increase in patients requesting a bed, the unit's usage has increased from 11 to 20 beds and requests are rising. This means these extra beds must be stored on the unit, restricting space. Staff are starting to suffer with their backs, moving big pieces of equipment. This is also time consuming, so less time with the patients.

Method: An informal patient focus group, led by Occupational Therapy (OT), was conducted to establish why patients are requesting beds over dialysis chairs. Further, a simple questionnaire was designed by OT and completed by patients already on a bed to identify their needs. Additionally, a pressure mattress for dialysis chairs was trialled on the unit. Ten patients trialled the mattresses over 3 months and then verbal feedback was requested.

Results: The following themes emerged from the focus group: Patients felt that there were not enough pillows, chairs were too hard to sit on for four hours and chairs were not being used to their full functioning ability. The questionnaire identified that 34 patients required a bed due to frailty or health needs and only 6 were for comfort. A trial of pressure mattresses produced positive verbal feedback especially from a patient who reported improvement in their backache allowing them to be more comfortable during dialysis.

Following this formal evaluation, a business case was written to recommend that all 40 dialysis chairs be provided with pressure mattresses, extra pillows and training with the unit staff to make them aware of all the uses of the dialysis chairs. The pressure mattresses were purchased through charitable funds, housekeeping provided more pillows and a renal engineer provided training on the dialysis chairs for all the renal unit staff. Benefits found were that patients were more comfortable during dialysis and their pressure care was improved. Staff are now able to spend more time on patient care and not moving furniture. The working environment was safer and less cluttered, allowing sufficient space for patient care. The unit now has clear criteria for a bed use. The number of beds has reduced by six.

Discussion: We have successfully evaluated the provision of comfortable seating for haemodialysis by prioritising patient views and experience. The project has resulted in successful application for funding to provide enhanced pressure mattresses for all dialysis chairs to improve patient experience and reduce use of beds, with multiple benefits also for nursing staff.

Monday 5th June 16:00 – 17:00

Track C1 – Haemodialysis 1

Poster: 124
Submission: 185

Establishing a Specialist Occupational Therapist role within the renal unit

Mrs Jo Hamilton, Professor Maarten Taal

UHDB, Derby

Introduction: Renal Replacement therapy (RRT) and its associated complications have substantial impact on the patient's physical function, quality of life and psychological wellbeing. Occupational Therapists (OTs) treat people holistically, (physically, psychological and socially) and are therefore in a good position to enhance their overall wellbeing. The workforce document, which the UK Kidney Association revised in 2020, identifies and supports that all Renal Units should have a full time OT with an understanding of the effects of RRT. In 2021, following submission of a comprehensive business case, funding was established for a renal specialist OT. We anticipated that creating the role in a unit with no renal psychologist, social worker or physiotherapist was going to be challenging. This role being rare nationally, we thought it would be helpful to report our experience during the first year.

Methods: A referral system was devised whereby staff or patients could refer their problems to the OT and these were screened to assess whether they were appropriate. Screening also identified whether patients required OT treatments or could be signposted to a different relevant agency to meet their needs.

Links were created to other services in the community, e.g., emergency response for therapy and care assessments for patients in their home, wellbeing services, community support schemes.

Once needs were starting to form a renal pathway was created with a psychological therapy service (PTS) for the OT to refer renal patients for psychological support. The OT would meet regularly with PTS team leader to answer any questions on CKD and dialysis.

Data were collected monthly regarding the number and source of referrals as well as number of patients seen. Progress was reviewed and challenges discussed in a monthly mentoring meeting with a consultant nephrologist. Informal feedback was sought from all members of the multidisciplinary team.

Results: Data showing the number and source of referrals are shown in Figure 1. Most referrals were from in-centre haemodialysis patients (ICHD) but over time the number of referrals from home haemodialysis patients (HHD), Peritoneal dialysis (PD), clinic and transplant recipients increased. A wide range of referrals was received, summarised in Table 1. Feedback from medical and health professions has been very positive and patients are now referring themselves.

Discussion: We have successfully established a Specialist OT role on the renal unit and have observed a growing demand for the service. The role itself keeps evolving but our initial experience clearly identifies the scope of support that OT can offer to this vulnerable population. We will continue to work with

patients to help improve their experience and quality of life. We hope that our experience and data will be helpful to other renal units seeking to establish a similar service.

Figure 1. Number and source of referrals to the Occupational Therapist

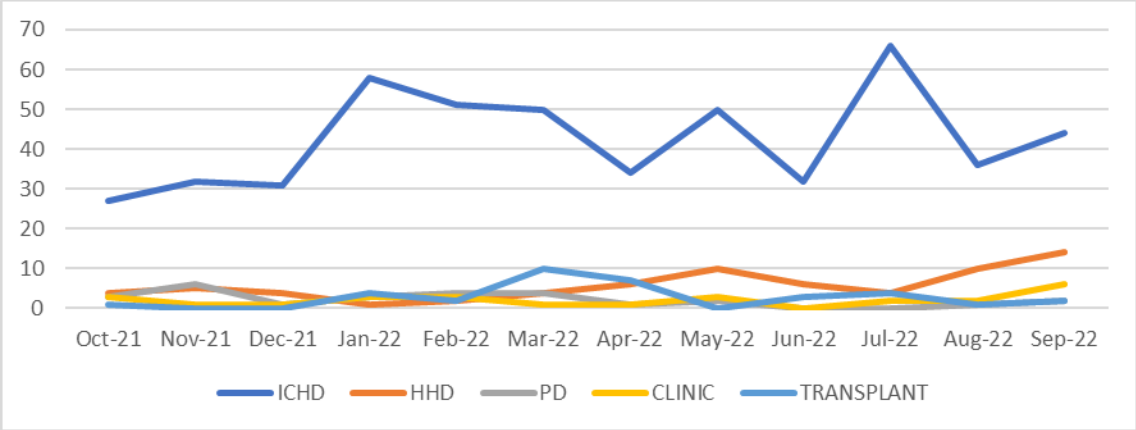


Table 1. Examples of referrals:

TRANSPORT ASSESSMENTS, BED/CHAIR ASSESSMENTS, CARE PACKAGES, EQUIPMENT, ADAPTATIONS, COPING REVIEWS, WHEELCHAIRS, GRANT APPLICATIONS, ADAPTIVE CUTLERY, SIGHT SERVICE, MENTAL HEALTH SUPPORT, BENEFIT REVIEWS, PRESSURE CARE, COMPLEX HOSPITAL DISCHARGES, SUPPORTING DISCHARGE ASSESSMENT UNIT, FATIGUE MANAGEMENT, ANXIETY MANAGEMENT.

Monday 5th June 16:00 – 17:00

Track C1 – Haemodialysis 1

Poster: 125
Submission: 211

The incidence of bacteraemia during the first 30 days of tunnelled haemodialysis catheter insertion in South West Wales

Dr Timothy Scale, Dr Panagiotis Bakoulas

Swansea Bay University Health Board, Swansea

Bacteraemia associated with central venous catheterisation is one of the most serious complications in patients undergoing haemodialysis with central venous catheters (CVC). Despite efforts to increase the proportion of patients starting dialysis with an arteriovenous fistula, a large percentage of them still use a central venous catheter for vascular access.

In an effort to quantify this issue in the South-West Wales area, we retrospectively looked into the patients that had a tunnelled CVC inserted for the purpose of gaining venous access for haemodialysis and those that developed bacteraemia no longer than 30 days after said procedure. We extracted data from the renal database in our area and we noted the incidence of bacteraemia in the 30 days that followed a tunnelled haemodialysis CVC insertion between 2015 and 2022. We then categorized these patients with a positive blood culture to likely, possibly or unlikely related to the CVC insertion. Risk factors, such as immunosuppression, difficult insertion, Diabetes Mellitus (DM), previous MRSA were also noted.

We found that in the last 8 years there have been 945 patients with tunnelled line insertions on our database. In these 945 insertions, 31 patients had at least one positive blood culture in the 30 days that followed the procedure. 13 were likely related to the line insertion, 7 were possibly related and 11 were unlikely to be related to the procedure. Therefore, the risk of developing bacteraemia likely or possibly related to the tunnelled CVC insertion was 1 every 47 insertions or 2.1% in the 30 days after the procedure. More specifically, our data suggests that patients who received a tunnelled line had a risk of developing Staphylococcus Aureus (SAUR) bacteraemia within the first 30 days of a line insertion of 1 in 118 insertions. All SAUR bacteraemias in the population we studied were likely or possibly related to the line insertion. All 13 patients that developed bacteraemia likely related to the tunnelled CVC insertion and 5 out of 7 patients with bacteraemia possibly related to the procedure were hospitalised. 5 deaths occurred that were likely or possibly related to bacteraemia developed during the 30 days following a tunnelled haemodialysis line insertion. We are currently assessing the risk factors and their importance in explaining the infection rates.

Year	Tunnelled lines inserted	Number of cultures taken	Positive cultures	People with positive cultures
2015	111	13	5	4
2016	104	32	6	6
2017	95	24	2	2
2018	123	39	3	3
2019	126	52	10	5
2020	125	34	4	2
2021	130	48	16	7
2022	131	36	4	2
	945	278	50	31

In conclusion, the review of our data shows an increased rate of infection in the 30 days after a tunnelled haemodialysis CVC insertion compared to the rate of infection in our chronic haemodialysis population as a whole. Consequently, this is an indicator that CVC dependent haemodialysis contributes negatively to the infection rate of HD patients in our units and greater efforts need to be made towards reducing the number of CVC dependent HD patients and reducing the infection rate related to tunnelled CVC insertions.

Monday 5th June 16:00 – 17:00

Track C1 – Haemodialysis 1

Poster: 126
Submission: 288

Magnetic resonance imaging assessment of skin and muscle sodium in haemodialysis

Dr Rebecca Noble[1,2], Dr Benjamin Prestwich[2], Miss Kelly While[1], Prof Maarten Taal[1,2], Prof Nicholas Selby[1,2], Prof Susan Francis[2]

[1]Centre for Kidney Research and Innovation, Derby.
[2]The University of Nottingham, Nottingham

Introduction: Haemodialysis (HD) is life sustaining for patients with end-stage kidney disease (ESKD) but is associated with a marked increase in incidence of cardiovascular disease (CVD) and high annual mortality rates. Sodium balance is regulated by the kidneys in health but has to be achieved by sodium removal during HD for those with ESKD. Recent evidence suggests that non-osmotically stored sodium in the muscle and/or skin may be a critical factor impacting the development of hypertension and CVD. Sodium magnetic resonance imaging (23Na MRI) allows the assessment of skin and muscle sodium storage and may provide a valuable tool in evaluating sodium storage in dialysis patients. In this study, we used 23Na MRI to measure muscle and skin sodium content in younger and older healthy individuals and people receiving HD, and investigated the effect of a single dialysis session on muscle and skin sodium content.

Methods: 23Na MRI was acquired on a 3T Philips Ingenia scanner using a custom-made 23Na RF coil. 3D GRE 23Na scans (3x3x30mm3, 10 slices) were acquired in a 15-minute scan. Four reference bottles of increasing sodium concentration (10, 20, 30 and 40mmol/L NaCl) were placed in the RF coil above the leg to calibrate sodium concentration. In the same imaging session, 1H MR images were acquired to delineate muscle groups, skin structures and tissue water content. 23Na concentration maps were generated using custom software and regions of interest of each muscle and the skin were manually segmented.

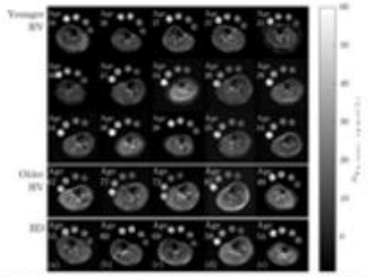
Data was collected on 14 younger (23-38yrs,7M:7F) and three older (66-77yrs,3M:1F) healthy volunteers (HVs), and 5 male HD patients (55-68 yrs) who had been on HD for more than 3-months. HD patients underwent a pre-dialysis 23Na MRI calf scan, then had their usual dialysis session with a dialysate Na prescription of 137 mmol/L, followed by a repeat 23Na MRI calf scan post dialysis. Patient demographics, dialysis vintage, residual renal function, and ultrafiltration volume were collected, along with blood samples at the start and end of the dialysis session, including serum sodium.

Results: Figure 1 shows 23Na images in the younger and older HV group and HD patients pre-dialysis. Muscle and skin sodium was increased in older HVs compared to younger, with HD patients pre-dialysis tending to be lower than older HVs (Figure 2). HD patients' demographics and clinical measures pre- and post-dialysis are shown in Table 1. HD treatment reduced muscle sodium whilst skin sodium showed little change (Figure 3).

Discussion We have optimised methods for measuring muscle and skin sodium. 23Na concentration in muscle and skin is higher in older subjects. HD patients' 23Na values fall between those observed in the older and younger HV groups. These values are consistent with published data from patients dialysed against 137mmol/l sodium dialysate, but lower than other studies in which dialysate sodium levels were higher. Further studies are planned to study the effect of dialysate sodium on skin and muscle sodium concentrations and mechanistic links to cardiovascular disease.

Subject ID	Age (yrs)	Serum Na		Actual ultrafiltration (ml)	Blood pressure				Time on RRT (days)	Residual urine output (ml/d)
		Pre-dialysis	Post-dialysis		Pre-Dialysis		Post-dialysis			
					Systolic	Diastolic	Systolic	Diastolic		
a	55	138	137	1960	150	94	121	78	174	1
b	60	145	141	1490	153	92	148	88	323	0
c	68	139	143	1960	194	62	153	83	752	1
d	58	140	137	1980	161	85	165	91	211	1
e	54	140	141	2340	159	88	157	103	714	1

Table 1: HD patient characteristics and clinical measures pre- and post-dialysis, all patients received a low dialysate ^{23}Na prescription of 137 mmol/L.



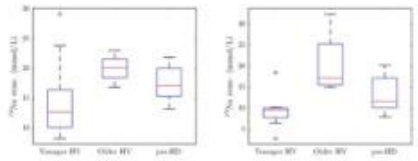
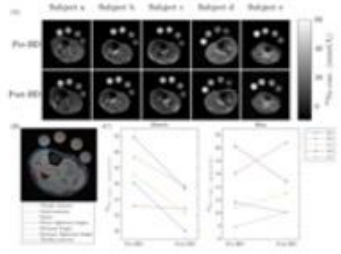


Figure 2: Mean ^{23}Na concentration in A) muscle and B) skin for the younger, older and the haemodialysis group pre-dialysis (pre-HD). Note an outlier in the younger group who high ^{23}Na in their muscle and skin.



Monday 5th June 16:00 – 17:00

Track C1 – Haemodialysis 1

Poster: 127
Submission: 303

Congestion on the M4: an analysis of regional critical care referrals to renal services in southeast Wales.

Dr Mark Davies, Dr Gareth Roberts, UHW Renal SpRs, Dr Rhodri Pyart

UHW, Cardiff

Introduction: Under current NHS pressures it is crucial that patients receive the right care in the right place at the right time. Renal replacement therapy (RRT) is required in hospital settings for:

- acutely unwell patients with acute kidney injury +/- other complex medical needs
- patients on chronic dialysis with new inpatient medical needs.

The models of RRT delivery to hospitalised patients varies between UK regions and renal networks. In our region, inpatient intermittent haemodialysis (IHD) is only provided in a single tertiary renal centre. Continuous RRT is provided in 6 critical care (CC) settings, but patients may be suitable for a renal care bed, and IHD.

We sought to understand the impact of this model on local CC services. We wanted to assess the proportion of referrals that were appropriate, times from referral to transfer and reasons for delayed transfer.

Method: Over 4 months, all CC discussions with the on-call Renal SpR were prospectively documented. Clinical information was recorded on our renal network database (VitalData) and a summary of the discussion was recorded in a bespoke data collection form. Retrospectively, the dates of transfer were collected from patients' records, along with reasons for delay etc.

Results: 45 new patients were referred from CC to the on-call Renal SpR, 36 after removing advice-only calls. 5 (14%) were chronic dialysis patients in ITU soley for RRT. 18 patients were suitable for transfer; of these 11 (61%) were ready for transfer at the time of referral . In only 5 cases was there a delay in transfer to the renal ward, once patient ready, of >24 hours; the main reason for delay was bed capacity. Results are shown in Tables 1, 2, 3, 4.

Table 1: Patients referred as needing, or may need, transfer

Referring Hospital	Total	All (eventually) suitable for transfer	Ready for transfer (at time of referral)
1	18	8	3
2	1	1	0
3	6	1	1
4	1	1	1
5	6	4	4
6	4	3	2
Total	36	18	11

"Advice only" calls excluded

Table 2: Reason for ITU admission

Reason for ITU admission	n
AKI in ITU for filter only	10
AKI in ITU for other reasons	13
Chronic dialysis in ITU for filter only	5
Chronic dialysis with another reason to be in ITU	8

Table 3: Numbers per hospital and delays in transfer

Referring Hospital	N	Delay in transfer	Referral-to-ready interval
1	18	24 (24,36)	36 (0,72)
2	1	96 (96,96)	24 (24,24)
3	6	24 (24,24)	0 (0,0)
4	1	0 (0,0)	0 (0,0)
5	6	24 (12,36)	0 (0,12)
6	4	24 (12,36)	0 (0,24)
Total	36	24 (18,48)	0 (0,48)

Delay and interval are median hours (interquartile range). Referral-to-ready interval is the time between first referral to the renal service and the patient being ready for transfer (i.e. no longer requiring CC services and appropriate for renal ward)

Table 4: Reasons for transfer delay > 24 hours

Reasons for delay	n
Bed availibility	4
Unclear	1

Discussion: Our data does not reflect a perception in local CC services that “renal” patients block ITU beds. Chronic dialysis patients do not appear to be a high “inappropriate” burden on CC services. It is paramount that chronic dialysis patients always have access to life-sustaining treatment. The data highlight the need for clear, transparent, agreed criteria for patients being suitable for transfer to the regional renal ward. This data is now being discussed with critical services in the region. We hope that working more collaboratively, with timely discussion of appropriate patients, will help us prioritise these patients and free up CC beds more readily. These data alone would not support the need for additional inpatient dialysis services in other hospitals - which would be extremely costly. This analysis demonstrates how prospectively collected data can help get an accurate picture about important local issues, that can contribute to meaningful discussions and future planning.

Monday 5th June 16:00 – 17:00

Track C1 – Haemodialysis 1

Poster: 128
Submission: 345

Delays in Transferring haemodialysis patients to Renal units may result in increased total hospital length of stay

Dr Antonious Hanna, Dr Usama Butt, Dr Pratik Solanki

East and North Herts NHS Trust, Stevenage

Introduction: Most renal units in the UK have adopted a hub and spoke model. Within the spoke aspect there may be multiple dialysis satellite units whose nearest hospital may not be the hub unit. These other hospitals tend to have limited attendance from a renal physician and the majority of discussions regarding patient care would be conducted via telephone. When an unwell haemodialysis patient who dialyses at a satellite unit attends their local hospital, there is often a lack of expertise in the attending clinical staff and additional procedures such as vascaths and haemofiltration in high dependence units may be required. Although these factors are well known, what is more difficult to appreciate is whether the length of stay is prolonged by a delay in transfer to the renal unit.

Method: We conducted the study at Lister Renal Department and retrospectively looked at data from the 1st June to 31st October 2021. Patients within our cohort can be admitted to 4 other local hospitals. We examined the outlier hospital documentation that had been created and updated by the oncall renal registrar. We excluded those who died during their admission. We conducted two tests. One comparing those who were transferred within 24 hours with those who were transferred after 24 hours. The other examining those who were transferred within 48 hours and those after 48 hours. We used an unpaired T-test in both cases. Our main study objective was looking at total length of stay.

Results: 77 haemodialysis dependent patients initially presented to their local (non-renal hub) hospital. 19 were excluded as they died during the admission.

Of the 58 remaining dialysis-dependent patients:

7 were not transferred, of which all were discharged within 3 days (mean average 1.1 days).

21 were transferred within 24 hours. The mean average total length of stay for these patients was 7.3 days. This compared to 13.4 days for those transferred after 24 hours.

Using an unpaired T-test, the p value was statistically significant at 0.0258

35 patients were transferred before 48 hours. The mean average total length of stay for these patients were 9.3 days. This compared to 14.4 days in those transferred after 48 hours.

Using an unpaired T-test, the p value was not significant at 0.0893

Discussion: This was an intriguing study which suggested that most haemodialysis patients would have benefitted from transfer directly to the renal department (Lister Hospital in this case) to receive treatment under the renal team. Interestingly, the data was only significant for those who were transferred within 24 hours, suggesting that early transfer is key in affecting length of stay. The next step would be to extend the study further and include a whole year of data, analysing possible confounders such as patients too unwell for transfer. In terms of intervention, we will be conducting an educational program about early transfer and exploring the use of dialysis passports to ensure that patients are directly brought to Lister Hospital in the future.

Monday 5th June 16:00 – 17:00

Track C1 – Haemodialysis 1

Poster: 129
Submission: 352

Assessing service provision for podiatry input in patients receiving haemodialysis for consideration of renal workface plan across multiple dialysis units

Dr Estelle Mills, Mr Pradeep Solanki, Dr Mysore Phanish

Croydon University Hospital, London

Diabetes mellitus is a common cause of end stage renal failure requiring renal replacement therapy (RRT) either peritoneal or haemodialysis.

Those on RRT are at an increased risk of foot ulceration, infection and amputation. Mortality is also increased in those with diabetic foot ulcers. In order to consider this risk, NICE guidelines emphasise recognising those at higher risk, ensuring they have appropriate service referral and monitoring.

Despite this increased risk of severe complications; there is not a definitive provision for podiatry input links with haemodialysis centres locally. This is a pilot study to survey satellite dialysis unit patients, exploring their current level of foot care input, their risk level, current or previous foot ulcers and amputation, and self-recollection of risk status.

Methods: A list of diabetic patients on haemodialysis at the satellite unit was obtained n=30. A simple data collection sheet was developed, and the patients gave informed consent and were all interviewed using the structure of the data collection sheet. The results of the survey were anonymised and the survey data was performed, collected and interpreted by separate people.

Results: 30 patients were surveyed at the satellite dialysis unit. 14 (47%) of the interviewed patients did not recall if they had foot screening in the last year. Of these 14, 9 did not know their risk stratification score (64%). General Practitioners, Practice Nurses, and Podiatrists made up 80% of clinicians who performed the foot screenings.

9 of the 30 patients have regular podiatry appointments, with the site of their regular podiatry appointments varying. There was a high variation in how often they were followed up by podiatry; from being seen every 1 to 140 days.

4 of the 30 patients had a current foot ulcer, 3 of these were on the toes and 1 on the ball of the foot. Of these 4, 1 patient did not know where their foot ulcer was currently being treated. 9 of the 30 (30%) patients had had a previous foot ulcer, and 1 of the 30 (3%) had had a previous amputation of part of the foot.

Discussion: As 64% of the patients who had a recent screening did not recall their risk level, there should be further efforts for education to ensure patients are aware of and understand the risk stratification.

The number of patients who have podiatry follow up and the frequency of their appointments varied, which requires further investigation to minismise risk to the patients.

This survey will be completed at other satellite units within the region to obtain a wider view of foot care within haemodialysis units. This will provide further information on the needs of these patients and service gaps. It would also provide context for further multidisciplinary work including education, intervention and prevention of foot ulcers and infections, improving outcomes and mortality for these patients.

Monday 5th June 16:00 – 17:00

Track C1 – Haemodialysis 1

Poster: 130
Submission: 374

Acting on results: Utilising the findings from the NightLife study 12-month internal pilot to understand study processes, NHS service delivery, and remodel the recruitment trajectory.

Dr Katherine L Hull[1,2], Ms Niamh Quann[3], Dr James Fotheringham[4,5], Dr Victoria Cluley[6], Dr Helen Eborall[7], Dr Carmel Conefrey[8], Dr Leila Rooshenas[8], Professor James O Burton[1,2,9]

[1]Department of Cardiovascular Sciences, University of Leicester, Leicester.
[2]John Walls Renal Unit, University Hospitals of Leicester NHS Trust, Leicester.
[3]Leicester Clinical Trials Unit, Leicester.
[4]School of Health and Related Research, University of Sheffield, Sheffield.
[5]Department of Renal Medicine, Sheffield Teaching Hospitals NHS Trust, Sheffield.
[6]School of Sociology and Social Policy, University of Nottingham, Nottingham.
[7]Usher Institute College of Medicine and Veterinary Medicine, University of Edinburgh, Edinburgh.
[8]Population Health Sciences Bristol Medical School University of Bristol, Briston.
[9]School of Sport, Exercise and Health Sciences, Loughborough University, Loughborough

Introduction: In-centre haemodialysis capacity is constrained by slot availability and high demand; dialysis capacity requires careful consideration for clinical service and recruitment to trials of alterative haemodialysis regimens. The NightLife study is a randomised controlled trial to evaluate the impact of in-centre nocturnal haemodialysis (INHD), compared to daytime in-centre haemodialysis on quality of life. An internal pilot review was undertaken at the end of the first 12-months of study recruitment to evaluate trial feasibility and assess INHD NHS service delivery.

Methods: The internal pilot review evaluated site set-up, participant recruitment and retention. The processes and associated timeline required to achieve research governance clearance and development of an INHD service were mapped out. Recruitment totals and rates across different sites were reviewed to identify characteristics or challenges that influenced recruitment. Future participating site interest was confirmed, alongside recruitment potential and dialysis capacity. Findings were utilised to model the recruitment trajectory for the remaining 18-month study period.

Results: Three NHS Trusts with eight participating dialysis units contributed to the internal pilot, achieving the 12-month site set-up target. Site set-up was completed with achievement of sponsor green light in ≈14 months. Recruitment was below the 12-month target (30 participants randomised, 12-month target was 96). Participant retention was significantly higher than expected; the crossover rate from INHD to daytime haemodialysis was 3%, much below the anticipated 25%.

Participating sites were categorised as *naïve* (require INHD service set-up) or *established* (existing INHD service prior to study participation). 63% of the recruited participants were obtained from a single naïve site; recruitment occurred rapidly until INHD bed capacity was saturated. Recruitment from the

established sites relied on natural flow of patients through the service (i.e. change in dialysis modality, transplantation, prolonged hospital admission or death), with a rate of ≈1 participant per month.

Fifteen sites had expressed an interest to join the NightLife study; 14 were naïve sites. The recruitment trajectory was remodelled. The site online date was estimated as 14 months from first contact. The observed recruitment rates for naïve and established sites were combined with the randomisation ratio (1.33:1, intervention:control) and INHD bed capacity, until target recruitment for each site is achieved. This demonstrated the potential to achieve the original target sample size (350 participants) over the 30-month recruitment period (Figure 1).

Discussion: Remodelling of NightLife study recruitment using internal pilot data demonstrated it is non-linear with participants joining in a stepwise manner, with influxes of participants as INHD naïve sites join the study and steady recruitment from INHD established sites. This resulted in a shift in focus to assisting naïve sites in INHD service development, meeting research governance clearance and achieving sponsor green light.

These learnings translate to other interventional studies, pilot data, and operational dialysis service management in the NHS: understanding and modelling of bed capacity would aid expansion or alteration to dialysis shift patterns, and crisis planning e.g. water treatment plant failure.

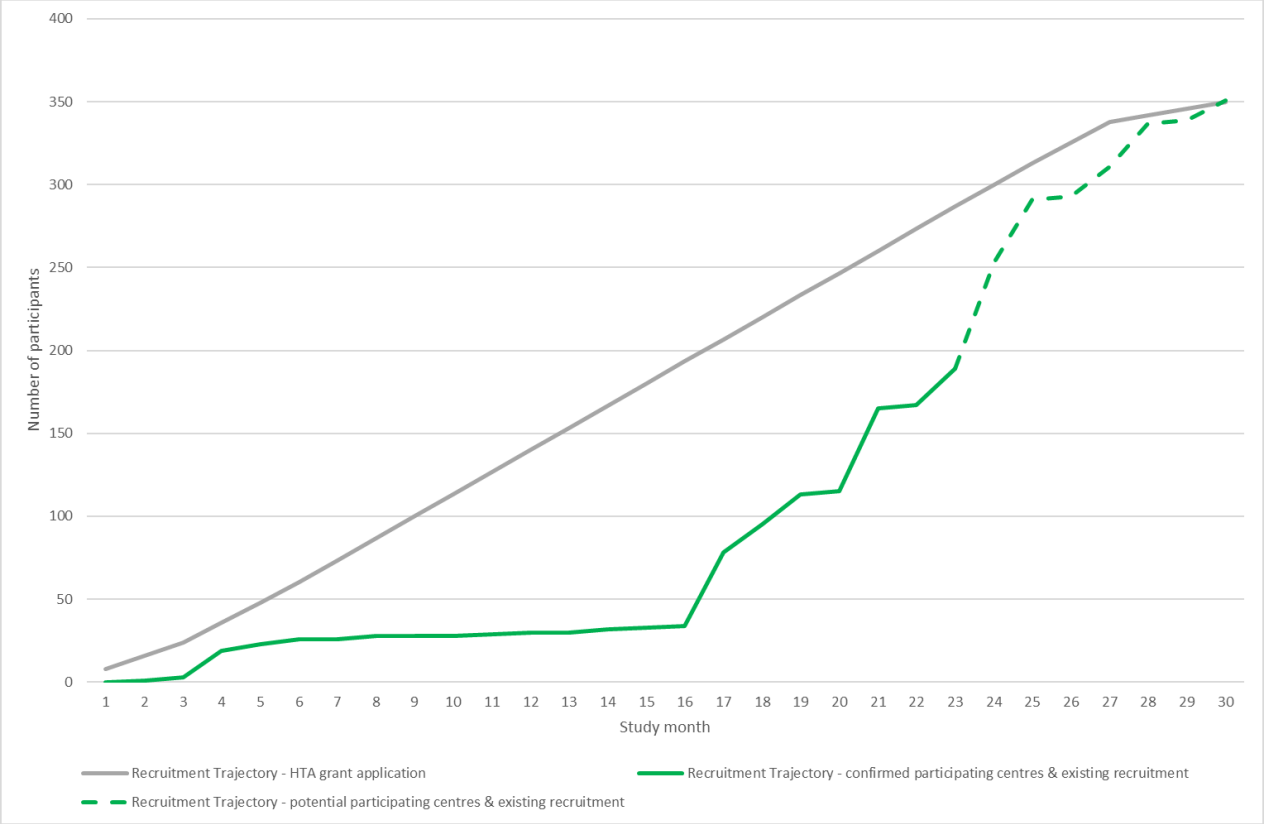


Figure 1 - NightLife study recruitment metrics: actual recruitment from Year 1 and projected recruitment for Year 2 and 3.

Monday 5th June 16:00 – 17:00

Track C2 – Haemodialysis 2

Poster: 131
Submission: 378

Death in haemodialysis patients after recovering from covid 19

Dr Nageen Anwar, Dr Syazril Samani, Dr Abraham Abraham

Liverpool University Hospitals, Liverpool

Introduction: Patients with end stage renal disease (ESRD) have weak immune systems making them more prone to infections including Covid 19. In centre haemodialysis (ICHD) also makes patients more exposed to infections such as Covid 19 as they are attending dialysis units 2 -3 times a week. Additionally high comorbidity burden and frailty in most ICHD patients causes them to have more severe infections with serious complications, leading to adverse outcomes. Studies show that mortality rates in patients with ESRD who get Covid 19 are higher than normal population. In a previous study done at our hospital it was found that ICHD patients who developed covid 19 but recovered from it also had a higher mortality than those who did not have Covid 19. We wanted to investigate this further to see what the causes of death were in these patients and how they compared to patients who have not had Covid 19 infection.

Methods: This was a retrospective study done at Liverpool University hospitals (LUHFT). All ICHD patients who had Covid 19 infection and died (either due to Covid 19 or other unrelated causes post recovery) at LUHFT between March 2020 to July 2021 were included. Data was collected using the patient's hospital records and documentation for cause of death.

Results: During the duration of our study 37 patients on ICHD who developed covid 19 infection died due to this. 21 patients recovered from Covid 19 infection but subsequently died of other causes. Out of these 10 died due to ESRD related complications, 6 due to infections 2 due to malignancy, 2 due to ICH, 1 due to bowel ischaemia.

Discussion: Covid 19 has had a significant impact on patients with ESRD. Our results show that not only is Covid 19 associated with higher mortality from acute infections but also after recovery from initial infection. The causes of death were variable in the patients we studied. Majority of deaths post recovery from covid 19 were due to ESRD related complications and subsequent infections. This may reflect increased frailty and reduced physiological reserve in these patients.

Monday 5th June 16:00 – 17:00

Track C2 – Haemodialysis 2

Poster: 132
Submission: 384

An exploratory study of gut permeability in subjects on haemodialysis: response to an oral beta-D-glucan load

Dr Oscar Swift[1], Dr Malcolm Finkelman[2], Dr Yonglong Zhang[2], Miss Eunice Doctolero[1], Mrs Chadd Javier[1], Mr Mikky Gilbert[1], Dr Sivakumar Sridharan[1], Professor Ken Farrington[1], Dr Enric Vilar[1]

[1]East and North Hertfordshire NHS Trust, Stevenage. [2]Associates of Cape Cod, East Falmouth

Introduction: End stage kidney disease (ESKD) is associated with chronic inflammation. A combination of increased gut permeability and impaired hepatic clearance of gut-derived toxins are likely contributory factors to chronic inflammation in ESKD.

Gut permeability assessment in kidney impairment is complex as traditional gut permeability probe concentrations are significantly influenced by residual kidney function.

(1-3)-β-D glucans (BDG) are glucose polymers found in dietary plant material and also fungi and bacteria. BDG predominantly undergo reticuloendothelial (primarily hepatic) clearance. Elevated serum BDG levels have been previously observed in chronic kidney disease and may reflect systemic translocation of gut derived material from the portal system.

This study aimed to establish differences in serum BDG concentrations in individuals with normal kidney function (NKF) and ESKD following ingestion of a BDG-rich meal.

Methods: 20 participants with ESKD receiving haemodialysis via an arteriovenous fistula with a median baseline serum C-reactive protein (CRP) ≥5mg/L over the previous 3 months and 20 participants with NKF were studied. Participants with active infection, autoimmune disease, gastrointestinal disease and hyperkalaemia were excluded.

All participants followed a low fibre diet for 48 hours and fasted for 12 hours prior consuming a BDG-rich drink delivering 10mg/gram of BDG. In the ESKD cohort, the drink was consumed immediately prior to a dialysis session following a 1-day interdialytic gap.

In addition to routine blood tests, serum BDG levels were measured at: baseline, 0.5, 1, 1.5, 2, 3, 4, 6 and 48 hours. Serum BDG measurements were performed using the Fungitell® assay (Associates of Cape Cod, Inc). Faecal calprotectin and alpha-1-antitrypsin were also analysed.

Results: 20 participants with ESKD receiving haemodialysis (mean age 66.8) and 20 participants with NKF (mean age 44.6) were recruited.

Baseline serum BDG levels were higher in the ESKD group (NKF group 29.6pg/ml versus ESKD group 67.1pg/ml, p = 0.001) and at all other timepoints (Figure 1). There were no significant differences in change from baseline BDG levels between groups. Individual BDG levels post meal ingestion are shown in Figure 2.

Baseline serum BDG levels correlated strongly with median baseline CRP over 3 months (p = 0.001) however this relationship was not present when the two groups were examined separately. Faecal calprotectin and alpha-1-antitrypsin did not correlate with baseline serum BDG measurements (p = 0.93, p=0.78, respectively).

Discussion: Elevated BDG levels are observed in ESKD and increase both during and immediately following dialysis after ingestion of a BDG load. In addition to dietary BDG, translocation of gut-derived microbial BDG into the systemic circulation may play an important role in contributing to systemic inflammation observed in advanced kidney disease. Elevated BDG may reflect increased gut permeability which may be secondary to uraemic toxin related gut barrier dysfunction or splanchnic ischaemia related to ultrafiltration.

Figure 1 Changes in serum beta-D-glucan levels in inflamed haemodialysis patients and individuals with normal kidney function following ingestion of a beta-D-glucan meal

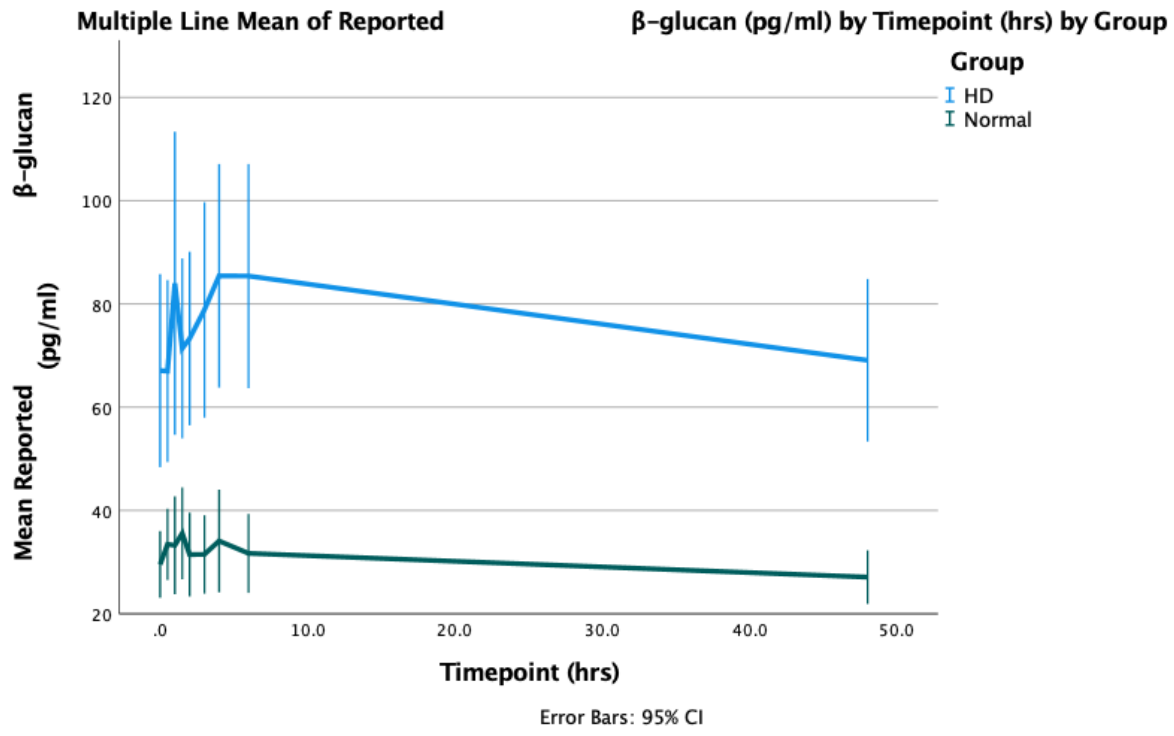
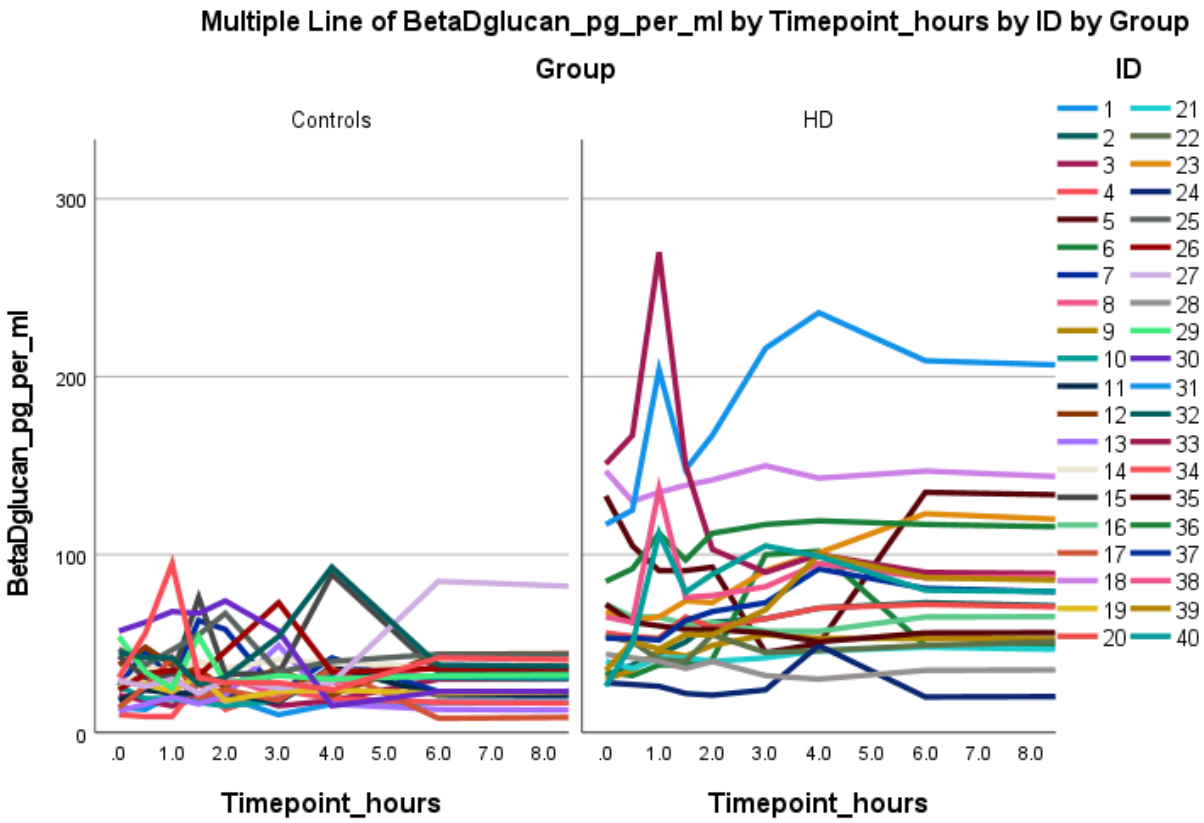


Figure 2 Individual changes in serum beta-D-glucan levels in inflamed haemodialysis patients and individuals with normal kidney function following ingestion of a beta-D-glucan meal


Multiple Line of BetaDglucan_pg_per_ml by Timepoint_hours by ID by Group
Group
ID
Controls
HD
BetaDglucan_pg_per_ml
300
200
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Monday 5th June 16:00 – 17:00

Track C2 – Haemodialysis 2

Poster: 133
Submission: 386

Beta-glucan is elevated in people requiring dialysis and associates with inflammation and transient elastography values equivalent to suspected hepatic fibrosis and steatosis

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Introduction: People with end-stage kidney disease (ESKD) commonly co-exhibit multiple risk factors (type 2 diabetes mellitus, obesity and hypertension) for non-alcoholic fatty liver disease (NAFLD) and its progressive, fibroinflammatory form non-alcoholic steatohepatitis (NASH). NAFLD and NASH associate with increased risk of fatal cardiovascular events. NASH will soon become the leading cause of cirrhosis both in the UK and worldwide.

The cause of systemic inflammation in ESKD is unclear. Liver disease can contribute to inflammation due to reduced reticuloendothelial function and systemic circulation of gut-derived toxins. Beta-D-glucan (BDG), a cellular component of dietary plant material and also fungi and bacteria, is elevated in ESKD and is a promising marker of gut-derived toxins.

This study reports interim findings on relationships between systemic inflammation, liver impairment and serum BDG in ESKD.

Methods: This prospective study involves prevalent patients with ESKD receiving dialysis (for >3 months) at five participating UK sites. Results are derived from analysis of the first 238 patients (recruitment target 450).

A FibroScan (Echosens) was used to measure hepatic steatosis using controlled attenuation parametrography (CAP) and fibrosis using transient elastography. A fibrosis-4 index score assessed fibrosis risk. These results were supplemented by baseline clinical and radiological data, serum beta-D-glucan levels pre- and post-dialysis, clinical assessment of fluid status, and bioimpedance spectroscopy (Fresenius Medical Care).

Results: Mean age of participants was 63 years (67% male). Mean dialysis vintage was 1041 days. 97% had hypertension, 53% had diabetes mellitus and 65% had hyperlipidaemia. Mean body mass index was 27.8kg/m2.

BDG levels were greater post-dialysis than pre-dialysis, even after correcting for haematocrit changes (88.6pg/ml vs 76pg/ml, $p<0.001$). Pre-dialysis BDG levels correlated significantly with baseline liver stiffness measurement determined by elastography (rho = 0.184: $p = 0.005$). Pre-dialysis BDG strongly correlated with an elevated fibrosis-4 index ($p=0.001$), ALT ($p=0.001$), AST ($p=0.0027$) and a low platelet count ($p=0.005$). Patients with high median CRP levels over previous 3 months (≥ 5 mg/l) had higher BDG than those with lower levels (83.7 vs 56.1 pg/ml: $p = 0.009$) and higher readings for liver stiffness (6.5 (6.8) vs 5.3 (3.5): $p= 0.004$). Baseline BDG levels were higher in those with suspected hepatic steatosis but not significantly (85.9 vs 74.2 pg/ml: $p =0.088$). In contrast median CRP levels were significantly higher in those with suspected hepatic steatosis (9.1 (15.2) vs 4.8 (6.8): $p <0.001$). Ultrafiltration rate strongly correlated with pre- and post-dialysis BDG levels but not with change in BDG levels. The use of cellulose containing dialysis membranes did not associate with pre- or post-BDG levels or with change in levels across the dialysis session.

Discussion: BDG levels were significantly higher post-dialysis than pre-dialysis. This was unrelated to the use of cellulose containing dialysis membranes. There were strong associations between BDG levels, systemic inflammation and non-invasive assessment of increased hepatic fibrosis risk. Elevated BDG observed in dialysis patients may be the result of a combination of increased gut permeability and impaired liver function. BDG may contribute to the chronic inflammatory state observed in advanced kidney disease.

Monday 5th June 16:00 – 17:00

Track C2 – Haemodialysis 2

Poster: 134
Submission: 402

A novel integrated multidisciplinary care model for patients on maintenance haemodialysis: results from a single-centre retrospective study

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Introduction: Patients receiving maintenance haemodialysis have complex care needs, requiring coordination between multiple healthcare professionals. Innovative, collaborative pathways are needed to reduce risk of errors and missed opportunities in care, and to address the complex needs of this group.[1]

We developed the Biannual Comprehensive Haemodialysis Multidisciplinary Team (BCH MDT) care model. This study aimed to assess its effectiveness in delivering a coordinated multidisciplinary healthcare service.

Methods: Weekly meetings are held in our centre at which all patients on maintenance haemodialysis are reviewed biannually. Meetings are attended by the patient, nephrologist, dialysis specialist nurses, dialysis access specialist nurse, iron therapies specialist nurse, renal dietician, renal transplant co-ordinator, palliative care consultant, and renal social worker. Meetings are structured around a specially designed proforma.

In this single-centre retrospective study, data were collected from 146 patient encounters with the BCH MDT from two time periods: August-December 2020, when the initiative was commenced (n=63) and February-July 2022, when it had been running for two years (n=83). In addition, written anonymous feedback was collected from both patients and multidisciplinary healthcare professionals who participated.

Results: Outputs from patient-MDT encounters included investigations planned (60 patient encounters; 41% of all encounters), referrals made to other specialists (48 encounters, 33%), changes to dialysis prescriptions (54 encounters, 37%), changes to medications (57 encounters, 39%) dialysis access issues addressed (38 encounters, 28%), and new ReSPECT discussions[2] (37 encounters, 25%).

The proportion of patients achieving their prescribed Kt/V was 63% (2020 group) and 77% (2022 group). Of patients who were considered to be eligible for referral for a renal transplant assessment, the proportion of those who had not yet been referred and were referred directly via the BCH MDT was 13% (2020 group) and 10% (2022 group).

Feedback from 18 patients and 13 multidisciplinary healthcare professionals who had participated was overwhelmingly positive, and provided insights and directions for successful service delivery.

Discussion: The BCH MDT is an effective method of delivering coordinated multidisciplinary care for haemodialysis patients. Staff in our centre use it as an opportunity to review and optimise care, resulting in high numbers of actions and adjustments to care.

In this uncontrolled study, there was improvement over time in the proportion of patients achieving adequate Kt/V, and in referral rates for transplant assessment, suggesting a positive impact on care. While the model is not a replacement for pre-existing referral pathways, it has helped to seal gaps in care by preventing missed opportunities to refer patients for renal transplant assessment or other specialist care.

The initiative is viewed positively both by patients and by multidisciplinary healthcare professionals involved.

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2. Hawkes CA, Fritz Z, Deas G, et al. Development of the Recommended Summary Plan for Emergency Care and Treatment (ReSPECT). Resuscitation. 2020;148:98-107. doi:10.1016/j.resuscitation.2020.01.003

Monday 5th June 16:00 – 17:00

Track C2 – Haemodialysis 2

Poster: 135
Submission: 404

An assessment of the impact of using incremental haemodialysis as the default starting option in a dialysis unit

Mr Stuart Ross, Dr Scott Day, Dr Stewart Lambie

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Introduction**:** Most patients starting haemodialysis still have significant residual kidney function. Usual practice is to start all patients on a standard thrice weekly dialysis schedule regardless of their residual kidney function. While this one size fits all approach ensures that all patients are adequately dialysed and does not require dialysis prescriptions to be individualised, it does not take into account the negative impact that dialysis will have on a patient's residual kidney function and on their quality life. Strategies that can preserve the residual kidney function of haemodialysis patients should confer survival benefit. Incremental haemodialysis, essentially starting patients on twice weekly HD while their RRF is preserved, has some evidence suggesting that it may preserve RRF longer and that it can be used without negatively affecting mortality or morbidity. From 2019 this was the default method of starting HD in our base and satellite units. We now report on the outcomes of that change.

Method**:** All new hospital haemodialysis patients transferring from our Advanced Kidney Care Clinic were started on twice weekly haemodialysis unless they had hyperkalaemia or fluid overload in the months before starting. Any unplanned starts, peritoneal dialysis patients transferring to haemodialysis and failing transplant patients were also started on twice weekly haemodialysis unless they had a residual urine volume of < 600ml in 24 hours. Patients were asked to complete a 24 hour collection of urine every 6 weeks which was used with our routine blood testing to calculate their residual urine volume, KrU urea clearance and total Kt/V. Patients were maintained on twice weekly haemodialysis for as long as their residual urine volume was > 600ml/24 hours, KrU Urea Clearance > 3ml/min and total Kt/V > 2. Any evidence of failure to thrive on haemodialysis, hyperkalaemia or fluid overload also necessitated an increase to three times per week haemodialysis regardless of the patient's residual urine volume or KrU urea clearance.

Results**:** Since August 2019 we have started 40 patients on incremental haemodialysis with no increased hospitalisation in this group. Patients were maintained on twice weekly haemodialysis for a mean of 34 weeks with 9 patients continuing for over one year. There are currently 24 patients on incremental haemodialysis representing 27% of all haemodialysis patients. The unit has saved or avoided:

- >£110,000 in consumables and taxi costs
- 48,000 miles in travel
- 67 tonnes CO^2
- 3 tonnes of non-recyclable waste
- 1,486 dialysis sessions

Discussion**:** Incremental haemodialysis allows new haemodialysis patients to be safely started on haemodialysis treatment in a more patient centred way. It reduces the burden associated with starting dialysis while also having significant cost saving and environmental benefits. Some additional testing and monitoring of results is required but the time and costs associated with this are minimal when compared with the potential savings.

Monday 5th June 16:00 – 17:00

Track C2 – Haemodialysis 2

Poster: 136
Submission: 407

A review of all patients requiring unplanned acute kidney replacement therapy (KRT) in a tertiary renal setting- a retrospective analysis

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[2]School of Medicine- Cardiff University, Cardiff

The UK Renal Registry (UKRR) reports annually on incident kidney replacement therapy (KRT) patients. Patients requiring acute haemodialysis can be classified as either acute dialysis or chronic dialysis, depending on whether the treating physician believes that the patient will recover renal function. After 90 days, acute dialysis patients are additionally labelled as chronic dialysis if no renal recovery occurs, and KRT is continued. Patients requiring unplanned KRT have a higher mortality rate, with worse short and long-term outcomes, when compared to planned KRT cohorts. Centre-level variations in reporting acute and chronic dialysis rates undermines outcome data.

We retrospectively analysed all patients who had at least one unplanned haemodialysis session in a regional renal centre, between 2 March 2020 and 1 June 2022. Data was obtained from the renal data system. 265 patients were identified. To further analyse this cohort, we defined three separate clinical groups of patients requiring unplanned KRT:

1. Acute Kidney Injury (AKI)- any patient requiring unplanned KRT for an abrupt decline in kidney function
2. Chronic Kidney Disease (CKD)- any patients requiring unplanned KRT who were under regular follow up in nephrology clinic for more than 3 months
3. End Stage Renal Disease (ESRD) at presentation- previously labelled as late presenters or 'crash landers', these were patients presenting with an unplanned KRT with no clear reversible factors

This third group could be further divided into:

1. New ESRD at presentation- patients requiring KRT for more than 90 days, who had been first seen by nephrology within 3 months of KRT initiation
2. Known ESRD at presentation- patients requiring KRT for more than 90 days who had previously been seen by nephrology, but not under regular follow up
3. Unknown ESRD at presentation- patients requiring KRT for more than 90 days, who had never been seen by nephrology

The number of patients in each group is shown in table 1.

Group of acute patients	**Number** of patients	**Percentage** of total patients
AKI	191	72 %
CKD	45	16 %
ESRD at presentation	29	11 %

Further analysis of the AKI group revealed a clear difference in renal recovery, dependent on the presence or absence of CKD prior to developing AKI (table 2).

Group	Number of patients	Percentage of total
Total AKI	191	
Recover	148	77%
Long term	43	23%
AKI only	133	
Recover	114	86%
Long term	19	14%
AKI on CKD	58	
Recover	34	59%
Long term	24	41%

55 of the 191 AKI patients died during follow up, with 50 patients (91%) dying within 6 months of the first KRT session.

The CKD group consisted of patients who, although known to nephrology, had unpredictable decline in their renal function.

In the ESRD at presentation group, 8 of 29 patients were classified as new ESRD. 8 patients were classified as known ESRD, with 6 of the 8 patients discharged from follow up due to clinic non-attendance. The remaining 13 patients had never been seen by nephrology prior to requiring KRT. 14 of the 29 patients in this group had regular blood testing via primary care.

We believe that there are clear benefits to changing the classification of patients requiring unplanned KRT. Separating this heterogenous group into three subgroups (AKI, CKD and ESRD at presentation) allows for more targeted interventions, both to reduce future patient presentation, and ongoing support for these patients.

Monday 5th June 16:00 – 17:00

Track C2 – Haemodialysis 2

Poster: 137
Submission: 413

Assessing service provision for podiatry input in patients receiving haemodialysis for consideration of renal workforce plan across multiple dialysis units

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[2]Renal Unit, Epsom and St helier University Hospitals NHS trust, London.
[3]Croydon Health Services NHS trust, Croydon University Hospital NHS Trust, London

Diabetes mellitus is a common cause of end stage renal failure requiring renal replacement therapy (RRT) either peritoneal or haemodialysis. Those on RRT are at an increased risk of foot ulceration, infection and amputation. Mortality is also increased in those with diabetic foot ulcers. Taking these risks into account, NICE guidelines emphasise recognising those at higher risk and ensuring they have appropriate service referral and monitoring.

Despite this increased risk of severe complications; there is not a definitive provision for podiatry input links with haemodialysis centres locally. This is a pilot study to survey satellite dialysis unit patients, exploring their current level of foot care input, their risk level, current or previous foot ulcers and amputation, and self recollection of risk status.

Methods: A list of patients with diabetes on haemodialysis at Croydon satellite dialysis unit was obtained n=30. A simple data collection sheet was developed, and the patients gave informed consent and were all interviewed using the structure of the data collection sheet. The results of the survey were anonymised and the survey data was performed, collected and interpreted by separate people.

Results: 30 patients were surveyed at the satellite dialysis unit. 14 (47%) of the interviewed patients did not recall if they had foot screening in the last year. Of these 14, 9 did not know their risk stratification score (64%). General Practitioners, Practice nurses and podiatrists made up 80% of clinicians who performed the foot screenings.

9 of the 30 patients have regular podiatry appointments, with the site of their regular podiatry appointments varying. There was a high variation of how often they were followed up by podiatry; from being seen eve ry 1 to 140 days.

4 of the 30 patients had a current foot ulcer, 3 of these were on the toes and 1 on the ball of the foot. Of these 4, 1 patient did not know where their foot ulcer was currently being treated. 9 of the 30 (30%) patients had had a previous foot ulcer, and 1 of the 30 (3%) had had a previous amputation of part of the foot.

Discussion: As 64% of the patients who had a recent screening did not recall their risk level, there should be further efforts for education to ensure patients are aware and understand the risk stratification. The number of patients who have podiatry follow up and frequency of their appointments varied, which requires further investigation to minimise risk to the patients.

This survey will be completed at other satellite units under Epsom and St Helier Hospitals NHS trust Renal services to obtain a wider view on footcare within haemodialysis units. This will provide further information on the needs of these patients and service gaps . It would also provide context for further multidisciplinary work including education, intervention and prevention of foot ulcers and infections, improving outcomes and mortality for these patients.

Monday 5th June 16:00 – 17:00

Track C2 – Haemodialysis 2

Poster: 138
Submission: 438

Not enough to go around: Managing immediate haemodialysis capacity needs in a service under pressure

Ms Eleanor King, Ms Joanne Welch, Ms Rhiannon Winfield

York & Scarborough Teaching Hospitals NHS Foundation Trust, York

Context: Our Renal Service provides treatment for over 500 patients with haemodialysis provided at four centres. The service also has an active home therapies programme supporting both peritoneal dialysis and home haemodialysis.

For the last decade ongoing capacity for growth has been a concern. The requirement for dialysis sessions has approached the physical capacity of our units and that of the current staffing establishment. There are significant concerns about the condition of the physical estate. An absence of capital funding has been a major barrier to expansion or rebuilding of facilities.

The risk to service sustainability had been well described throughout this time. In May 2022 managers presented a short-term action plan to the Trust Board. This described the immediate needs of the service in order to maintain access to haemodialysis. The plan was agreed with the expectation that additional enabling funding would need to be sought from the wider health care system.

Situation: In July 2022 the service identified an immediate crisis with insufficient capacity to dialyse all patients.

This had arisen due to a 'perfect storm' of factors:

- High demand for acute inpatient dialysis sessions
- High demand for cohort dialysis of covid + patients
- A surge in new chronic patients requiring sessions

Action: The service moved to a crisis response footing with thrice weekly sitrep meetings for all haemodialysis unit managers together with operational managers, matron and clinical lead for the service. These meetings allowed for 'in the moment' decision making to manage capacity. We also informed the CQC and provided updates as the situation unfolded.

The Multi-disciplinary team reviewed all patients dialysing in one centre and agreed a number of them should be reduced to a twice weekly dialysis regime for two weeks. These patients were informed of the situation, given bespoke advice, medication adjustments and were closely monitored. At the end of the first week, it was clear that the crisis had not abated so a second, different cohort of satellite unit patients were identified to reduce to twice weekly whilst the first cohort returned to thrice weekly. Finally, a third cohort were identified who also dialysed twice weekly for a fortnight. After six weeks

acute pressures had lessened, and thrice weekly dialysis was resumed for all patients. We then accelerated opening an additional small shift at a satellite unit, staffed using long day efficiencies and through the goodwill of staff taking on extra hours.

Reflection: Although planning had been taking place over several years and there was a widespread awareness of the risk, this situation nevertheless required an emergency response and a significant, though temporary, change to dialysis treatment. This was distressing for some patients and families.

We have maintained the discipline of weekly ‘sitrep’ meetings, ensuring that we are sighted on day-to-day pressures and dialysis capacity is used equitably.

We believe our experience can be helpful for all units facing growth in patient numbers in a context where capital funding is scarce. We would recommend all units consider their emergency plans for a capacity crisis.

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Track C2 – Haemodialysis 2

Poster: 139
Submission: 461

An innovative safety device to improve dialysis line safety: user experience and mechanical evaluation

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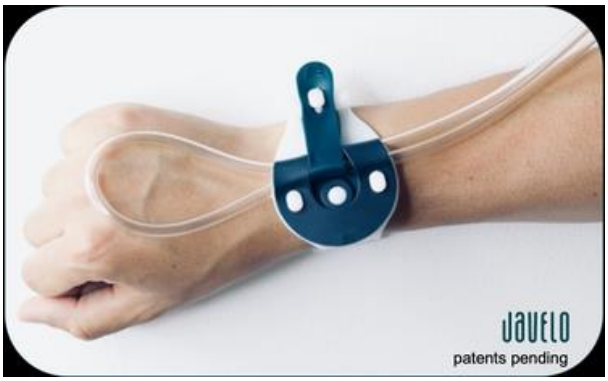
[3]University of Edinburgh, Edinburgh

Introduction: Approximately 300-500ml of blood flows through a haemodialysis (HD) circuit each minute during an episode of HD that may last up to 3-4hrs. A break in the circuit between patient and machine therefore carries the risk of significant, rapid blood loss and haemorrhagic shock. Published rates of needle dislodgement (ND) in the academic literature, when applied to the UK HD population, suggest anywhere between 40 and 4000 patients experience minor or major blood loss each year as a result of ND. Needle taping remains standard practice; however, methods to secure dialysis lines varies between providers. A standardised medical device that secures lines may therefore improve patient safety and overall confidence during HD, especially when considering home and/or in-centre nocturnal therapy.

Methods: We designed, developed and manufactured a simple, single-patient, reusable medical device capable of securing needle or machine HD lines/tubing on a patient limb (see Figure 1). Twelve healthy volunteers undertook qualitative comfort testing. Each simultaneously wore the device, a commercially available adhesive product and adhesive tape for between 1-4 hours. After removal, they were asked to score each device for overall comfort and rank them by preference. 5 HD nurses from 4 different UK sites were invited to score the device overall and identify an area for improvement. Finally, we evaluated the device's mechanical capacity to withstand force and prevent line displacement using an adapted Instron machine, force displacement software and standard medical tubing. We compared this to other commercially available securement devices. All data are presented as mean with standard deviation.

Figure 1



Results: The device received an average comfort score of 8.83 (±0.94) out of 10, compared to the adhesive product 6 (±2.09) and adhesive tape 4.58 (±2.27) (n = 12). Based on comfort, 10 out of 12 healthy volunteers preferred to use the safety device compared to other commercially available alternatives. Five HD nurses gave the safety device an average overall score of 7.2 (±1.3). Areas for improvement included size reduction, labelling of parts and device colour. The average peak force on a HD machine line before it dislodged using a commercially available bracelet and clip device was 1.88N (±0.5, n=3) and 1.93N (±0.23, n=3) respectively. The safety device was able to withstand 14.4N (±0.3, n=3) with no displacement of the HD line.

Discussion: HD line safety is a key issue for patients, nurses and clinicians. We developed a simple safety device, that can be self-assembled by a patient, to isolate the access site from forces applied downstream on the machine line, complementing existing needle taping and safety practice. The device showed improved comfort and mechanical performance compared to commercially available securement devices. HD nurses positively engaged with the device, identifying key areas for further improvement that have since been incorporated.

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Track C2 – Haemodialysis 2

Poster: 140
Submission: 466

Can a blood test for middle molecules be used to measure residual kidney function to perform incremental dialysis?

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Introduction: Incremental dialysis involves combining residual kidney functions (RKF) with dialysis dose to individualize treatment, increasing the dialysis dose as RKF falls. Potential benefits include quality of life benefits, less treatment burden and health economic benefits. Kidney Disease Outcome Quality Initiative (KDOQI) recommends incremental dialysis may be performed when renal urea clearance (KRU) is >=2ml/min. To avoid underdialysis, incremental approach requires frequent interdialytic urine collections to monitor RKF, which can be inconvenient.

An easier assessment of RKF would likely increase the uptake of incremental dialysis. Blood levels of middle molecules (e.g. Beta 2 Microglobulin (Beta2M) and Beta Trace Protein (BTP)) have been studied as predictors of RKF. However, their role in identifying patients for incremental dialysis have not been tested. A proposed simple method is identification of patients with KRU >= 2 ml/min is based on having a blood middle molecules level below a certain cut-off. Alternatively direct prediction of KRU from middle molecule levels can be performed with an algorithm.

We set out to establish if these methods may identify patients with significant RKF who can benefit from incremental dialysis.

Methods: We conducted a retrospective analysis on the data from a multicentre feasibility randomized controlled trial to assess the impact of incremental versus conventional hemodialysis initiation. As a part of this trial 55 participants were followed up for up to 12 months with monthly RKF measurement using interdialytic urine collections. Monthly Beta2M and BTP measurements were also performed. We used (1) a published middle molecules-based KRU equation (2) published Beta2M cut-off levels, to predict RKF. We, then, compared the predicted RKF with conventionally measured RKF from urine collection. The focus was to establish reliability of these methods in identifying patients with KRU > 2 ml/min, which is the recommended cut-off for incremental dialysis, and to identify where underdialysis might occur if these methods were used in clinical practice.

Results: The middle molecules-based KRU equation had 62% sensitivity and 84% specificity to identify those with KRU >2, whereas a beta2M cut-off level of <19.15mg/L had 78 % sensitivity and 82 % specificity. 6/55 (10.9%) participants would have had underdialysis whilst performing incremental dialysis guided by a middle molecules-based KRU equation and 7/55 (12.7%) would under dialyse using the Beta2M cut-off level to predict KRU. The predicted mean underdialysis that would occur using these methods was 0.2 – 0.3 standard kt/v units. Combining these methods with urine volume improved sensitivity and specificity. Beta2M level of <19.15 mg/L and Urine volume of >0.5 litre/day combined

predicted KRU >2 with 70% sensitivity and 98% specificity. In other words, only 1/55 (1.8%) patients would have had under dialysis if incremental dialysis were performed based on Beta2M cut-off and urine volume.

Discussion: Beta2M level, when combined with urine volume assessment reliably predicts adequate RKF to perform incremental dialysis safely. This tool has a potential to replace interdialytic urine collection and analysis to determine RKF and offers an easy way to perform incremental dialysis.

Monday 5th June 16:00 – 17:00

Track D – Infection Prevention

Poster: 141
Submission: 138

The benefits of Sotrovimab treatment in vulnerable renal patients with COVID-19

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Introduction: Sotrovimab is a dual-action neutralising monoclonal antibody that blocks entry of COVID-19 virus into host cells and clears infected cells. In December 2021, the Department of Health recommended Sotrovimab as a treatment option for non-hospitalised adults.[1] A study showed a relative risk reduction in hospitalisation or death of 85% in non-hospitalised patients with mild-to-moderate disease who were at risk of disease progression, when treated with Sotrovimab compared with placebo.[2] This led to the creation of the COVID Medicines Delivery Unit (CMDU) in our local District Hospital where Sotrovimab could be administered in a timely manner to eligible patients, including renal transplant and haemodialysis patients.

Aim: To audit the number of renal transplant and haemodialysis patients who underwent Sotrovimab treatment and collect data on S-antibody levels, vaccination status, immunosuppression medications (transplant patients) and subsequent hospital admissions.

1. To compare the cycle threshold (CT) values 2 weeks post-infection in haemodialysis patients who received Sotrovimab treatment vs those who did not.

Methods: Data was collected on renal transplant patients and haemodialysis patients who developed COVID-19 infection between 1st January and 30th June 2022 using the Electronic Patient Record (EPR), the CMDU and the Local Dialysis Unit databases.

Results: 59 renal transplant patients underwent treatment with Sotrovimab over the 6-month period. 11/59 patients (19%) had undetectable S-antibody levels at the time of COVID-19 diagnosis. 55/59 (93%) had received at least 3 vaccinations. 31/59 patients (53%) were on triple immunosuppression (prednisolone/tacrolimus/mycophenolate) and 23/31 of these patients (74%) had their mycophenolate held during their infection. 3/59 patients (6%) were subsequently admitted to hospital after treatment with Sotrovimab, one with acute kidney injury (AKI), one with diarrhoea and vomiting and the other with AKI and diarrhoea caused by co-existing CMV colitis.

34 haemodialysis patients received Sotrovimab over the 6-month period. All patients tested had detectable S-antibody levels, except one. They were unvaccinated. 28/34 patients (82%) had received at least 3 vaccinations. 1/34 patients (3%) were subsequently admitted to hospital with fluid overload.

The Cycle Threshold (CT) values, 2 weeks post COVID-19 diagnosis of the haemodialysis patients who had received Sotrovimab between 1st January and 31st March showed 11/29 patients (38%) had

undetectable viral levels at 2 weeks. A further 12/29 patients (41%) had levels of >30, suggesting a low viral load. The remaining 6/29 (21%) had levels <30.

49 haemodialysis patients developed COVID-19 between 1st January and 31st March and did not receive Sotrovimab. Of these, 26/49 (53%) had undetectable viral levels at 2 weeks. A further 14/49 patients (29%) had CT values >30, suggesting a low viral load. 7/49 (14%) had CT values <30.

Discussion: Sotrovimab has been given to a significant number of renal patients via the CMDU. Subsequent admissions to hospital were very low and unrelated to COVID-19. A higher proportion of haemodialysis patients who did not receive Sotrovimab had undetectable viral levels 2 weeks post-infection when compared with those who did receive Sotrovimab (53% vs 38%). This is likely to be reflective of less severe/asymptomatic disease at presentation.

Monday 5th June 16:00 – 17:00

Track D – Infection Prevention

Poster: 142
Submission: 224

A nationally coordinated response to the COVID-19 pandemic: Lessons learned

Submitted on behalf of the Welsh Kidney Network (WKN), Dr Gareth Roberts

Welsh Kidney Network, Cardiff

Introduction: Services for patients with kidney disease in Wales are managed and provided by three of the seven Welsh health boards; Betsi Cadwaladr University Health Board (UHB) provide services for residents in the northern region of Wales, Swansea Bay UHB for the south west region, and Cardiff and Vale UHB for the south east region. This all-Wales 'hub-and-spoke' style system is commissioned by the Welsh Kidney Network (WKN), which consists of a 'core' team of individuals working full-time, and a number of other multidisciplinary professionals employed on a sessional basis, all of which meet regularly in different forums (Figure 1). It is consistently reported that Wales has a high rate (1,289 PMP) of patients requiring kidney replacement therapy (KRT) (UKRR, 2021). Given all forms of KRT are life maintaining, it was therefore important that KRT services in Wales were maintained throughout the COVID-19 pandemic, to prevent adverse patient outcomes and additional burden to the wider NHS. This was made more difficult given safe provision of KRT depends on collaboration with other services and patients receiving KRT were classified as 'clinically extremely vulnerable' (CEV) at the pandemic onset.

Methods: To highlight key learning points in relation to the delivery of renal services throughout the pandemic, an exercise was undertaken which involved retrospectively reviewing actions taken by WKN and Welsh service providers at both the immediate onset and throughout the pandemic. Minutes of all COVID-19 related meetings and events hosted by WKN since the outbreak were also collated, with all findings summarised in a single document.

Results: The exercise identified 23 key lessons across 10 different themes, resulting in 16 recommendations (Table 1). From a leadership perspective, and related to the first recommendation, Table 2 lists all COVID-19 related meetings hosted by WKN to date. In addition to the continuation of pre-existing routine meetings, and a special series of dedicated national COVID-19 meetings during March and April 2020, the review highlighted similar benefits arising from wider UK meetings attended by the WKN Manager. It also identified that representation at said meetings meant that from the pandemic onset, all providers of kidney services in Wales were able to respond quickly and in a joined-up way.

Discussion: The work described here demonstrates the advantages of a healthcare service delivery approach that is nationally led and coordinated. Because it is a national network, at the onset of the COVID-19 pandemic, the WKN was able to mobilise quickly. By providing an inclusive forum for clinically-led discussion of data available at the time, this enabled providers of kidney services across NHS Wales to respond to emerging evidence and make changes in practice in a timely manner. The authors therefore suggest that where it is known a patient cohort is CEV to novel viruses, a network-based approach for disseminating information and clinical recommendations is the most efficient. To maximise

service resilience in the event of further COVID outbreaks and/or other public health threats, WKN therefore recommend all healthcare networks have this function within their 'Terms of Reference'.

Figure 1: Organisation of the WKN

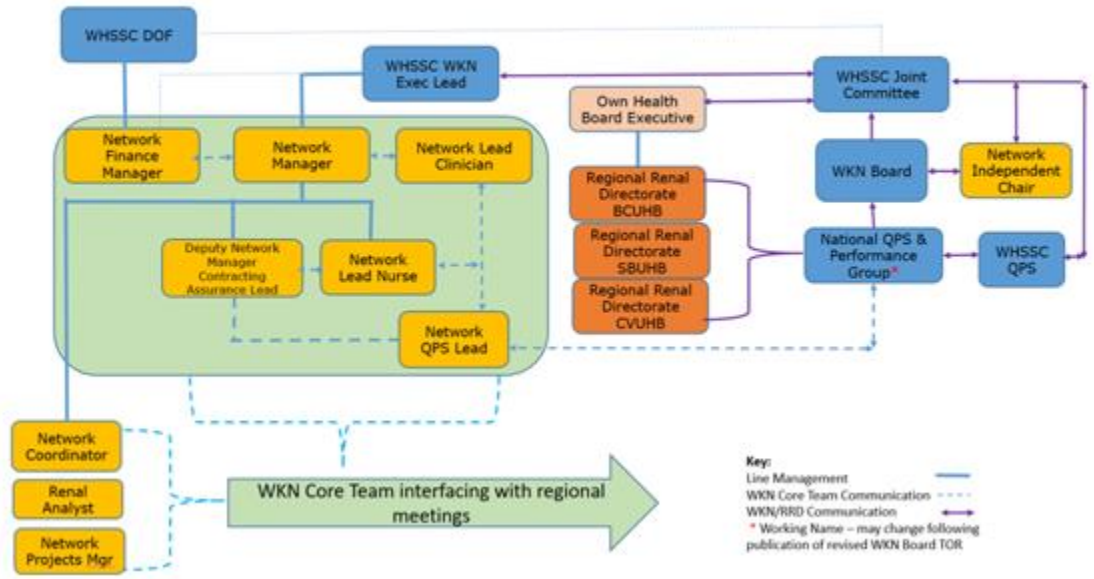

Table 1: Lessons learned from the delivery of renal services during the COVID-19 pandemic

Theme	Action	Lesson Learned	Recommendation
Leadership	The Welsh Kidney Network (WKN) was able to mobilise quickly to provide an inclusive forum to facilitate clinically led discussion and recommendations based on the data and information available at the time.	This enabled timely updates and changes in practice in response to the emerging evidence.	Where it is known that cohorts of patients are CEV to novel viruses, a network approach is the most efficient platform to disseminate information and clinically based recommendations. 1. All networks should have this function within their Terms of Reference.
Preparedness	Flu outbreak business continuity plans were used as the basis of Covid-19 continuity plans	Flu plans were not fit for purpose for a novel virus that could be spread asymptomatically. Radical re-writes were required in real time in order to protect services and patients.	Renal Services Covid-19 business continuity plans are now refined and easily transferable for use for other similar emerging viruses. 2. Business continuity plans must be tested at least annually or on first signs of potential need (whichever is soonest) to ensure they remain fit for purpose.
Environment	The WKN recommended cohorting of patients wherever possible to minimise risk of nosocomial infection.	Nosocomial infections were minimised but not eradicated. Lack of isolation rooms, waiting area constraints, space between dialysis stations and adequate ventilation made maintenance of cohorts problematic.	All renal services risk assessed each unit to determine levels of capacity to enable social distancing and one way systems for patient flow. Where this could not be accommodated mitigations were put in place such as screens. 3. Current mitigations to minimise nosocomial infections should be maintained wherever practicable. 4. Any new dialysis units or significant refurbishments to existing estate should be Covid-19 compliant in terms of ventilation (10 air exchanges per hour), space between stations and with an increase in available isolation cubicles. In addition, sufficient space patient waiting areas and ingress and egress from units is factored into plans.
PPE	WKN recommended enhanced PPE to be available to all nursing staff and HCP in dialysis and transplant units.	HB's held different view around the use of enhanced PPE i.e. gowns and FFP3 masks. It appeared that this related to lack of specific reference to the need of dialysis & transplant patients within IPC recommendations issued by PHW.	Due to the vulnerability of both the patient cohort and the specialism of nursing/clinical staff all renal services should default to enhanced PPE if risk of Covid-19 or other novel virus is detected. 5. Immediate use stocks of enhanced PPE should be available in all units 6. The senior nurse in each unit should be trained in fit testing and have the required equipment available to do so.
Testing	WKN recommended that regular and frequent testing of patients during peaks of infection.	Although testing in in-patient services was initiated quickly the fact that dialysis is an out-patient service meant that testing regimes for both patients and staff were not at first universally applied.	All dialysis and transplant patients are CEV and therefore require rapid access to testing for infection. 7. Status of outpatient dialysis units and transplant ward should be commensurate with high-risk in-patient clinical environments.
Vaccination and antiviral treatments.	The WKN recommended that the renal community in Wales were among the earliest adopters of mass vaccination programmes.	Rapid access to vaccination reduced mortality and serious illness. Available data suggest the need for frequent booster doses for such patients	All dialysis and transplant patients are CEV and therefore require rapid access to vaccinations and anti-viral treatments as clinically appropriate.

	The WKN recognised that CEV dialysis and transplant patients should be prioritised for access to appropriate antiviral treatments in the event of infection.	All CKD 4/5, dialysis and transplant patients were classified as CEV were offered treatment if and when has a positive LF/PCR tests. Positive patients were identified via the National Antiviral service National Antiviral Service (NAVS) - Welsh Medicines Information Centre (wales.nhs.uk) Treatment were offered either centrally or via the local renal/ dialysis Unit.	8. Dialysis and Transplant patients should continue to be prioritised to receive vaccines, boosters and antiviral treatments as clinically advised.
Maintaining safe staffing	WKN recommended that all specialist dialysis and transplant staff should be maintained within dialysis services and not redeployed.	As pressure built across the whole system and staff sickness became more widespread maintaining adequate staffing became more problematic. Numerous interventions by senior staff were required to ensure that renal services were recognised as essential and redeployment of specialist staff was minimised at all times.	Renal Services classification as an essential service should remain in place. 9. Redeployment of specialist renal staff to non-dialysis areas should not occur unless adequate risk assessments have been undertaken to ensure the continuity of renal care and prevention of nosocomial infection by returning staff. 10. All HCP accessing renal services should be made aware of the vulnerability of patients. 11. Cross working across units should be risk assessed and minimised.
Home Dialysis	The WKN recognised that the unit dialysis patients were unable to shield and as a consequence recommended that there was focus on maintaining current home dialysis patients in the community and enabling more to train. Increase in access to HHD & PD	Home dialysis specialist nurses were amongst the first group of staff to be redeployed to the dialysis units. Although this was a necessary action to ensure maintenance of safe unit dialysis, it compromised support to existing home dialysis patients and impacted on ability to increase training provision.	Home dialysis not only provides a better quality of life for patients it protects them from nosocomial infection, as they are able to shield. 12. Home dialysis training should not be suspended or reduced during period of increased viral prevalence 13. Nurses involved in training patients on home dialysis should be protected and not redeployed to other areas (including unit dialysis areas). 14. Home dialysis and unit dialysis capacity should be reviewed regularly ensure ability to meet existing demand with sufficient uplift to enable cover for staff illness etc. 15. Dedicated training areas to be available in all future unit dialysis facilities.
Treatment Regimes	The WKN recognised that although reducing frequency of dialysis was an option it came with risk of harm and therefore was dependant on Consultant led assessment of risk for individual patients.	At times of high infection rates in some areas of the community, the dialysis frequency of some patients, guided by their clinical status, were reduced from three times to twice weekly. This was supported with the prescription of special drugs to control potassium level. Many patients could not tolerate the reduced frequency and were switched back to thrice weekly during pandemic.	Standard unit dialysis provision of 12 hours dialysis per week should be recognised as a minimum maintenance treatment. 16. Reducing frequency of dialysis should be avoided. Only in last resort situations and after clinical approval, reduced frequency may be considered in a limited number of patients.
Transport	WKN worked in collaboration with WAST/NEPTS to maintain safe and timely dialysis transport services.	Use of PPE by patients and staff during transport was essential in reducing the risk of cross infection. Reimbursement for dialysis transport was quickly expanded to ensure all those patients who were able travel independently were reimbursed in a timely way.	Dialysis transport is an integral element of a patients treatment and therefore should be arranged in a manner that maximises patient safety and ability to attend for treatment.

			17. PPE for dialysis patients (and NEPTs staff) should be available, particularly during period of peak infection. 18. Sustaining the dialysis transport reimbursement programme
Support for staff	WKN recognised the significant pressure that was placed on front line staff during this time.	Maintaining a resilient and supported workforce was recognised as the critical requirement to mitigate against staff burnout and stress. Although the employing organisations were primarily responsible for staff wellbeing the WKN facilitated two virtual learning events to enable reflection and sharing of best practice.	Supporting staff welfare at times of extreme pressure is critical in maintaining a resilient workforce. 19. Enable all Wales reflective learning events to facilitate sharing of best practice and provision of mutual support.
Patient Education	WKN worked in collaboration with Kidney Charities and patient groups to ensure calm, clear and consistent messaging was provided to patients.	The level of mis-information about the virus, vaccines and treatments was very high, causing unwarranted anxiety in the renal community. The WKN in partnership with the Kidney Charities published regular patient newsletters to ensure that patients (and staff) were in receipt of the most accurate and timely information. This was enhanced by a series of webinars.	Enabling patients to access calm and clinically robust information about a risk to health that required whole system learning was paramount in reducing unwarranted stress and anxiety. Maintain collaborative approach to provision and delivery of patient education and information. Ensure the WKN website is accessible to all and regularly updated as required.
Psychosocial care and welfare support for patients.	WKN recognise the significant burden that patients have to cope with as a consequence of renal disease. This significantly exacerbated during the pandemic and the legacy of welfare issues remain.	During the pandemic most of face to face support was converted to virtual clinics. Whereas this enabled baseline clinical support to be provided, opportunity to gain full understanding of patients psychosocial circumstances was limited.	Adverse psychosocial circumstances can severely impact on patients quality of life and ability to comply with treatment regimes. 22. Renal social workers, welfare officers and counsellors need to be available to support patients at all times, but particularly during periods of extreme stress. 23. All patients need to have an up to date holistic assessment of needs to enable the mobilisation proactive support to meet any unmet need.

Table 2: Timeline of COVID-19 related meetings hosted by the WKN

Date	Organisation/s present	Meeting
Wed 04/03/2020	WKN representatives	National QPS Meeting
Regular National COVID-19 meetings commenced 10th March 2020:		
Tue 10/03/2020	Coordinated by WKN and chaired by Dr Gareth Roberts (WKN Clinical Lead); All service provider regions represented, ISP providers represented from 12th March onwards.	National COVID-19 Meeting
Thu 12/03/2020		
Mon 16/03/2020		
Tue 17/03/2020		
Thu 19/03/2020		
Thu 26/03/2020		
Thu 02/04/2020		
Thu 09/04/2020		
Thu 16/04/2020		
Thu 23/04/2020		
During the period of regular National COVID-19 meetings, the following also took place:		
Thu 19/03/2020	WKN representatives	Mgmt. Team Meeting
Wed 08/04/2020	WKN representatives, WG Policy Lead, Kidney Charity representation	Network Board
Meetings taking place following dedicated regular National COVID-19 meetings had ceased:		
Wed 06/05/2020	WKN representatives	QPS Meeting
Wed 13/05/2020	WKN representatives	Mgmt. Team Meeting
Fri 03/07/2020	WKN representatives	QPS Meeting
Fri 10/07/2020	WKN representatives	Mgmt. Team Meeting
Fri 04/09/2020	WKN representatives	QPS Meeting
Mon 07/09/2020	WKN representatives	Mgmt. Team Meeting
Fri 25/09/2020	WKN representatives	National Renal Learning Event
Fri 09/10/2020	WKN representatives, WG Policy Lead, Kidney Charity representation	Network Board Meeting
Wed 04/11/2020	WKN representatives	Mgmt. Team Meeting
Wed 25/11/2020	WKN representatives, WG Policy Lead, Kidney Charity representation, Public Health Wales	Network Board Meeting
Fri 11/12/2020	WKN representatives	QPS Meeting
Meetings taking place in 2021, where COVID-19 discussions were primarily focussed on the vaccination programme:		
Mon 18/01/2021	WKN representatives	Mgmt. Team Meeting
Thu 28/01/2021	WKN representatives	Vaccine roll-out meeting
Wed 10/02/2021	WKN representatives, WG Policy Lead, Kidney Charity representation	Network Board Meeting
Wed 17/03/2021	WKN representatives	QPS Meeting
Tue 20/04/2021	WKN representatives	Mgmt. Team Meeting
Fri 07/05/2021	WKN representatives	QPS Meeting
Wed 09/06/2021	WKN representatives, WG Policy Lead, Kidney Charity representation	Network Board Meeting
Fri 16/07/2021	WKN representatives	Mgmt. Team / QPS Meeting
Wed 04/08/2021	WKN representatives, WG Policy Lead, Kidney Charity representation	Network Board Meeting
Wed 01/09/2021	WKN representatives	QPS Meeting
Tue 14/09/2021	WKN representatives	Mgmt. Team Meeting
Thu 23/09/2021	WKN representatives, Powys Teaching Health Board	Meeting to discuss issues that may affect mid-north Powys Patients
Fri 24/09/2021	WKN representatives	National Audit Meeting
Mon 04/10/2021	WKN representatives, WG Policy Lead, Kidney Charity representation	Network Board Meeting
Wed 10/11/2021	WKN representatives, WG Policy Lead, Kidney Charity representation	Network Board Meeting
Sat 22/01/2022	WKN representatives	Special meeting of Renal QPS – COVID-19 position across Wales
Thu 17/03/2022	WKN representatives	Mgmt. Team Meeting
In addition to above, and separate Welsh Government meetings, WKN Manager also attended a number of UK wide meetings:		
Daily NHS Blood and Transplant (NHSBT) meetings concerning transplantation, regular COVID-19 and 'Safety in Haemodialysis Work Stream' meetings hosted by the UK Kidney Association (UKKA), and meetings hosted by Welsh Ambulance Services Trust/NHS Non-Emergency Patient Transport Service, to coordinate the dialysis transport response.		

References:

UK Renal Registry (2021) '24th Annual Report - data to 31/12/2020'. Available at: https://ukkidney.org/audit-research/annual-report/24th-annual-report-data-31122020 (Accessed: December 2022).

Monday 5th June 16:00 – 17:00

Track D – Infection Prevention

Poster: 143
Submission: 235

Impact of circulating strains and vaccination status on COVID-19 -related hospitalisations and mortality in patients with renal disease in England: A retrospective observational study using Hospital Episode Statistics (HES)

Dr Shruti Menon, Mr. Phil Allison, Dr. Jurgens Peters, Mr Robert Atkinson

AstraZeneca, London

Background**:**Chronic kidney disease (CKD) patients on dialysis or undergone a kidney transplant are at a higher risk of severe COVID-19 infections and death. This could be attributed to the underlying nature of the disease including immunosuppression that elicits weaker response to the vaccine. It may also be compounded by the emergence of novel circulating strains. Currently, there is limited data on the impact of omicron on COVID-19 hospitalizations and associated mortality in this disease group.

This study aims to understand the impact of dominant circulating strains and vaccination status on hospitalization and in-hospital mortality rates in patients with renal disease.

Methods**:** This was an exploratory retrospective analysis of observational data from the Hospital Episode Statistics (HES) data set for England. All patients aged ≥18 years in England with a primary diagnosis of COVID-19 between 1 Jan 2020 and 31 May 2022 were included. Linked data from COVID-19 Vaccination Status database and Office for National Statistics death register (ONS) helped inform vaccination status and mortality respectively. The population was stratified by immunocompromised status (IC) (Table 1) and non-immunocompromised (non-IC) groups. Patients with renal disease included chronic kidney disease stage 4 and 5 and kidney transplant patients.

The outcomes were stratified by the COVID-19 waves characterized by the dominant variant of concern (Wildtype variant (WTV); Alpha variant (AV); Delta variant (DV); Omicron variant (OV and sub-lineages)). The vaccination status was defined as no vaccination; 1 dose; 2 doses; and booster dose.

Results**:** A total of 414,676 hospital admissions with a primary diagnosis of COVID-19 in England were identified during the study period, which comprised of 2.36% and 7.14% of all inpatient admissions in non-IC and IC patients, respectively. Patients with renal disease constituted 4.9% (n= 20,571) of the total in-patient admissions and 25.16% of IC admissions (Table 2).

A decline in hospital admissions were observed in the general population from WTV to OV (reduced by 46%) (Table 3). Among patients with renal disease, COVID-19 hospital admissions reduced from 35% during WTV to 16% during DV, with a slight increase during OV (20%) (figure 1a). Conversely, in non-IC patients, a steady decline in hospital admissions were observed across the COVID-19 waves (WTV: 31% AV: 35%; DV: 20%; OV: 15%) (Figure 1b).

Among vaccinated patients, with increased number of doses, there appears to be a disproportionate increase in the number COVID-19 hospitalisations among IC patients compared to non-IC patients (Booster dose: 34.27% IC vs 65.73% non-IC; Table 3). In patients with renal disease, the hospitalization rates remain unchanged in those who received 2 or more doses (Figure 2a). In addition, hospitalization rate appears to be higher compared to the non-IC group (15% vs 8%) (Figure 2b).

Among IC patients, in-hospital mortality was highest in patients with renal disease (37.5%; Table 5). The mortality was also higher than those reported in non-IC patients (OV: 19.37% vs 11.29%).

Conclusion**:** Patients with renal disease continue to be disproportionally affected by COVID-19 compared to non-immunocompromised patients, thus highlighting the need for better management of these patients.

Table 1: List of diagnoses for the identification of immunocompromised patients

Condition	Implementation	Excluded groups due to coding/ lack of data
Down syndrome	**Down syndrome**	-
Patients with a solid cancer	**Primary diagnosis of solid cancers** **Chemotherapy** (only if recorded within 12 months prior to the index diagnosis) **Radiotherapy** (only if recorded within 6 months prior to the index diagnosis)	Patients receiving PI3K inhibitors
Patients with haematological diseases and stem cell transplant recipients	**Bone marrow transplant** (both donors and recipients, only recorded within 12 months prior to the index diagnosis) **Radiotherapy** (only recorded within 6 months prior to the index diagnosis) **Chemotherapy** (only recorded within 12 months prior to the index diagnosis) **Haematological diseases** **Sickle cell**	• Individuals with haematological malignancies who have received chimaeric antigen receptor (CAR)-T cell therapy in the last 24 months or radiotherapy in the last 6 months • Individuals with haematological malignancies receiving systemic anti-cancer treatment (SACT) within the last 12 months except patients with chronic phase chronic myeloid leukaemia (CML) in molecular response; or first- or second-line tyrosine kinase inhibitors (TKI)
Patients with renal disease **Patients with liver disease**	**CKD 4 to 5** **Renal transplant** **Cirrhosis** **Liver transplant**	• Non-transplant patients who have received a comparable level of immunosuppression -
Patients with immune-mediated inflammatory disorders (IMID) **Immune deficiencies**	**As treatment was not recorded in HES, IMID diagnosis was identified using attendance at outpatient department** for the IMID diagnosis/es in the 1 month prior to index diagnosis. **Immunodeficiency** including: • Hereditary hypogammaglobulinaemia • Combined immunodeficiencies • Immunodeficiency associated with other major defects • Common variable immunodeficiency • Other immunodeficiencies	• IMID treated with rituximab or other B-cell–depleting therapy in the last 12 months • IMID with active/unstable OR stable disease on corticosteroids, cyclophosphamide, tacrolimus, cyclosporin or mycophenolate • IMID patients with active/unstable disease, including those on biological monotherapy and on combination biologicals with thiopurine or methotrexate • Autoimmune polyglandular syndromes/autoimmune polyendocrinopathy, candidiasis, ectodermal dystrophy (APECED syndrome) • Any patient with a secondary immunodeficiency receiving, or eligible for, immunoglobulin replacement therapy
HIV/AIDS	**HIV disease**	-
Solid organ transplant recipients	**Solid organ transplants** (recipients excluding kidney and liver transplant, as they are captured in the criterion on renal and liver disease)	-
Rare neurological conditions	**MND** **MS** **MG** **Huntingtons' diseases**	-

Table 2: Characteristics of the patients hospitalised with a primary diagnosis of COVID-19 during the study period, overall and by immunocompromised status

	Total hospitalisations	Immunocompromised status	
	N= 414,676	Yes, N=81,770	No, N= 332,906
Age at admission, Mean (SD)	66 (19)	68 (16)	65 (19)
Median (IQR)	68 (29)	71 (24)	68 (30)
Min-Max	18-110	18-105	18-110
Age group, N (%)			
18-54	115,734 (27.91)	16,640 (20.35)	99,094 (29.77)
55-64	66,213 (15.97)	13,796 (16.87)	52,417 (15.75)
65-74	72,589 (17.50)	17,716 (21.67)	54,873 (16.48)
≥75	160,140 (38.62)	33,618 (41.11)	126,522 (38.01)
Sex, N (%)			
Female	189,547 (45.71)	40,509 (49.54)	149,038 (44.77)
Male	224,790 (54.21)	41,213 (50.40)	183,577 (55.14)
Unknown	339 (0.08)	48 (0.06)	291 (0.09)
Comorbidities, N (%)			
Down syndrome	1,028 (0.25)	1,028 (1.26)	-
Haematological malignancies and HSCT	4,184 (1.01)	4,184 (5.12)	-
HIV/AIDS	1,224 (0.30)	1,224 (1.50)	-
IMID	45,241 (10.91)	45,241 (55.33)	-
Immune deficiencies	2,037 (0.49)	2,037 (2.49)	-
Liver disease	6,021 (1.45)	6,021 (7.36)	-
Other haematological disease	1,247 (0.30)	1,247 (1.53)	-
Rare neurological diseases	5,208 (1.26)	5,208 (6.37)	-
Renal disease	**20,571 (4.96)**	**20,571 (25.16)**	-
Sickle cell & thalassaemia	2,673 (0.64)	2,673 (3.27)	-
Solid cancers	6,677 1.61)	6,677 (8.17)	-
Solid organ transplant	783 (0.19)	783 (0.96)	-

Table 3: Hospital admission characterized by immunocompromised status and in patients with renal disease across COVID-19 waves

	WT variant: Jan 1st 2020 - Dec 15th 2020		Alpha variant: Dec 16th 2020 - May 17th 2021		Delta variant: May 18th 2021 - Dec 12th 2021		Omicron variant: Dec 13th 2021 - May 31st 2022	
Immunocompromised status	**IC N (%) =24805 (19.47)**	**Non-IC N (%) =102592 (80.53)**	**IC N (%) =23921 (17.14)**	**Non-IC N (%) =115611 (82.86)**	**IC N (%) =14121 (17.86)**	**Non-IC N (%) =64934 (82.14)**	**IC N (%) =18907 (27.55)**	**Non-IC N (%) =49713 (72.45)**
Renal diseases (RD) (n=20,571)	7,208	-	5,998	-	3,236	-	4,124	-
Proportion of RD hospitalisation by wave from total IC admissions (%)	*29.06*	-	*25.07*	-	*22.92*	-	*21.81*	-
Proportion of RD hospitalisation by wave from total RD admissions (%)	*35*	-	*29*	-	*16*	-	*20*	-

Table 4: Hospital admission characterized by immunocompromised status and in patients with renal disease by vaccination status

	No vaccine		1 dose of vaccine		2 doses of vaccine		Booster vaccine	
Immunocompromised status	**IC N (%) =50,369 (16.8)**	**Non-IC N (%) =249,410 (83.2)**	**IC N (%) =4,632 (19.84)**	**Non-IC N (%) =18,714 (81.16)**	**IC N (%) =12,331 (24.95)**	**Non-IC N (%) = 37,085 (75.05)**	**IC N (%) =14,438 (34.27)**	**Non-IC N (%) =27,697 (65.73)**
Renal diseases (n=20,571)	13,116	-	1,261	-	3,043	-	3,151	-
Proportion of RD hospitalisation by wave from total IC admissions (%)	*26.04*	-	*27.22*	-	*24.68*	-	*21.82*	-
Proportion of RD hospitalisation by wave from total RD admissions (%)	*64*	-	*6*	-	*15*	-	*15*	-

Table 5: COVID-19 related respiratory support and in-hospital mortality in patients with renal disease and non-IC patients by vaccination status and COVID-19 wave

	Total hospitalisation	Basic respiratory support, n (%)	Advanced respiratory support, n (%)	Mortality, n (%)
Renal diseases	**20,571**	**3,301 (16.05)**	**3,287 (15.98)**	**7,745 (37.65)**
COVID-19 wave				
WTV	7,208	1,163 (16.13)	1,159 (16.08)	3,254 (45.14)
AV	5,998	1,030 (17.17)	1,024 (17.07)	2,598 (43.31)
DV	3,236	721 (22.28)	719 (22.22)	1,094 (33.81)
OV	4,124	387 (9.37)	385 (9.32)	799 (19.37)
Vaccination status				
No vaccine	13,116	2,452 (18.69)	2,446 (18.65)	5,754 (43.87)
1 dose	1,261	121 (9.60)	118 (9.36)	498 (39.49)
2 doses	3,043	495 (16.27)	493 (16.20)	905 (29.74)
Booster	3,151	233 (7.39)	230 (7.30)	588 (18.66)
Non-IC	**332,906**	**11,562 (10.19)**	**11,493 (10.13)**	**66,212 (19.89)**
COVID-19 wave				
WTV	102,592	7,878 (7.68)	7,824 (7.63)	28,176 (27.46)
AV	115,611	8,863 (7.67)	8,719 (7.54)	25,005 (21.63)
DV	64,934	4,980 (7.67)	4,941 (7.61)	7,404 (11.40)
OV	49,713	1,515 (3.05)	1,502 (3.02)	5,613 (11.29)
Vaccination status				
No vaccine	249,410	34,369 (13.78)	34,114 (13.68)	53,105 (21.29)
1 dose	18,714	1,321 (7.06)	1,296 (6.93)	4,265 (22.79)
2 doses	37,085	2,956 (7.97)	2,937 (7.92)	5,417 (14.61)
Booster	27,697	622 (2.25)	619 (2.23)	3,425 (12.37)

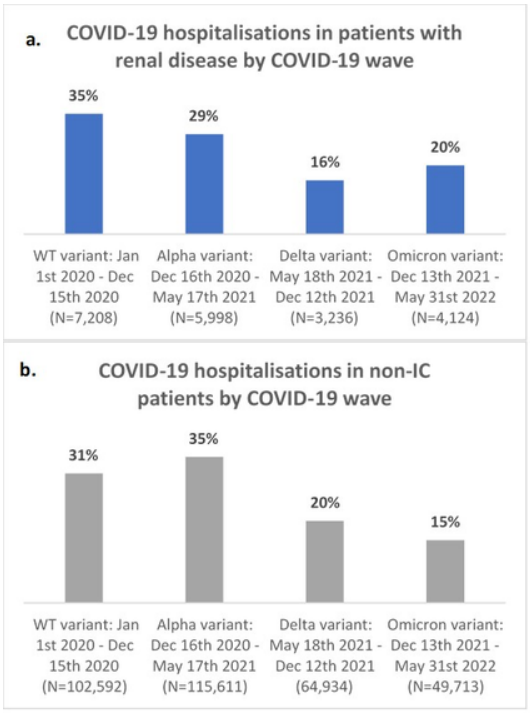

Figure 1: COVID-19 hospital admissions in patients with (a) renal disease and (b) non-IC patients by COVID-19 wave

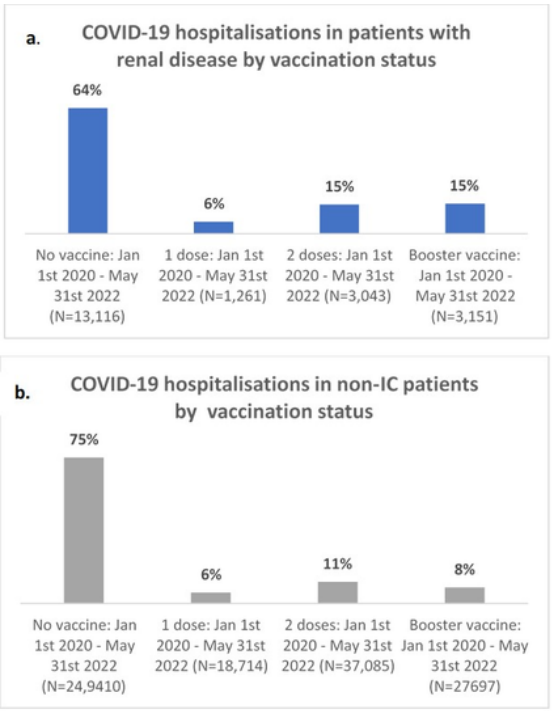

Figure 2: COVID-19 hospital admissions in patients with (a) renal disease and (b) non-IC patients by vaccination status

Monday 5th June 16:00 – 17:00

Track D – Infection Prevention

Poster: 144
Submission: 247

Prescribing of Nirmatrelvir/Ritonavir (Paxlovid®) as a Covid-19 treatment for patients with severe kidney dysfunction (eGFR <30ml/min including haemodialysis and peritoneal dialysis patients)

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University Hospital of Wales, Cardiff

Introduction: Nirmatrelvir/Ritonavir (Paxlovid) is prescribed for SARS CoV-2 positive outpatients with mild symptoms of Covid-19 as a strategy to reduce risks of hospitalisation and death.

UK prescribing guidance for Paxlovid	
Kidney Function (eGFR)	*Paxlovid dose for 5-days*
30 to 60ml/min	Nirmatrelvir 150mg/Ritonavir 100mg BD
<30ml/min	Contraindicated

CKD patients are often excluded from clinical trials which is a barrier to gaining access to new therapies (eg CKD patients excluded from ~50% of Covid-19 clinical studies). In most cases the investigational drug had no strong pharmacological, pharmacokinetic or toxicity reasons to exclude CKD patients.

WHO guidance (September 2022) advised against the use of the neutralising Monoclonal Antibody (nMAB), Sotrovimab, due to efficacy concerns against current circulating variants of SARS CoV-2. This was a major concern because Sotrovimab had been first line outpatient therapy for those with a Paxlovid contraindication.

The above factors directed us to review the Paxlovid contraindication in patients with eGFR <30ml/min.

Methods: An initial literature review did not identify any published Paxlovid clinical experience in patients with severe kidney dysfunction.

Following this, focus shifted to data related to drug safety profile and pharmacokinetics to discuss with local experts that could support prescribing decisions balancing risks and benefits for this complex group of patients.

Results: In the EPIC - HR study, Paxlovid was well tolerated with side effect profile comparable to placebo. Reported serious adverse events were higher in placebo group (7%) than Paxlovid group (2%).

The MHRA has not identified any safety signals via the Yellow Card Scheme since launch of Paxlovid in early 2022.

In a network meta-analysis of Covid-19 treatments, Paxlovid reported as producing beneficial outcomes without increasing adverse events.

The Nirmatrelvir component of Paxlovid has a renal route of excretion - 49.6% of a dose is recovered in the urine, predominantly as the parent drug. Compared to healthy controls, peak Nirmatrelvir levels (Cmax) and overall exposure (Area Under Curve) increased in renal dysfunction.

	Pharmacokinetic parameters *(full dose Nirmatrelvir 300mg BD)*	
Renal dysfunction	*Cmax increase*	*AUC increase*
eGFR 30-60ml/min	38%	87%
eGFR <30ml/min	48%	204%

For drugs with a degree of renal excretion, accumulation can put the patient at higher risk of side effects, but when the drug is well tolerated, without evidence of dose related toxicity and, if the course of treatment is short, risk is mitigated.

Discussion: Patients with severe kidney dysfunction are a Covid-19 high-risk group and it is our view that they should not be excluded from receiving Paxlovid. The excellent safety profile of the drug was the main factor directing this risk vs benefit conclusion, acknowledging that extending the prescribing is off label.

Guidance was launched across our region in November 2022:

- Paxlovid can be a prescribing option for patients with eGFR <30ml/min.
- Recommended dose is 150mg Nirmatrelvir/100mg Ritonavir twice a day for 5 days (as per eGFR 30 to 60ml/min).

To add to the evidence base we are now following up patients with eGFR <30ml/min prescribed Paxlovid to ask if they experienced any potential treatment related side effects.

Monday 5th June 16:00 – 17:00

Track D – Infection Prevention

Poster: 145
Submission: 332

The effect of COVID-19 with or without acute kidney injury on inpatient mortality in England

Dr Nitin Kolhe[1], Dr Richard Fluck[1], Prof Maarten Taal[2,1]

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[2]Nottingham University, Derby

Introduction: COVID-19 and acute kidney injury (AKI) are each associated with increased mortality but the interaction between these two conditions has not been adequately investigated with appropriate control groups. The aim of this national study was to assess patient characteristics and mortality and well as associations with higher mortality in patients with or without COVID and with or without AKI.

Methods: We extracted 3,324,748 FCE of all adult patients admitted patients between March 20 and March 21 from England's national database of all hospitals. We excluded patients on chronic dialysis, acute dialysis in CKD, acute dialysis with no AKI codes or not residing in England. We also excluded multiple FCEs within same spell and duplicate FCEs. We extracted all diagnoses and procedure codes for the cohort. We divided the study period in two phases of SARS CoV-2 strains. "Other" strain of SAR CoV-2 was dominant between 1st March 2020 and 21st December 2020 and "Alfa" strain was dominant between 22nd December 2020 to 17th May 2021. The end date of each phase was based on more than 50% decline in each variant. We further categorised phases based on publication of the RECOVERY trial.

Results: There were 663,628 patients with 2,385,337 admissions out which 856,544 had AKI as identified by N17 codes while 1,528,793 had no AKI. There were 1,008,774 admissions in 133,988 patients who did not have AKI or COVID (group 1) and 520,019 admissions in 256,037 patients who had COVID (group 2). Amongst admission with AKI, there were 630,342 admissions in 218,270 patients who did not have COVID-19 (group 3) and 226,202 admissions with COVID in 55,333 patients (group 4). Patients in group 4 were older (75.4 ± 13.8 years) and had greater length of stay (17.1 ± 17 days) than all other groups. Acute dialysis was performed in 1.4% of patients in group 3 and 3.6% of patients in group 4. Crude in-hospital mortality was highest in group 4 at 28.7% and lowest in group 1 (1.1%). Critical care requirement was lowest in group 1 (1.2%) compared to group 4 (10.9%) as was ITU mortality (4.8% versus 47.8%). In multivariable analysis, when compared with group 1, patients in group 4 had highest odds of death (OR 22.28, 95%CI 21.79, 22.78) followed by patients with group 2 (OR 9.67, 95%CI 9.46, 9.88). Patients in group 3 had OR of 6.44, 95%CI 6.30, 6.58. Odds of death were lower during post-RECOVERY phase with "Other" (OR 0.80, 95%CI 0.79, 0.81) and "Alfa" (OR 0.86, 95%CI 0.85, 0.87) SARS CoV-2 strains.

Discussion: This national study shows that the COVID pandemic had great impact on mortality in England and the odds of death increased substantially when complicated by AKI. Moreover, AKI associated with COVID was associated with a substantially higher odds of death than AKI due to other causes. The change in practice after publication of the RECOVERY trial was associated with a lower odds of death.

Monday 5th June 16:00 – 17:00

Track D – Infection Prevention

Poster: 146
Submission: 456

Long-term kidney outcomes following COVID-19 infection: an observational matched cohort study of adults in England using the OpenSAFELY platform

Dr Viyaasan Mahalingasivam[1], Dr Bang Zheng[1], Dr Kevin Wing[1], Dr John Tazare[1], Dr Ruth E Costello[1], Professor Juan Jesús Carrero[2], Professor Dorothea Nitsch[1], Dr Kathryn E Mansfield[1], Professor Laurie Tomlinson[1]

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[2]Karolinska Institutet, Solna

Introduction: There is evidence that people hospitalised with COVID-19 are more likely to experience AKI, but risks of longer-term kidney complications and changes in risks over time are not known. We sought to investigate kidney complications and death in COVID-19 survivors across distinct pandemic periods.

Methods: We conducted a cohort study of adults without pre-existing ESRD using individual-level primary care records linked to hospitalisation, vaccination and COVID-19 testing data on the OpenSAFELY platform. We defined individuals with COVID-19 based on their earliest record of infection (February 2020 to October 2022). We matched people with COVID-19 on age, sex and region to up to three pre-pandemic comparators from the general population on the same date 3 years earlier. We excluded all those who died within 28 days of either first diagnosis of COVID-19 or matching, after we commenced follow-up. Results were analysed in time periods reflecting COVID-19 "waves" (i.e. February 2020 to August 2020, September 2020 to June 2021, July 2021 to November 2021, December 2021 to October 2022). We used multivariable Cox regression adjusted for demographic, socioeconomic and clinical covariates to obtain hazard ratio (HR) estimates for each outcome (ESRD, 50% reduction in eGFR, AKI, and death). Follow-up ended in November 2022 for those with COVID-19 and November 2019 for pre-pandemic comparators.

We additionally performed stratified analyses for all outcomes based on COVID-19 severity (non-hospitalised, ward-level hospitalisation, and critical care admission) for the pandemic period as whole (February 2020 to October 2022).

Results: 3.6 million adults with COVID-19 met the inclusion criteria (100,000 February 2020 to August 2020, 1.1 million September 2020 to June 2021, 1.0 million July 2021 to November 2021, 1.4 million December 2021 to October 2022). These individuals were matched to 10.4 million adults pre-pandemic. Matched comparators had a similar distribution of covariates (**Table 1**).

Overall, we found increased rates of all outcomes following COVID-19 throughout the pandemic compared to pre-pandemic comparators (**Figure 1**). After adjustment, the HR for ESRD in individuals with COVID-19 compared to pre-pandemic comparators from February 2020 to August 2020 was 2.56

(95%CI 2.18-3.01), with reducing HRs in subsequent periods. There was an increase in all outcomes (except ESRD) from December 2021 to October 2022 compared to the periods between September 2020 and November 2021.

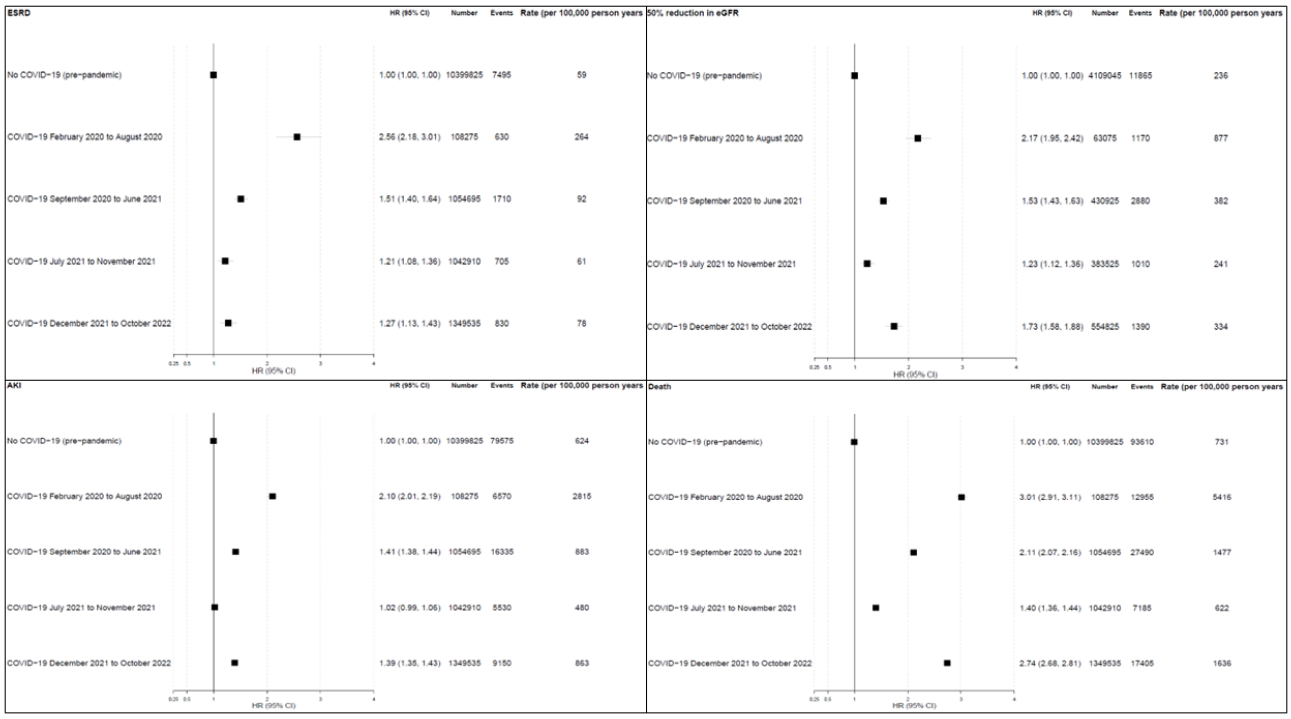
From February 2020 to October 2022, there was no increase in kidney outcomes in the non-hospitalised COVID-19 subgroup (e.g. HR for ESRD 0.81 (95%CI 0.76-0.86)), but rates substantially increased for all outcomes after hospitalisation (e.g. HR for ESRD 2.62 (95%CI 2.38-2.88) for ward-level inpatients and HR 20.45 (95%CI 15.52-26.93) for those requiring critical care).

Discussion: We found increased kidney outcomes and death in COVID-19 survivors across all pandemic periods compared to matched pre-pandemic comparators, though this was limited to people who were hospitalised. Risks were greatest in the earliest phase of the pandemic. Increased kidney outcomes after COVID-19 require further evaluation as they are likely exerting substantial pressures on patients and services.

Table 1: Descriptive characteristics:

	COVID-19	Pre-pandemic control
Total	3,555,415	10,399,825
Follow-up time (Days)		
Median (IQR)	381 (307-636)	385 (308-642)
Age		
Median (IQR)	43 (32-56)	44 (32-56)
Sex		
Female	1,926,435 (54.2)	5,626,590 (54.1)
Ethnicity		
White ethnicities	2,519,115 (70.9)	7,297,945 (70.2)
South Asian ethnicities	241,650 (6.8)	669,810 (6.4)
Black ethnicities	74,355 (2.1)	220,530 (2.1)
Mixed ethnicities	41,570 (1.2)	113,365 (1.1)
Other ethnicities	50,060 (1.4)	198,550 (1.9)
Ethnicity data missing	628,660 (17.7)	1,899,630 (18.3)
Smoking status		
Current/former smoker	1,734,025 (48.8)	5,131,515 (49.3)
Baseline eGFR		
Median (IQR)	90.8 (76.5-103.6)	90.8 (76.6-103.6)
Baseline CKD stage		
No CKD	1,304,760 (36.7)	3,757,500 (36.1)
CKD 3A	82,805 (2.3)	237,350 (2.3)
CKD 3B	35,055 (1.0)	91,935 (0.9)
CKD 4	9,730 (0.3)	22,255 (0.2)
No baseline eGFR measurement	2,123,065 (59.7)	6,290,780 (60.5)
Cardiovascular diseases	289,955 (8.2)	574,480 (5.5)
Diabetes	373,735 (10.5)	829,055 (8.0)
Hypertension	635,590 (17.9)	1,768,840 (17.0)
Immunosuppressive diseases	73,315 (2.1)	175,800 (1.7)
Cancer (non-haematological)	190,210 (5.3)	497,955 (4.8)

Figure 1: Fully-adjusted hazard ratio estimates for each outcome by period of COVID-19 infection:


ESRD
HR (95% CI)
Number
Events
Rate (per 100,000 person years
No COVID−19 (pre−pandemic)
1.00 (1.00, 1.00)
10399825
7495
59
COVID−19 February 2020 to August 2020
2.56 (2.18, 3.01)
108275
630
264
COVID−19 September 2020 to June 2021
1.51 (1.40, 1.64)
1054695
1710
92
COVID−19 July 2021 to November 2021
1.21 (1.08, 1.36)
1042910
705
61
COVID−19 December 2021 to October 2022
1.27 (1.13, 1.43)
1349535
830
78
0.25 0.5 1 2 3 4
HR (95% CI)
50% reduction in eGFR
HR (95% CI)
Number
Events
Rate (per 100,000 person years
No COVID−19 (pre−pandemic)
1.00 (1.00, 1.00)
4109045
11865
236
COVID−19 February 2020 to August 2020
2.17 (1.95, 2.42)
63075
1170
877
COVID−19 September 2020 to June 2021
1.53 (1.43, 1.63)
430925
2880
382
COVID−19 July 2021 to November 2021
1.23 (1.12, 1.36)
383525
1010
241
COVID−19 December 2021 to October 2022
1.73 (1.58, 1.88)
554825
1390
334
0.25 0.5 1 2 3 4
HR (95% CI)
AKI
HR (95% CI)
Number
Events
Rate (per 100,000 person years
No COVID−19 (pre−pandemic)
1.00 (1.00, 1.00)
10399825
79575
624
COVID−19 February 2020 to August 2020
2.10 (2.01, 2.19)
108275
6570
2815
COVID−19 September 2020 to June 2021
1.41 (1.38, 1.44)
1054695
16335
883
COVID−19 July 2021 to November 2021
1.02 (0.99, 1.06)
1042910
5530
480
COVID−19 December 2021 to October 2022
1.39 (1.35, 1.43)
1349535
9150
863
0.25 0.5 1 2 3 4
HR (95% CI)
Death
HR (95% CI)
Number
Events
Rate (per 100,000 person years
No COVID−19 (pre−pandemic)
1.00 (1.00, 1.00)
10399825
93610
731
COVID−19 February 2020 to August 2020
3.01 (2.91, 3.11)
108275
12955
5416
COVID−19 September 2020 to June 2021
2.11 (2.07, 2.16)
1054695
27490
1477
COVID−19 July 2021 to November 2021
1.40 (1.36, 1.44)
1042910
7185
622
COVID−19 December 2021 to October 2022
2.74 (2.68, 2.81)
1349535
17405
1636
0.25 0.5 1 2 3 4
HR (95% CI)

Monday 5th June 16:00 – 17:00

Track D – Infection Prevention

Poster: 147
Submission: 465

Humoral response to vaccination for SARS-CoV-2 disease (COVID-19) in people with chronic kidney disease receiving haemodialysis: a prospective observational cohort study.

Professor Christopher Brown[1], Dr Mark Ponsford[2], Mr Aled Richards[1], Mr Lee White[1], Ms Jenny Hudson[3], Professor Stephen Jolles[4]

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[2]Cardiff University, Cardiff.
[3]Public Health Wales, Swansea.
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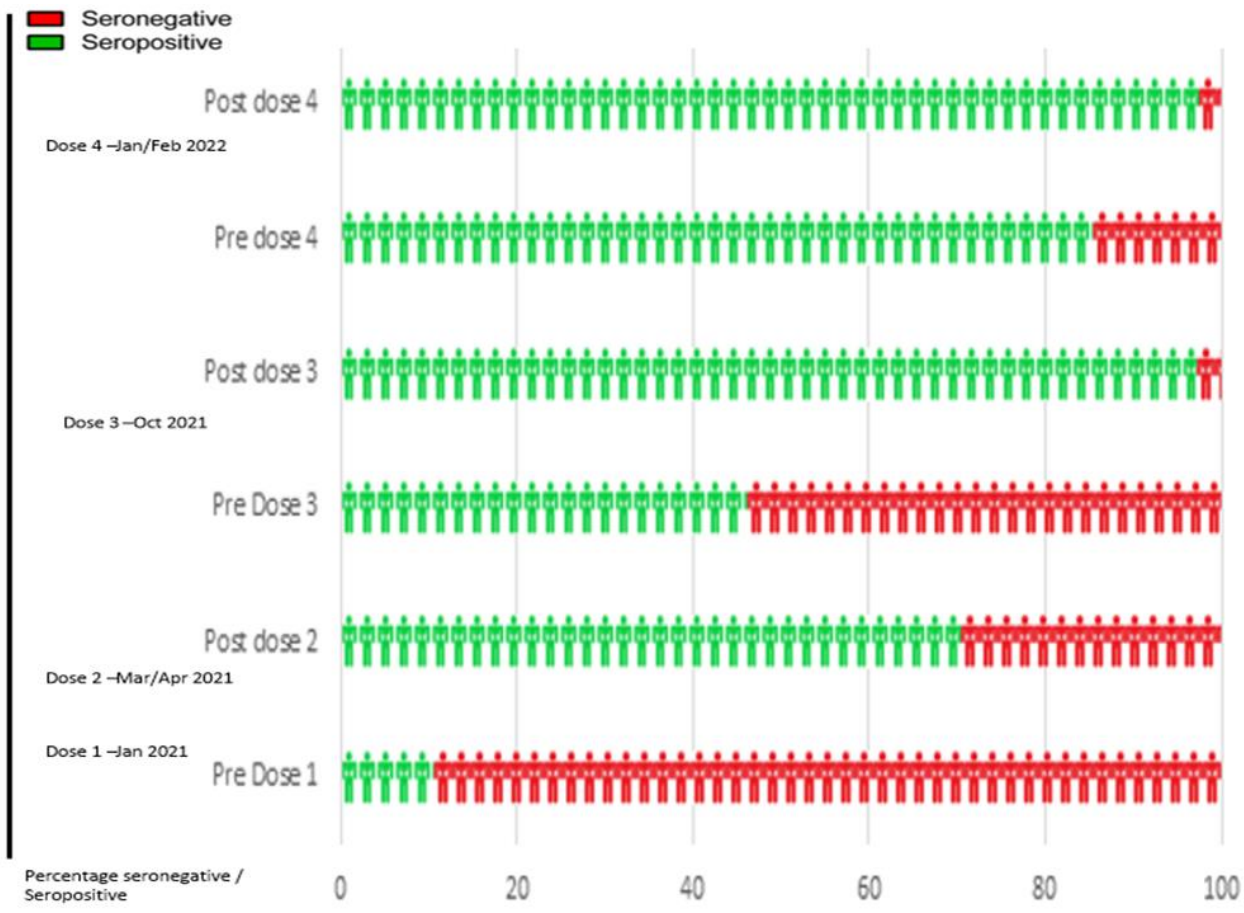
Introduction: People with end-stage renal disease requiring haemodialysis (HD) have an exaggerated risk of mortality from COVID-19 pre-vaccination. Sub-optimal immunogenicity following 2 doses of COVID-19 vaccination has been reported in this population. This study evaluated the ability of this cohort to mount an adequate and sustained anti-SARS-CoV2 spike S1 receptor binding domain (RBD) IgG response, as a correlate of protection against COVID-19.

Methods: We undertook a prospective observational study of the humoral response to serial COVID-19 vaccination (COVID-19 ENLIST study vaccine-arm, REC: 20/YH/0309). Stored serum obtained from the course of routine haemovigilance monitoring were extracted for semi-quantitative determination of anti-SARS-CoV-2-spike S1 IgG level using the EUROIMMUN ELISA. The presence of a detectable anti-spike IgG was determined relative to the manufacturer-specified cut-off (Optical Density ratio ≥ 1.1), using serum samples obtained approximately 21 days post-vaccination. The potential for waning of humoral immunity was assessed using pre-vaccination samples.

Results: Within our regional haemodialysis centre 134 HD participated, with a median age 67.5 years (IQR: 56.0 to 78.0), predominately male (65.8%) and with a median Charlson co-morbidity index of 6 (IQR: 4 to 8). Prior to first COVID-19 vaccination, 14/132 (10.6%) individuals with available serum had detectable anti-SARS-CoV-2-spike IgG; 11 of whom had a prior molecularly-confirmed COVID-19 diagnosis. Following primary immunization with 2-doses of ChAdOx1-S (Astra-Zeneca), 93/132 (70.5%) of individuals seroconverted, increasing to 107/111 (96.4%) following receipt of a booster BNT162b2 mRNA (Pfizer) and 114/116 (98.3%) following 4th dose of mRNA (Pfizer or Moderna). Substantial waning following doses was evident, with only 44% and 85% of HD patients remaining seropositive immediately prior to the 3rd and 4th booster doses, respectively (Figure 1). Individuals who remained seronegative after four doses had a history of solid organ transplant were receiving immunosuppression.

Figure 1: Primary analysis of frequency of individuals failing to mount an adequate anti-SARS-CoV-2 spike IgG response



Discussion: Most (98%) HD patients were able to mount a detectable humoral immune response following serial COVID-19 vaccination. However, timely access to booster vaccination against variants of concern remain important in this patient group, given the convergence of demographic risk factors for severe disease and evidence of waning immunity. Post-vaccination sero surveillance for HD individuals (e.g. integrated with haemovigilance schemes) may be helpful to identify individuals who remain seronegative and may benefit from additional booster vaccinations or priority access to post-exposure COVID-19 therapeutics.

Monday 5th June 16:00 – 17:00

Track E1 – Living with Kidney Disease 1

Poster: 148
Submission: 123

Barriers and facilitators to staff asking patients about their psychological well-being in the post renal transplant out-patient clinics

Miss Adele Hewitt[1,2], Dr Janette Moran[3], Dr Sunil Daga[4], Dr Chloe Miller[3]

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Research has shown patients undergoing a renal transplant are more likely to experience psychological distress, which can lead to poor adherence to medications, reduce engagement to services and higher rates of transplant rejection/graft failure (De Pasquale et al., 2020). A recent survey in 2020 by the UK kidney Patient Reported Experience Measure (PREM) found that a large proportion of renal patients were not being asked about their psychological wellbeing during transplant follow-up care. Therefore, it is important that this is explored to support patients' psychological needs and to help understand any difficulties staff may be experiencing. As psychological well-being is a broad term it was broken down into four categories (Anxiety, Depression, Stress and General Well-being) to give staff the opportunity to rate and discuss different areas of psychological well-being they may find easier/ more difficult to talk about with patients.

A online survey using a mixed methods design was administered to twenty-seven out of a pool of thirty-five renal staff. Staff used a five-point Likert Scale to rate how 'Important', 'Confident' and 'How often' they asked patients about their psychological well-being post renal transplant. Staff also used a ten-point Likert Scale to rate how useful certain facilitators might be. Quantitative findings were analysed using descriptive and frequency statistics. Additionally, for the qualitative component, three free text boxes were implemented throughout the survey which were analysed using rapid qualitative analysis.

Most staff reported that it is 'Very important' or 'Extremely important' to ask patients about their psychological well-being post renal transplant (Anxiety = 81.4%; Depression = 85.1%; Stress = 77.7%; General Well-being = 96.1%). Most staff reported that they were 'Fairly confident' or 'Very confident' to discuss patients psychological well-being post renal transplant (Anxiety = 77.7%; Depression = 77.7%; Stress = 80.8%; General Well-being = 70.3%. Finally, most staff reported that they 'Sometimes' or 'Often' ask patients about their psychological well-being post renal transplant (Anxiety = 66.6%; Depression = 65.4%; Stress = 65.4%; General Well-being = 70.4%). When asked how much certain facilitators might help aid discussions around psychological well-being staff reported opportunities to reflect/discuss clinical work, staff training in psychological difficulties, more time in clinic, and having a separate session dedicated to mental health screening as being the most helpful. Qualitative barriers included time pressures, not feeling confident, and lack of privacy. Qualitative facilitators included an increase in psychological staffing and staff training.

Whilst staff feel it is important to ask patients about their psychological well-being post renal transplant, they reported not feeling as confident doing so, which may be impacting on how often they initiate those conversations. These findings may help explain why patients reported in the 2020 PREM that they were not being asked about their psychological well-being during the transplant process. Results indicate extra training, more time in clinic and more psychology staff could increase staff confidence. The findings can be used to help implement service change in the Renal Department, provide better psychological care and patient experience, and support overall transplant outcome.

https://jmp.sh/rs02JqQv

Monday 5th June 16:00 – 17:00

Track E1 – Living with Kidney Disease 1

Poster: 149
Submission: 158

Healthcare System Overload and Economic Recession: The Worries of People with Chronic Kidney Disease and Their Significant Others During the COVID-19 Pandemic, a Sign of Things to Come in the UK?

Ms Ella C Ford[1,2], Ms Gurneet K Sohansoha[1,2], Ms Naeema A Patel[1,2], Dr Thomas J Wilkinson[1,3], Dr Courtney J Lightfoot[1,2], Professor Alice C Smith[1,2]

[1]Leicester Kidney Lifestyle Team, Department of Population Health Sciences, University of Leicester, Leicester.
[2]Leicester NIHR Biomedical Research Centre, Leicester.
[3]NIHR Applied Research Collaboration East Midlands, Leicester Diabetes Centre, Leicester

Introduction: The pandemic presented enormous challenges to those living with chronic kidney disease (CKD), such as heightened risk of serious illness and changes to healthcare delivery due to social restrictions. It is vital to learn from the pandemic to inform improvements in healthcare. Understanding the impact on patients and their families is important in this knowledge synthesis. Here we report the worries of people with non-dialysis CKD (ND-CKD), kidney transplant recipients (KTR), and their 'significant others' (SO) living under different restriction levels.

Methods: Participants from 11 hospital sites in England were invited to complete an online survey between August and December 2020. The survey, adapted from the World Health Organisation, included 13 items relating to worries, rated on a Likert scale from 1 ('don't worry at all') to 7 ('worry a lot'). SOs answered an additional statement of 'passing COVID-19 onto person with CKD'. Higher restrictions (HR) were defined as Tiers 2-4 and national lockdown, and lower restrictions (LR) as Tier 1 and pre-tier restrictions. The 13 items were summed for the overall worry score, and mean scores calculated for each item.

Results: 236 participants with ND-CKD (mean age 64.0 (±13.7) years, 60% male), 293 KTRs (mean age 57.9 (±11.4) years, 54% male), and 191 SOs (mean age 60.1 (±13.2) years, 39% male) completed the survey. 314 (44%) participants were living under HR and 406 (56%) under LR. The worry with the highest mean score for SOs was 'passing COVID-19 onto person with CKD' (mean 5.0 (±1.3)). Other than this item (specific to SOs), Table 1 illustrates the top three worries across participant groups and restriction levels.

Table 1: Top three worries across participant groups and restriction levels

	Participant Groups			**Level of Restriction**	
Worries	**ND-CKD**	**KTR**	**SO**	**HR**	**LR**

Health System Becoming Overloaded	3.7 (1.9)	3.7 (1.9)	4.0 (1.8)	3.9 (1.9)	3.7 (1.9)
Economic Recession	3.6 (1.8)	3.6 (1.8)	3.4 (1.7)	3.6 (1.8)	3.5 (1.8)
Loved One's Health	3.6 (1.9)	3.5 (2.1)		3.5 (2.1)	
Restricted Access to Essential Supplies			3.6 (1.7)		3.5 (1.8)

Data presented as mean (SD) rating

Those living under HR had significantly higher overall worry scores than those under LR (P=0.049). There were no significant differences in overall worry between participant groups. Participants were significantly more worried about their physical health than mental health (P<0.001).

Discussion: Concerns about the impact of the pandemic on mental health are widespread and well-publicised. We found that overall worry levels were higher in those living under HR but did not differ between participant groups. Overall, participants were more worried about their physical health than mental health. Importantly, irrespective of participant group or restriction level, the health system becoming overloaded was the uppermost concern, with economic recession also consistently featuring as a top three worry. Today's socio-political environment has proved these to be valid fears. Recognising and minimising these worries is vital to reduce potential consequences such as avoiding engagement with healthcare services due to concern of the system being overloaded, which could ultimately affect individuals' health and wellbeing.

Monday 5th June 16:00 – 17:00

Track E1 – Living with Kidney Disease 1

Poster: 150
Submission: 164

Perceptions of personal safety and resultant changes in behaviour after receiving the COVID-19 vaccine among people living with kidney disease and their significant others

Ms Gurneet K Sohansoha[1,2], Ms Naeema A Patel[1,2], Ms Ella C Ford[1,2], Dr Thomas J Wilkinson[1,3], Dr Courtney J Lightfoot[1,2], Professor Alice C Smith[1,2]

[1]Leicester Kidney Lifestyle Team, Department of Population Health Sciences, University of Leicester, Leicester.
[2]Leicester NIHR Biomedical Research Centre, Leicester.
[3]NIHR Applied Research Collaboration East Midlands, Leicester Diabetes Centre, Leicester

Background & Aims: The COVID-19 vaccine first became available at the end of 2020 for clinically vulnerable people, such as those with chronic kidney disease (CKD). Prior to this, the clinically vulnerable were advised to shield, with significant consequences on life participation. The vaccine aims to protect against COVID-19 and reduce the risk of getting seriously ill or dying from COVID-19, thus potentially reducing the need for restrictive shielding. We explored perceptions of COVID-19 safety and changes in behaviour, e.g. reduced shielding or isolating, following receipt of the COVID-19 vaccine in people with non-dialysis CKD (ND-CKD), kidney transplant recipients (KTRs), and their significant others (SOs).

Methods: Participants at 11 hospital sites across England were invited to complete an online survey between May and June 2021. The survey included items asking about changes to their perceptions of COVID-19 risk, and social behaviours. Participants ranked questions on 7-point Likert scales (perceived COVID-19 safety,1: feel not safe at all to 7: feel completely safe; changes in social behaviour, 1: no change to 7: complete change) after receiving the COVID-19 vaccine, and provided free-text explanations for their ranked responses. Question ratings were analysed by ANOVA, and free-text responses by content analysis to identify common themes.

Results: 114 ND-CKD (mean age 65.5 (±1.2) years, 59% male), 120 KTR (60.95 (±9.9) years, 51% male), and 77 SO (63 (±11.08) years, 62% male) participants completed the survey. In total, 109/114 (96%) ND-CKD, 116/120 (97%) KTR, and 71/77 (92%) SO participants had received the COVID-19 vaccine. There were no significant differences amongst the groups for perceived COVID-19 safety, with participant groups reporting feeling safe from the virus (mean perceived safety rating 6.0 [±1.3] out of a maximum of 7). However, all groups reported limited changes in behaviour after receiving the vaccine (scale rating 3.6 [±1.3]/7). Common themes identified for perceived safety were ‘risk perception’ and ‘availability of vaccine evidence’. ‘Relaxed shielding’, ‘compliance with government guidance’, and ‘using own discretion’ were common themes identified for changes in behaviour.

Discussion: The findings show that the majority of participants had received the COVID-19 vaccine by May 2021. Participants reported feeling safer from COVID-19, but despite this, changes to shielding and social behaviour were limited. This is explained through the free text responses as participants stated

they felt safer after receiving the vaccine due to reduced risk of hospitalisation, severe illness and new variants. However, despite feeling safer, changes in behaviour were limited. This is partly explained by the continuation of some restrictions at the time of the study (e.g. 'rule of 6' indoors). However, factors such as increased social mixing and reduced mask-wearing by others which potentially increases risk for the clinically vulnerable, and uncertainty around vaccine efficacy in clinical populations, resulted in ongoing social avoidance behaviour. These factors persist in today's environment and demonstrate the need for communication of high-quality research evidence to encourage uptake of booster COVID-19 and flu vaccines, and effective public education campaigns, to allow clinically vulnerable people to confidently return to pre-pandemic social behaviours.

Monday 5th June 16:00 – 17:00

Track E1 – Living with Kidney Disease 1

Poster: 151
Submission: 225

Supporting the welfare and wellbeing of patients with kidney disease: A collaborative cross-sector approach

Submitted on behalf of the Welsh Kidney Network (WKN), AnnMarie Pritchard

Welsh Kidney Network, Cardiff

Introduction: Patients on Kidney Replacement Therapy (KRT) face many barriers, including poor employment opportunities due to disadvantaged socioeconomic status and symptoms of their kidney failure. The consequent low income, compounded by the current increase in cost of living means many patients on KRT live in relative poverty, with 45% of the population on KRT in Wales reported to be in the 4th and 5th most socially deprived quintiles. Cognitive impairment associated with KRT means many patients struggle to process complex information and are therefore unable to easily identify and access benefits and welfare support they are entitled to. The project described here aims to provide a nationwide dedicated face-to-face welfare and wellbeing advice and support service, an important aim given ~1,400 adult Welsh residents currently require KRT, and the need for such services forecasted to grow by up to 5% per annum (Welsh Government, 2022).

Methods: Commissioned by the Welsh Kidney Network (WKN), services for patients with kidney disease in Wales are and managed and provided by three local health boards. Led by WKN, the project here is to involve employing the services of, and proof of concept already demonstrated by, 'Kidney Care UK' (KCUK), the UK's leading kidney patient charity and public provider of welfare assistance packages, and 'Auriga', the UK's leading public provider of welfare assistance packages (Fig 1). To align with the organisation of renal services in Wales, the project will involve the recruitment and training of three full-time 'Welfare and Wellbeing Advocacy Officers'. Supported by a 'National Project Manager', their role will involve attending units in either the North, South-East or South-West region of Wales, to support patients to talk about their individual welfare and wellbeing needs and signpost accordingly. While most counselling needs will be met by these KCUK-employed officers, financial and debt management advice will be referred to 'Auriga', with officers acting as conduit in these referrals.

Results: While the project remains in its planning stages, based on costs outlined in Table 1 and the assumption that ~50% of KRT patients in Wales will need and use KCUK services per year, and ~70% of these will also require referral to Auriga services, the initial investment of the project translates to ~£200 per patient. Based on successes of similar services implemented elsewhere, including at University Hospital Birmingham NHST, the authors expect an average of up to £4,000 to be realised in financial gains for patients supported by the intervention, representing a potential £1:£20 social return on investment.

Discussion: By maximising income, reducing utility-related expenditure and providing specialist psychosocial help, the work here offers significant opportunity to improve the welfare and wellbeing of patients with kidney disease in Wales. Requiring minimal resource, and having already been proven to

provide robust social return on investment elsewhere, the all-Wales model described remains a cost-effective method for improving the quality of life of patients with kidney disease in Wales. The authors therefore suggest that this new collaborative cross-sector solution also aligns with a value based healthcare approach.

Fig 1: Proof of concept demonstrated by KCUK and Auriga

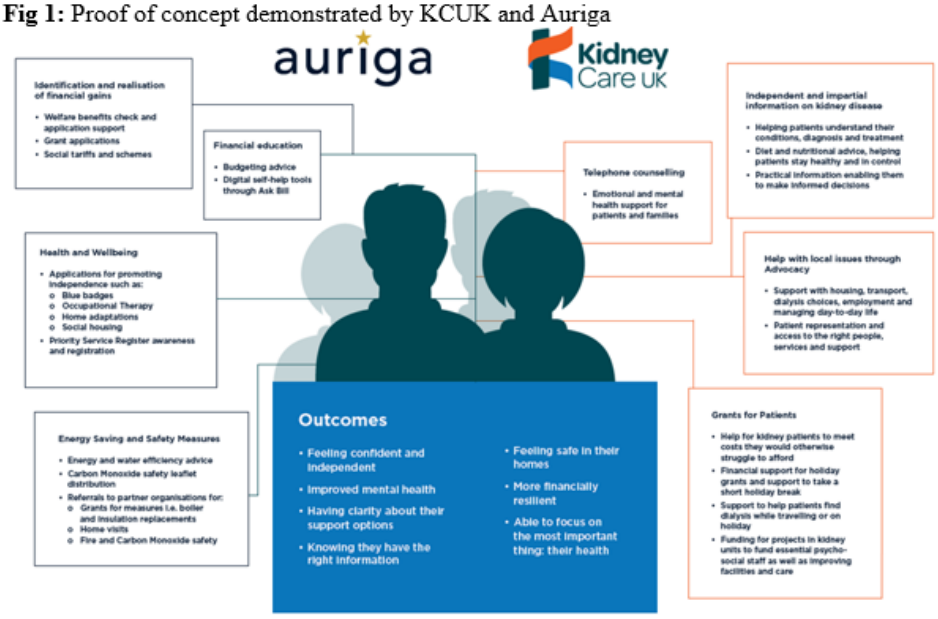

Table 1: Costs associated with the new all-Wales welfare and wellbeing service

Kidney Care UK Staff & Auriga Services - Scaled to service 3 Regions		
Project Manager	£	40,000.00
Associated costs (IT equipment, expenses etc.)	£	4,000.00
Welfare & Wellbeing Officer x 3	£	96,000.00
Associated costs (IT equipment, expenses, insurance, governance etc.)	£	21,000.00
Patient Reach & Engagement	£	9,000.00
KCUK Year 1 total cost	£	170,000.00
Auriga Year 1 total cost (estimated)	£	120,000.00
Total proposal cost Year 1	**£**	**290,000.00**
KCUK Year 2 total cost	£	158,000.00
Auriga Year 2 total cost (estimated)	£	120,000.00
Total proposal cost Year 2	**£**	**278,000.00**

Figures Exclude VAT

References:

Welsh Government (2022) Quality statement for kidney disease. Available at: https://gov.wales/quality-statement-kidney-disease-html (Accessed: December 2022).

Monday 5th June 16:00 – 17:00

Track E1 – Living with Kidney Disease 1

Poster: 152
Submission: 254

Smartphone/tablet-based gaming apps to deliver patient-led cognitive gamified training in haemodialysis patients (PACE Pilot Study)

Mr Murat Aksoy[1], Mrs Samantha Hunter[2], Dr Aziz U. R. Asghar[1], Professor Sunil Bhandari[2,1]

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Introduction: Dialysis remains a considerable burden to patients who subsequently develop cognitive impairment and progressive memory loss, which often leads to reliance on others for their care. This study examines utilising smartphone/tablet-based gaming apps to deliver patient-led cognitive gamified training (CGT) in a cohort of patients during haemodialysis sessions without the direct involvement of health professionals. We anticipate CGT improves cognitive function, leading to better quality of life, well-being and functional capacity compared to those with standard care. We herein present preliminary findings of baseline assessments.

Methods: This single-centre, two-armed pseudo-randomised pilot study comprised three phases. Firstly, the researchers evaluated and shortlisted commercially available general brain training programs. In the next phase, initial focus groups via patient public involvement meetings were given shortlisted CGT apps to assess and provide viewpoints. Subsequently, two brain training apps were selected for the CGT intervention. Phase 3, which involves an open-label trial of 55 patients (30 CGT and 25 control), was started in November 2022. The CGT patients were advised to use the apps for at least 30 minutes in each dialysis session over a six-month period. The following measures of memory and quality of life assessment are recorded at baseline, three months and six months.

1) Primary assessments: MoCA (Montreal Cognitive Assessment Test), MMSE (Mini-Mental State Exam), and ROWMA (Rapid Objective Working Memory Assessment).

2) Secondary assessments: PROM KDQoL-SFTM v1.3 (Patient Reported Outcome Measure Kidney Disease Quality of Life Short Form), PROMIS Global Health Instrument (Patient-Reported Outcomes Measurement Information System) and EQ-5D (European Quality of Life Five Dimension).

Scores for each assessment will be compared with those obtained in the baseline assessments within and between groups at each time point.

Results: We have recruited 16 haemodialysis patients (9 for the brain app intervention group and 7 for the control group) for the PACE pilot study. The baseline findings for the 16 patients in these two groups showed that their mean cognitive scores for the MoCA and ROWMA were well below the values as would be expected for healthy participants, while 3MSE baseline scores of both groups were higher than those for the healthy participants (Table 1). The baseline scores of the secondary self-reported assessments are presented in Table 2.

Table 1: Primary baseline cognitive and self-report assessments in haemodialysis patients.

Assessment	*Healthy Control Participant Scores (from literature)*	PACE Study Group Patients (n=9)	PACE Control Group Patients (n=7)
Primary			
Montreal Cognitive Assessment test (MoCA)	*<26*	23.78 ± 0.9	23.57 ± 0.9
Modified Mini-Mental State Exam (3MSE)	*<78*	87.33 ± 1.8	89.14 ± 2.0
Rapid Objective Working Memory Assessment (ROWMA)	*<15*	13.67 ± 0.5	12.14 ± 0.5

Table 2: Secondary baseline self-reported assessments in haemodialysis patients.

Assessment	PACE Study Group Patients (n=9)	PACE Control Group Patients (n=7)
Secondary		
Kidney Disease Quality of Life Short Form (KDQoL-SFTM) v 1.3		
SF-12 Physical Health Composite Score*	39.1 ± 8.4	39.6 ± 10.1
SF-12 Mental Health Composite Score*	49.0 ± 5.5	49.8 ± 7.4
KDCS (Kidney Disease Component Summary)*	66.0 ± 10.4	72.9 ± 11.5
Kidney-targeted Areas (KDQoL)*	68.4 ± 15.8	75.4 ± 15.8
Health-Related Quality of Life (HRQoL)*	61.4 ± 20.0	64.7 ± 21.7
Patient-Reported Outcomes Measurement Information System (PROMIS) Global Health Instrument questionnaire		
PROMIS Global Physical Health v1.2 T-score**	42.1 ± 1.6	43.4 ± 1.2
PROMIS Global Mental Health v1.2 T-score**	41.1 ± 1.4	41.5 ± 1.4
European Quality of Life Five Dimension (EQ-5D)		
Mobility**	2.0 ± 0.2	1.4 ± 0.3
Self-Care**	1.3 ± 0.2	1.0 ± 0.0
Usual Activity**	1.8 ± 0.2	1.6 ± 0.2
Pain/Discomfort**	1.4 ± 0.2	1.3 ± 0.2
Anxiety/Depression**	1.2 ± 0.2	1.1 ± 0.1
Health Today**	70.6 ± 6.2	66.4 ± 6.8

*(Mean ± Standard deviation), **(Mean ± Standard error of the mean)

Discussion: These preliminary results show that haemodialysis patients have cognitive problems, including short-term memory deficits. In addition, the self-reported metrics indicate that quality of life, well-being, and functional capacity needs to be improved.

Monday 5th June 16:00 – 17:00

Track E1 – Living with Kidney Disease 1

Poster: 153
Submission: 307

Supporting people with kidney disease to manage their health: How does patient activation impact perceived functional impairment?

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[2]Leicester NIHR Biomedical Research, Leicester.
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Introduction: Even at earlier stages not requiring kidney replacement therapy, chronic kidney disease (CKD) is associated with significant symptom and health burdens which have a considerable negative impact on functional status and ability to fully engage with work, leisure, and social activities. Optimal day-to-day management of CKD to maximise life participation requires a strong partnership between the healthcare team and patient to support effective self-management. Central to this partnership is patient activation, defined as the knowledge, skills, and confidence to manage one's own health. Highly activated patients take an active role in their health, whilst low activated patients have a more passive role. Higher activation is associated with better clinical outcomes. As part of a wider survey in people living with non-dialysis CKD, we explored the relationship between patient activation and perceived functional impairment due to CKD.

Methods: Participants from 14 hospital sites across England were invited to complete a survey on health and lifestyle factors including demographic and clinical information, the SF-12 health-related quality of life (QoL) questionnaire, Chalder Fatigue Scale, Patient Activation Measure (PAM-13), and Work and Social Adjustment Scale (WSAS). Participants were classified as having 'low' or 'high' activation based on their PAM-13 level (Levels 1&2 'low'; 3&4 'high'). Higher WSAS scores indicated greater perceived functional impairment due to CKD. Mann-Whitney tests were conducted to compare perceived impairment in WSAS domains between low and high activated participants. Linear regression was performed to determine the relationship between participant characteristics (i.e., age, gender, ethnicity, eGFR, patient activation, fatigue, physical and mental QoL) and WSAS score.

Results: 828 ND-CKD participants completed the survey [mean age 67.9 (±13.8) years, 60% (n=501) male, 92% White British (n=771), eGFR 33.1 (±19.7) ml/min/1.732, total number of additional comorbidities 2.0 (±1.5)]. 64% (n=529) of participants were classified as having 'low' activation. The mean WSAS score was 7.8 (±9.9) indicating mild functional impairment. Both high and low PAM groups perceived social and leisure activities (with other people e.g., outings/dating/parties) to be their most impaired functional activities, and close relationships with others as least impaired.

Individuals with low activation perceived greater impairment on work (P=0.035), home management (P<0.001), social leisure activities (P<0.001), private leisure activities (P<0.001) and close relationships (P<0.001) due to their CKD compared to higher activated individuals. Those who perceived greater

functional impairments were younger (P<0.001), had lower levels of activation (P=0.036), poorer physical (P<0.001) and mental (P=0.043) QoL, and greater levels of fatigue (P=0.001).

Discussion: Individuals with lower patient activation perceived greater impairment to a range of functional activities. Younger people may be more greatly impacted as they perhaps have greater expectations as to what they can achieve with marked impact in comparison to their peers without CKD. Older individuals may be more likely to attribute functional impairments to other age-associated comorbidities or to the effects of aging itself than to CKD. Interventions designed to increase patient activation and improve psychosocial adjustment have the potential to help individuals manage their CKD and reduce the perceived impairment on life participation.

Monday 5th June 16:00 – 17:00

Track E1 – Living with Kidney Disease 1

Poster: 154
Submission: 391

A Qualitative Study: Exploring patient, family and clinician perspectives about the psychosocial factors influencing access to kidney transplantation and transplant outcomes for children

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Introduction: Kidney transplantation is often seen as the optimal form of kidney replacement therapy for children and young people (CYP) with stage 5 Chronic Kidney Disease (CKD5). Psychosocial factors have been cited to delay their access to a kidney transplant, however it is unclear what these factors are.

We undertook a multi-centre qualitative study that explored the range of psychological and social factors that CYP, their carers and their paediatric nephrology multi-disciplinary team (MDT) perceived to influence how soon a CYP with CKD5 accesses a kidney transplant. This included factors that were perceived to influence kidney transplantation outcomes or deemed important to patients and their families in terms of their quality of life (QoL).

Methods: Semi-structured interviews were conducted with CYP, their carers and their paediatric nephrology MDT across 7 tertiary paediatric nephrology units in the United Kingdom. These interviews were reviewed for pertinent themes using thematic Analysis following the approach of Braun and Clarke.

Results: A total of 36 interviews were conducted with 13 families and 16 members of the paediatric nephrology MDT. The majority of participating families identified as White (57%), followed by Black (22%) or Asian (21%). The following themes were deemed important to accessing kidney transplantation and post-transplant outcomes: health beliefs; relationship with and trust in healthcare; support networks; family relationships; socioeconomic circumstances; culture and race; and mental health and coping strategies. Some of these factors influenced how clinicians, CYP or their family viewed the CYP as a suitable transplant candidate. Other factors influenced why families opted for living or deceased donation. Specific challenges from living with CKD5 and living through the COVID-19 pandemic were also discussed due to their impact on QoL and accessing a kidney transplant.

Discussion: There are a wide range of psychosocial factors that are perceived to influence a CYP's access to kidney transplantation. Longitudinal and prospective studies are needed to fully assess the

relationship between these psychosocial factors and a CYP's access to, and outcomes of, kidney transplantation.

Monday 5th June 16:00 – 17:00

Track E1 – Living with Kidney Disease 1

Poster: 155
Submission: 501

Developing complex care multiprofessional MDTs to support patient care for haemodialysis patients

Dr Emma Coyne, Miss Kate Ellerby, Dr Mark Jesky, Dr Linda Bisset, Miss Rachael Ewing, Mr Bruno Malfrici, Miss Helen Houlahan

Nottingham University Hospital NHS Trust, Nottingham

Introduction: Renal patients can present with multimorbidity which can lead to increased difficulties in self-management (Bowling et al., 2017). Haemodialysis regimens are complex and demanding, necessitating attendance at HD sessions, adherence to prescribed medications, and fluid and dietary restrictions. Poor adherence can lead to poor clinical outcomes and increased risk of mortality (Leggat et al. 1998). Renal multidisciplinary Care (MDC) teams enable a holistic care strategy to be formulated to manage risk and have been showed to improve patient outcomes (Hsu et al., 2021).

Within our renal unit we identified increasing concerns about risk including non-adherance, risk of self harm and self neglect and concerns that particular patient groups who would benefit from enhanced care pathways. A complex care multiprofessional MDT was developed to provide enable individual care-plans to considered for these patients and the usage and uptake was monitored over a year.

Methods: The complex care multiprofessional MDT included nephrologists, senior nursing staff, psychologist, young adult worker and a dietician and met on a monthly basis. Data on referrals, reason for referral, care plans outcomes and discharge was collected for two renal units over a 12 month period.

Results: 84 separate discussions were carried out over the year (range 3 -12 per meeting). 11 patients were carried over from the previous year, 18 new referrals were made including 3 re-referrals and 10 patients were discharged from review including two patients that died. More men (21) than women (7) were referred. Reasons for referral were qualitatively analysed and included adherence issues (attendance, shortened dialysis); frailty, violence and aggression, managing risk and violence and aggression, mental capacity concerns as well patients at risk for poorer outcomes e.g. immediate start to dialysis, cognitive impairment and serious mental health issues.

Discussion: The results highlight the increasing complexity of patient issues which are having to be managed by the haemodialysis unit staff. Creating a specific space to consider these issues has led to increased discussions about managing wider systemic issues such as non-attendance on dialysis, approaches to violence and aggression and concerns about mental capacity. The complex care MDT is a good example of multidisciplinary working to manage the range of complexity however the

administrative burden to support the MDT meetings and ensure that the MDT action points were followed up was found to be high. Recommendations are made to enable this to be sustainable in the long-term and to encourage communication with social care and wider care systems.

Monday 5th June 16:00 – 17:00

Track E1 – Living with Kidney Disease 1

Poster: 156
Submission: 075

An overview of systematic reviews of exercise-based interventions for people with long-term conditions

Dr Hannah Young[1,2], Dr Grace Dibben[3], Ms Lucy Gardiner[4,2], Professor Sally Singh[5], Professor Rod Taylor[3,6]

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[3]MRC/CSO Social and Public Health Sciences Unit, University of Glasgow, Glasgow.
[4]Department of Respiratory Sciences, University of Leicester, Leicester.
[5]4Department of Respiratory Sciences, University of Leicester, Leicester.
[6]Robertson Centre for Biostatistics, University of Glasgow, Glasgow

Introduction: Some 14.2 million people in England live with multiple long-term conditions (MLTCs), often defined as presence of ≥2 long-term conditions (LTCS), and an 86% increase in this number is predicted by 2035. Multiple long-term conditions are associated with a host of poor outcomes including reduced health-related quality of life (HRQoL), functional decline, and increased mortality and healthcare utilisation. Exercise based rehabilitation has the potential to ameliorate many of these outcomes. A systematic overview was undertaken to identify and summarise systematic review evidence of exercise-based interventions across a comprehensive list of LTCs.

Methods: Database searches were undertaken in June 2022. Eligibility criteria included peer-reviewed systematic reviews of exercise-based interventions compared to usual care, no-exercise control or other interventions that did not contain structured exercise, in adults (age ≥18 years) diagnosed with an LTC. Outcomes included mortality, hospitalisation, exercise capacity, frailty, disability, physical activity and HRQoL. A narrative synthesis summarised the available evidence.

Results: Electronic database searches yielded 11,074 unique records, from which 617 eligible systematic reviews were identified. One 'best' systematic review per LTC was selected for extraction and synthesis, based on recentness, comprehensiveness, focus, methodology and outcomes. Preliminary results identified 25 LTCs within which there is strong evidence that exercise is beneficial. There were 14 conditions for whom the benefits of exercise were unclear or conflicting. No evidence was identified for 5 LTCs.

Ongoing data extraction, quality appraisal and data synthesis will summarise the characteristics of exercise-based rehabilitation programs, and methodological quality and numerical findings of selected reviews (due for completion January 2023).

Discussion: The LTCs identified with clear indications for exercise-based interventions will inform the population for inclusion in the NIHR funded Personalised Exercise Rehabilitation FOR people with Multiple LTCs (PERFORM) research programme, which aims to develop and evaluate a rehabilitation intervention for people with multiple long-term conditions. The results will be highly relevant for people living with chronic kidney disease, which rarely occurs in isolation from other co-morbid conditions.

Monday 5th June 16:00 – 17:00

Track E1 – Living with Kidney Disease 1

Poster: 157
Submission: 200

Measurement properties of performance-based measures to assess physical function in chronic kidney disease: recommendations for use from a COSMIN systematic review

Dr Thomas Wilkinson[1], Ms Oksana Harasemiw[2], Dr Courtney Lightfoot[1], Ms Kathryn Wytsma-Fisher[3], Dr Pelagia Koufaki[4], Dr Clara Bohm[5], Dr Stephanie Thompson[6], Dr Jennifer MacRae[3]

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[3]The University of Calgary, Calgary.
[4]Queen Margaret University, Edinburgh.
[5]Seven Oaks General Hospital, Winnipeg.
[6]University of Alberta, Alberta

Introduction: Poor physical function is associated with increased morbidity and premature mortality in people living with chronic kidney disease (CKD). Routine assessment of physical function can help monitor disease progression and implement timely interventions, such as rehabilitation, exercise, or physical activity. Physical function testing is becoming increasingly embedded in national clinical practice, including in the assessment of frailty as stated in the NHS Long Term Plan.

Whilst it is not yet standard in nephrology practice, initiatives such as the Renal Service Transformation Programme (RSTP) are committed to including wellbeing measures into the RSTP dashboard and wider collection across kidney units in the UK; this includes measures of physical functioning and activity. However, there is wide heterogeneity in the physical function tests available for clinical and research use, hindering our ability to synthesise evidence.

A greater understanding of the measurement properties (e.g., such validity or reliability) of the various tests available would have significant implications in the use of such tests in research and clinical practice in the UK.

The aim of this review was to identify and evaluate performance-based physical function measures that could be recommended for standardised use.

Methods: Seven medical literature databases (MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, CINAHL, Scopus, and Web of Science) were searched, from inception to April 2022, for studies which evaluated a clinimetric property (validity, reliability, measurement error, and/or responsiveness) of an objectively measured performance-based physical function outcomes. Studies were evaluated using the COSMIN methodology and Grading of Recommendations, Assessment, Development and Evaluations (GRADE) based recommendations.

Studies with individuals of all ages and of any stage of CKD (non-dialysis, dialysis, and transplant) were included.

Results: In total, 50 studies with 21,315 participants were included. Clinimetric properties were reported for a total of 22 different performance-based physical function tests. In brief, the Short Physical Performance Battery (SPPB), Timed Up-and-Go (TUG), Sit-to-stand (STS)-5, STS-60, and gait speed tests had favourable clinimetric properties to support their use in CKD, and should be integrated into routine use (Figure 1). The majority of studies included were conducted in the hemodialysis population, and very few provided information regarding validity or reliability.

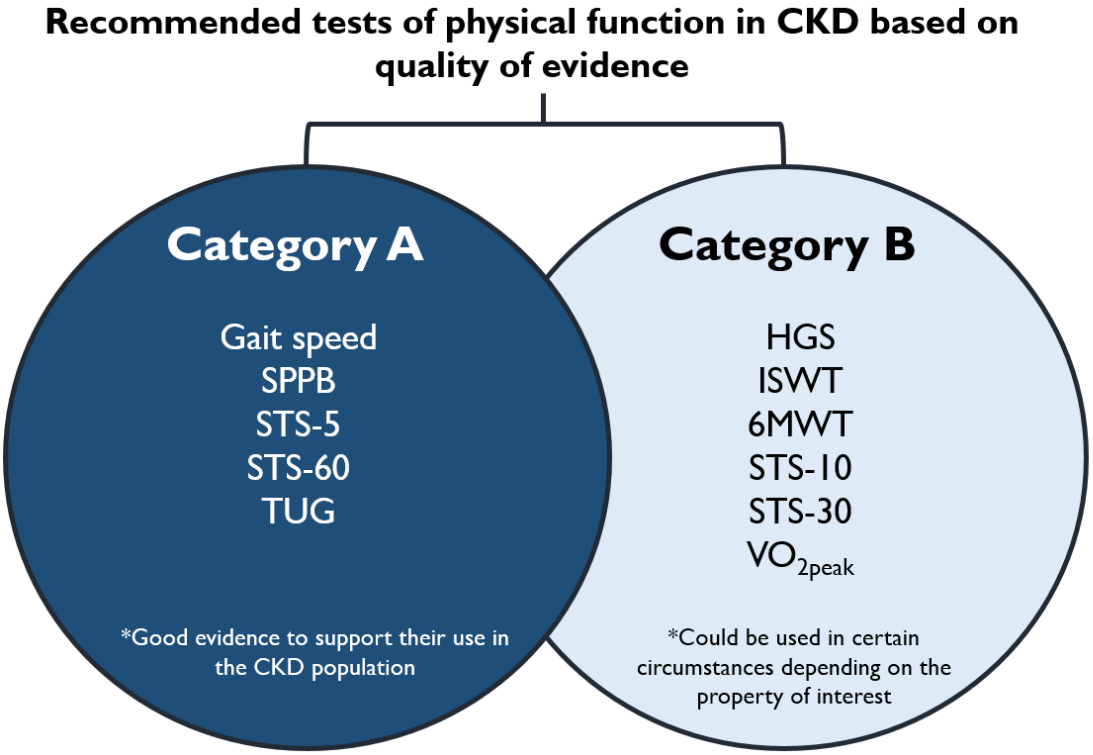


Figure 1. Recommended tests of physical function

Discussion: Out of all physical function tests reviewed, the SPPB, gait speed, STS-5, STS-60, and TUG demonstrated the best properties across the spectrum of CKD. In particular, the SPPB is a reliable and responsive test, which can also be disaggregated into its individual components for use in certain populations. However, knowledge gaps remain on the measurement properties for many tests, and not all physical function tests demonstrated high GRADE scores across all of the core measurement properties assessed. Our review and recommendations are the initial steps towards standardising a core outcome set of tools available to measure physical function in research and clinical settings for the CKD population. Our findings will help embed the use of physical function into nephrology practice as part of the RSTP.

Monday 5th June 16:00 – 17:00

Track E2 – Living with Kidney Disease 2

Poster: 158
Submission: 337

Inpatient physiotherapy needs of individuals with COVID-19 and kidney disease

Mrs Lyndsey Abdulnassir

Guy's and St Thomas' NHS Trust, LONDON

Introduction: Individuals with kidney disease are at greater risk of contracting COVID-19 and many patients hospitalised with COVID-19 will develop secondary kidney disease. Individuals with COVID-19 and kidney disease are more likely to suffer poorer clinical outcomes which may be amenable to physiotherapy.

Methods: The characteristics and physiotherapy management requirements of hospitalised patients referred for physiotherapy with COVID-19 and kidney disease are described. Data were collected between March 2020 and June 2020 on renal wards in a tertiary care centre.

Results: Characteristics: 59 patients with an average age of 61.2yrs (range 22-88yrs), including 39 males (66%) were treated. 53 (90%) had pre-existing kidney disease and 6 (10%) had acute kidney injury. 35 (59%) had been intubated and ventilated. The average length of stay was 36 days (+/-31 days).

Physiotherapy-specific symptoms: Individuals with COVID-19 and kidney disease commonly exhibited fatigue, shortness of breath, muscle weakness, reduced physical function, desaturation on exertion, reduced exercise tolerance and neurological impairments.

Physiotherapy interventions: Airway clearance techniques, progressive mobilisation, prone positioning, breathlessness management, fatigue management, muscle strengthening, balance retraining, neurological rehabilitation and orthotics provision were the management strategies required.

Outcomes: Improvement in physical function (Chelsea critical care physical assessment tool), oxygen demand and the need for long-term oxygen therapy, necessity for onward referral to rehabilitation services, discharge destination and the amount of therapy time provided were reviewed.

Discussion: During hospital admission individuals with COVID-19 and kidney disease have numerous and complex rehabilitation needs amenable to physiotherapy intervention. It is recommended that this is considered in future workforce planning to ensure sufficiently available and appropriately skilled rehabilitation for this cohort.

Monday 5th June 16:00 – 17:00

Track E2 – Living with Kidney Disease 2

Poster: 159
Submission: 342

A multi-centre mixed-methods internal pilot of a novel, digital physical activity and emotional well-being intervention for people with chronic kidney disease (Kidney BEAM).

Mr Christy Walklin

Kings College Hospital, London

Introduction: Chronic kidney disease (CKD) has substantial impact on health-related quality of life (HRQoL). Physical activity and emotional support may improve HRQoL but are not included in routine care. Digitally-delivered health interventions may address this, but their acceptability has yet to be explored in this population.

Kidney BEAM (https://beamfeelgood.com/home) is a theory-informed digital health intervention, offering live and on-demand exercise classes, delivered by healthcare professionals, alongside educational videos and blogs.

Since the COVID-19 pandemic an increasing number of clinical trials are being delivered remotely. We aimed to establish the feasibility of a remote randomised controlled trial (RCT) investigating the effectiveness of Kidney BEAM and explore participants' perceptions of trial and intervention acceptability.

Methods: A mixed-methods, multicentre randomised waitlist-controlled internal pilot was conducted. Adults with established CKD were recruited from five NHS hospitals and randomised 1:1 to Kidney BEAM or usual care. Participants in the intervention group were encouraged to complete two sessions of physical activity per week for 12-weeks.

Feasibility outcomes were based upon a priori progression criteria and included eligibility, recruitment, attrition, adherence rates, and remote collection of physical function and patient-reported outcome measures (PROMs). Acceptability was explored via semi-structured interviews with 15 participants.

Results: Of 763 patients screened, n=531 (69%, 95% CI 66-73%) were eligible. Of those eligible, n=303 (57%, 95% CI 53-61%) did not respond to an invitation to participate by the end of the pilot period. Of the 228 responders, 50 (22%, 95% CI 17-28%) consented. Of those consented, 8 (16% 95% CI 7-29%) withdrew prior to randomisation. Of the 42 randomised, 22 (10 (45%) male; 49±16 years; 14 (64%) White British) were allocated to Kidney BEAM and 20 (12 (55%) male; 56±11 years; 15 (68%) White British) to usual care. Seven (17%, 95% CI 7-31%) were lost to follow-up. Participants completed 15±12 sessions of the 24 sessions recommended (63%). At baseline, 90% of secondary outcome data was completed and 100% at 12 weeks.

Participants were motivated by a pre-existing desire to be active. Remote consent and assessment were reported as simple and quick. Participants felt safe completing a remote functional assessment, although some questioned its validity, and relevance of some PROMs.

Participants reported that Kidney BEAM made physical activity accessible and enhanced their functional ability. Educational videos were valued for their concise, accessible presentation. Participants enjoyed interacting with instructors during live classes, which increased their accountability. Whilst some participants reported feeling awkward in a class environment, many enjoyed sharing their experiences.

Areas for intervention refinement included additional 'onboarding' support, and minor adaptations to increase functionality. Participants suggested content be tailored to CKD stage and age. They felt Kidney BEAM's value would be maximised if used in synergy with routine care, particularly at the beginning of their kidney 'journey'.

Conclusions: A remote RCT of Kidney BEAM is feasible, with adaptions to increase recruitment rates, including enhanced follow-up of non-responders and addition of further centres. Kidney BEAM is acceptable, with adaptations to increase accessibility, particularly during first use of the intervention.

Monday 5th June 16:00 – 17:00

Track E2 – Living with Kidney Disease 2

Poster: 160
Submission: 383

The Duke's activity status index and sit-to-stand 60 are reduced but amenable to exercise in stage 5 chronic kidney disease

Mrs Lyndsey Abdulnassir

Guy's and St Thomas' NHS Trust, London

Introduction: Individuals with stage 5 Chronic Kidney Disease (CKD5) typically have reduced functional capacity. Self-reported questionnaires such as the Duke's Activity Status Index (DASI) and physical tests such as the sit-to-stand 60 (STS60) are increasingly used to assess cardiovascular risk for a kidney transplant. A DASI score of less than 34 (out of 58.2) or a reduction of 5 repetitions in STS60 are associated with increased risk when undergoing surgery.

Methods: The DASI and STS60 were collected from individuals with CKD5 attending a 12-week, physiotherapist-led renal exercise class between 2018 and 2021. Data was collected from individuals on the first (initial) and last (discharge) sessions.

Results: 35 patients, including 19 females, with a mean age of 57 years, completed the class attending a mean of 16 sessions.

The DASI (n=16) improved significantly from a mean score of 32.2 (STD 13.4) to 44.9 (STD 12.2; $p<0.01$) from the initial to discharge assessments. 60% (n=6/10) of individuals with scores less than 34 improved to a score of 34 or more.

The STS60 (n=31) improved significantly from a mean 20.7 (STD 7) to 35 (STD 9.6) repetitions ($p<0.01$) from the initial to discharge assessments. 80.6% (n=25/28) of individuals improved by 5 or more repetitions.

Discussion: Individuals with CKD5 typically present with low levels of functional capacity in keeping with the initial DASI (32.2) and STS60 scores (20.7 repetitions) in this study. Physical performance can be improved with regular exercise to levels associated with lower risk, as shown in this patient cohort. It is suggested that functional capacity is routinely measured and optimised as part of a kidney transplant assessment.

Monday 5th June 16:00 – 17:00

Track E2 – Living with Kidney Disease 2

Poster: 161
Submission: 476

BALANCE-ing during a pandemic: The evolution of a lifestyle management programme for pre and post kidney transplant recipients and donors from community based to on-line delivery.

Mrs Louise Kennedy, Mrs Jane Dursley

University Hospital of Wales, Cardiff

Introduction: In 2019 we were already running a successful community based multidisciplinary 'Lifestyle Management' programme for pre and post kidney transplant recipients and donors, who were considered to have a BMI too high or fitness level too low for safe anaesthesia and positive surgical / transplant outcomes.

Modelled on 'Eat Well for Life' and cardiac / pulmonary rehab, the 9 week community based programme, focused on education, discussion and peer support around aspects of diet and activity, followed by a circuit style exercise class tailored to the participants abilities. When Covid 19 caused lockdowns and shielding, our venues closed but we needed to provide this service more than ever as having renal failure and increased BMI impacted on Covid-19 survival.

We redesigned BALANCE as an online programme providing a Covid-19 safe service, using the same MDT approach with the addition of psychology. The groups receive weekly educational videos and live interactive Zoom sessions Each participant is provided with a tailored exercise plan with supportive apps and web links to continue at home

Method: Virtual BALANCE is run by specialist physiotherapist, dietitian and psychologist (providing motivational and behaviour change therapy) . Participants receive weekly videos covering different topics including how to complete outcome measures, these being weight, waist circumference, STS60 and QOL questionnaire. Weekly Zoom sessions offer discussion and peer support around the topics. Participants receive support from physiotherapy to improve activity and set goals, with provision of online resources such as 'Kidney Beam'.

Participants are referred the 'National Exercise on Referral Scheme' to continue their activity at local leisure centres. Online follow up sessions are run throughout the year and the quarterly news letter offers information and support around continued positive lifestyle changes.

Results:

	Face to Face	Virtual
Started programme	76 participants 8 groups	144 participants 20 groups

Completed programme	61 (80%)	125 (87%)
% Weight loss	• 84% pts lost weight of which • -2.5kg average loss • -2.4% body weight	• 85% pts lost weight of which • -3.6kg average loss • -3.4% body weight
Pre tx: Achieved BMI <35	14	23
Post tx: Achieved BMI <30	0	6
79pts moved down a BMI bracket from morbidly obese to obese, obese to overweight or overweight to healthy BMI		
No. pts transplanted	8	7
No. pts donated	0	1
Waist circumference	• -4.93cm (4%) average reduction	• -5.7cm (5%) average reduction
Fitness	• +40metre (11%) average increase in 6minute walk test	• +9 sit to stand (43%) increase in 60 seconds

Discussion: The blended model demonstrates positive results in weight loss, reduced BMI, waist circumference and improved level of fitness. resulting in more participants gaining access to the optimum treatment of kidney transplantation, improved outcomes and lower costs when compared to remaining on haemodialysis. One successful kidney transplant could save £500,000 when compared to the equivalent time on unit haemodialysis. This would fund our service for 7 years.
With the incidence of CKD and obesity both rising BALANCE has been embedded into our Transplant Pathway. The next steps will be to make the online service available to all UHB in Wales.

Monday 5th June 16:00 – 17:00

Track E2 – Living with Kidney Disease 2

Poster: 162
Submission: 227

Are dietetic telephone clinics more efficient for low clearance patients?

Mrs Saba Boyer-Masfari, Mrs Jill Twomey

Guy's & St Thomas' NHS Foundation Trust, London

Introduction: A review of the dietetic service provided to low clearance patients identified that there was:

- A low number of in-person dietetic consultations (28%/ n=29).
- A high number of ad-hoc telephone consultations (72%/ n=76/) outside of the scheduled clinic time.

This resulted in a high variability in the number of patients requiring a dietetic review week to week which made it difficult to plan workloads across the dietetic team. In the interest of working more efficiently and sharing workloads more equally, the structure of the dietetic service provided to low clearance patients was amended. The new structure dedicated a full day a week to booked telephone clinic appointments as opposed to attending the low clearance clinic half a day a week followed by ad-hoc telephone calls. Patients were booked into the telephone clinics following screening based on pre-defined criteria that remained the same as previous.

Methods: Data was collected following the relaxation of all COVID restrictions. In order to evaluate the efficiency of the new structure, the following data was collated using an excel spreadsheet over a 4 month period:

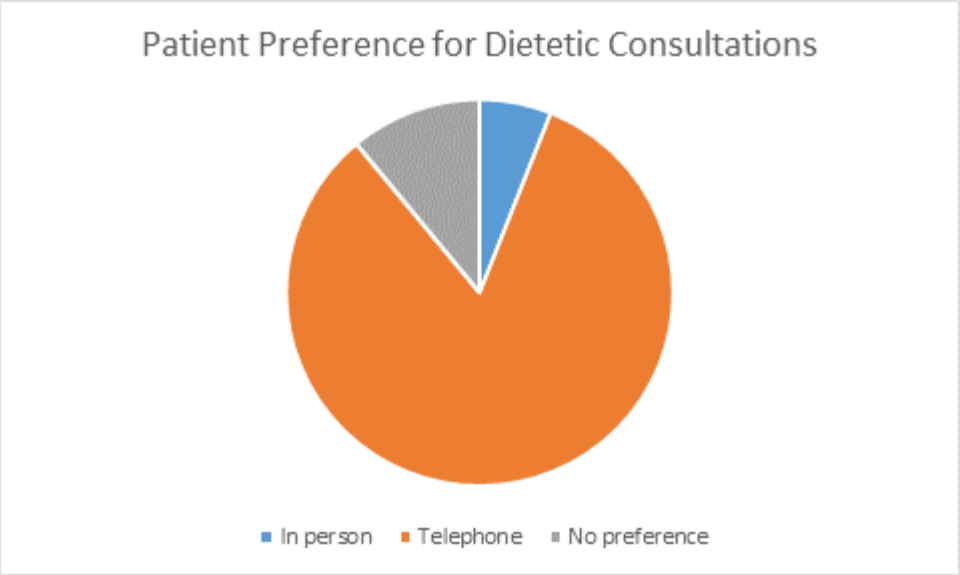
- Effect on waiting times between screening/ referrals and the dietetic appointment.
- DNA rates.
- Number of ad-hoc telephone calls required.

Patients were also asked whether they would prefer a telephone or in-person dietetic review for future appointments.

Results: Data on 76 new patients was collected.

90% (n = 69) of new referrals had a dietetic appointment prior to their next scheduled low clearance clinic appointment. DNA rates improved from 42% to 19% with implementation of the new structure. The number of ad-hoc telephone calls reduced by 40%.

71 responses on patient preference were obtained. 6% (n=4) preferred an in-person appointment and 83% (n = 59) preferred a telephone appointment. The remaining 11% (n=8) did not have a preference.



Discussion: Implementation of the new clinic structure resulted in less variability in ad-hoc calls from week to week. Additionally, as patients' blood results were available prior to their dietetic appointment, there was a reduced need for multiple appointments. These changes resulted in improved time management across the dietetic team. DNA rates improved by over 50% and there did not appear to be any negative impact on waiting times. Patients indicated a clear preference for telephone appointments.

Monday 5th June 16:00 – 17:00

Track E2 – Living with Kidney Disease 2

Poster: 163
Submission: 271

Effect of immuno-nutrition on systemic inflammation and muscle mass in a haemodialysis population: a feasibility study

Dr Daniela Viramontes Hörner[1], Professor Bethan E Phillips[2], Professor Philip J Atherton[2], Professor Kenneth Smith[2], Dr Daniel J Wilkinson[2], Professor Nicholas M Selby[1,3], Professor Maarten W Taal[1,3]

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Introduction**:** Decreased skeletal muscle mass (SMM) and systemic inflammation are frequent complications associated with poor outcomes in people receiving haemodialysis. Although these problems are widely acknowledged, it has become clear that simply providing conventional oral nutritional supplements (ONS) is often not effective in increasing SMM. This is partly because systemic inflammation causes “anabolic resistance”, a condition that inhibits optimal rates of muscle protein synthesis being achieved despite adequate protein intake/availability. Immuno-nutrition supplements are high in energy and protein (similar to conventional ONS), but also contain a unique combination of nutrients that have shown to reduce inflammation in people with cancer. Therefore, the purpose of this feasibility study is to explore the potential effect of immuno-nutrition on systemic inflammation and SMM in a haemodialysis population.

Methods**:** This was a single-centre, non-randomised, interventional feasibility study where 14 haemodialysis patients received 1 sachet per day (74 g dissolved in 125 ml of water) of a commercially available immuno-nutrition supplement (Oral Impact®, Nestlé) for 6 weeks. C reactive protein (CRP), skin autofluorescence (SAF, a marker of systemic inflammation), body composition assessment using bioelectrical impedance analysis (InBody 770), weight, body mass index (BMI), handgrip strength (HGS), routine biochemical variables (pre-dialysis), and energy, protein and fat intake were measured at baseline and after the 6-week intervention.

Results**:** Mean participant age was 69 ± 13 years and median dialysis vintage was 26 (interquartile range 9 to 94) months. Twelve participants (86%) were male and of white ethnicity. Diabetes and heart disease were present in 9 (64%) and 7 (50%) participants, respectively. Adherence to the intervention was high (98%). Participants reported that the taste of the supplement was nice and acceptable. No safety issues were observed in terms of development of hyperkalaemia or fluid overload. Table 1 shows changes in inflammatory and nutritional markers across the intervention period. We observed a significant increase in HGS and urea levels. Fat-free body mass and SMM remained stable, while body weight, BMI and body fat mass tended to increase, though changes did not reach statistical significance. Markers of systemic inflammation did not show any significant change.

Discussion**:** In this interventional feasibility study, we observed that provision of an immuno-nutrition supplement was associated with an improvement in muscle strength, as well as maintenance of SMM. This suggests that immuno-nutrition may be effective in preventing SMM loss over time in people on haemodialysis. The findings of this feasibility study will help design a randomised controlled clinical trial investigating whether immuno-nutrition supplementation can improve SMM and other nutritional markers, and to evaluate the impact on long-term outcomes, including quality of life.

Table 1. Changes in markers of systemic inflammation and nutritional status from baseline to 6 weeks of treatment with an immuno-nutrition supplement.

Variable	Baseline	6 weeks	*p* Value
C reactive protein (mg/L)	7.6 (4.8 to 32.3)	7.3 (2.9 to 22.0)	0.8
Skin autofluorescence (AU)	4.0 (3.2 to 4.6)	3.5 (3.1 to 4.0)	0.2
Handgrip strength (kg)	23.8 (17.1 to 27.9)	24.4 (18.9 to 30.8)	0.01
Post-dialysis weight (kg)	68.1 (60.8 to 81.7)	70.2 (61.0 to 84.1)	0.06
Body mass index (kg/m^2)	23.7 (21.8 to 27.0)	24.2 (21.8 to 27.0)	0.09
Extracellular water ratio	0.406 (0.392 to 0.409)	0.402 (0.394 to 0.409)	0.4
Fat-free body mass (kg)	49.2 (46.2 to 61.3)	50.2 (44.5 to 59.9)	0.7
Skeletal muscle mass (kg)	26.7 (25.3 to 33.6)	26.7 (23.9 to 32.3)	0.7
Body fat mass (kg)	17.9 (13.2 to 23.6)	21.1 (13.0 to 24.2)	0.06
Body cell mass (kg)	31.5 (30.0 to 39.1)	31.6 (28.4 to 37.7)	0.7
Phase angle (°)	3.4 (2.9 to 4.6)	3.7 (3.2 to 4.1)	0.5
Haemoglobin (g/L)	109 (105 to 118)	117 (111 to 119)	0.1
Urea (mmol/L)	13.1 (10.7 to 15.0)	18.7 (14.9 to 23.0)	0.003
Serum creatinine (µmol/L)	563 (425 to 666)	611 (498 to 706)	0.3
Serum albumin (g/L)	30.0 (29.0 to 35.0)	32.0 (29.5 to 33.3)	0.9
Total cholesterol (mmol/L)	3.0 (2.6 to 4.0)	3.4 (2.9 to 4.1)	0.2
Serum potassium (mmol/L)	4.5 (4.1 to 4.8)	4.6 (4.1 to 5.4)	0.3
Serum phosphate (mmol/L)	1.27 (1.11 to 1.69)	1.24 (1.09 to 1.70)	0.8
Energy intake (kcal/kg/d)	26.6 (22.5 to 33.8)	27.2 (22.3 to 31.6)	0.9
Protein intake (g/kg/d)	1.0 (0.9 to 1.3)	1.1 (1.0 to 1.4)	0.1
Fat intake (g/day)	86.0 (57.4 to 101.7)	72.2 (57.6 to 85.7)	0.1

Data expressed as median (interquartile range).
Abbreviations: AU, arbitrary units.

Monday 5th June 16:00 – 17:00

Track E2 – Living with Kidney Disease 2

Poster: 164
Submission: 275

Title: Renal transplant Dietetic Audit: Investigating the prevalence of malnutrition in patients with a failing kidney transplant

Miss Lucy McConvey[1], Ms Helena Jackson[2], Ms Clare Cremin[3]

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[2]St. Georges Hospital, London.
[3]Kings College London, London

Introduction: Chronic Kidney Disease (CKD) puts patients at risk of malnutrition, however malnutrition risk can be difficult to identify with generic screening tools[1]. UK guidelines recommend regular nutrition screening and dietetic input for patients with an estimated glomerular filtration rate (eGFR) below 30ml/min and local guidelines advise a minimum of annual dietetic review for patients with eGFR < or equal to 20.[2] However, limited resources are available for screening.

This audit aimed to measure the prevalence of malnutrition risk in the failing kidney transplant group (eGFR < or equal to 20ml/min).

Methods: Data were extracted from the renal unit database (Clinical Vision 5) for patients with a functioning renal transplant for >3 months under the care of the renal transplant team. The data were split into two groups based on their eGFR. Patients with an eGFR of < or equal to 20ml/min were defined as the failing transplant group in keeping with the referral criteria for the Advanced Kidney Care Clinic. Patients with an eGFR >20ml/min were defined as the functioning transplant group. A questionnaire based on the Patient Guided- Subjective Global Assessment Short Form (PG-SGA-SF) was conducted over the telephone for the patients in the failing transplant group and their Nutrition Impact Symptom (NIS) score was calculated. Patients with an NIS score > or equal to 3 were identified as at risk of malnutrition. SPSS Statistics were used for statistical analysis for both groups.

Results: Of the total 498 patients, 22 (4.4%) had an eGFR < or equal to 20. Telephone interviews were conducted with 20 patients within this group. Three patients did not answer and one was unable to provide information over the telephone. Therefore 16 NIS scores were calculated. According to the NIS score, nine (56%) patients with eGFR < or equal to 20ml/min questioned were at risk of malnutrition and were identified as patients who would benefit from dietetic input. Of this patient group 12 (75%) were experiencing symptoms impacting on their dietary intake. Most commonly were early satiety (n= 6), pain (n=5) and diarrhoea (n=3). Follow up from a dietitian was requested by four (25%) patients with a further eight requesting contact details for further information and clarification. No direct correlation was found between NIS score and eGFR.

Discussion: The standardised telephone questionnaire was a practical method for routine remote malnutrition screening of this patient group by staff without specialist renal dietetic training. The NIS scores indicated over 50% of patients with a kidney transplant and eGFR < or equal to 20 may be at risk

of malnutrition. The results indicate patients with a poorly functioning kidney transplant are a nutritionally vulnerable group and require access to malnutrition screening as per local and national clinical guidelines.

References:

1. Wright, M., Southcott, E., MacLaughlin, H. and Wineberg, S. (2019). Clinical practice guideline on undernutrition in chronic kidney disease. BMC Nephrology. 20, 1-10.

2. Kosters, C., Van den Berg, M. and Hamersvelt, H. (2020). Sensitive and practical screening instrument for malnutrition in patients with chronic kidney disease. Nutrition. 72, 1-5.

Monday 5th June 16:00 – 17:00

Track E2 – Living with Kidney Disease 2

Poster: 165
Submission: 277

A feasibility study exploring the impact of a low advanced glycation end-product diet on skin autofluorescence in kidney transplant recipients.

Dr Daniela Viramontes Hörner[1], Professor Maarten W Taal[1,2], Dr Janson Leung[2], Ms Ellen Patullo[2], Ms Catherine Johnson[2]

[1]Centre for Kidney Research and Innovation, Academic Unit for Translational Medical Sciences, School of Medicine, University of Nottingham, Derby.
[2]Department of Renal Medicine, University Hospitals of Derby and Burton NHS Foundation Trust, Derby

Introduction**:** Advanced glycation end-products (AGEs) are uremic toxins that result from hyperglycaemia and oxidative stress. AGEs are also formed in food, especially during cooking using dry-heat methods. AGE accumulation can be measured by skin autofluorescence (SAF) and increased SAF is a strong predictor of death and graft loss in kidney transplant recipients (KTR). Previous studies have reported that reduction of dietary AGE intake is associated with a decrease in circulating AGE levels, suggesting that a low-AGE diet may also be associated with a decrease in SAF. We aimed to investigate whether a low-AGE diet leads to a reduction in SAF levels in KTR.

Methods**:** Thirty-eight KTR were randomly allocated to a usual diet (control group, n=19) or a low-AGE diet (intervention group, n=19) and then followed-up for 6 months. The intervention group was provided with detailed written advice and counselling on how to choose foods low in AGEs, and to use high-water content cooking methods (stewing, steaming, boiling, poaching), instead of dry-heat methods (frying, grilling, roasting). The goal was to reduce dietary AGE intake to <8000 kilounits/day (kU/day). SAF was measured at baseline, 3 and 6 months. Rate of change in SAF (i.e., SAF trend) was calculated using the SLOPE function in Microsoft Excel. Dietary AGE intake, biochemistry and nutritional assessments were performed at baseline and 6 months.

Results**:** Mean age of the whole cohort was 56±11 years. Mean SAF was high at 2.9±0.7 arbitrary units (AU) compared to the reference value of 2.1±0.4 AU. Transplant vintage ranged from 42 to 126 (median 88) months. The majority of the participants were male (71%) and of white ethnicity (84%). Prevalence of diabetes, hypertension and heart disease was 16%, 53%, and 10%, respectively. Median dietary AGE intake was high at 18558 (15164 to 25341) kU/day. There were no significant differences between the intervention and control groups at baseline in SAF, dietary AGE intake, estimated glomerular filtration rate (eGFR), demographics, and clinical, biochemical and nutritional characteristics. Baseline SAF was negatively associated with eGFR (r=-0.387; p=0.02), energy intake (r=-0.464; p=0.003) and fat intake (r=-0.438; p=0.006).

Seventeen participants in the control group and 13 participants in the intervention group completed 6 months of follow-up (Figure 1). Adherence to the low-AGE diet was moderate (69%). Dietary AGE intake decreased significantly in the intervention group but remained high in the control group. Body weight, energy, and fat intake decreased in the intervention group but there was no significant change in SAF

(Table 1). The mean SAF trend observed was a decrease of 0.45±1.19 and 0.22±0.75 AU/year in the intervention and control groups, respectively (p=0.7 for comparison between groups).

Discussion**:** In this feasibility study, we observed a high drop-out rate in the intervention group, which may explain our finding that reduction in dietary AGE intake did not seem to have any significant effect in decreasing SAF levels. This highlights the need for a larger trial to determine the effect of dietary AGE restriction on SAF levels in KTR.

Table 1. Changes in skin autofluorescence, dietary AGE intake, nutritional markers, and clinical and biochemical data from baseline to 6 months in intervention and control groups.

Variable	Intervention group (n=13)			Control group (n=17)		
	Baseline	Month 6	p Value	Baseline	Month 6	p Value
Skin autofluorescence (AU)	3.1 ± 0.8	2.8 ± 0.5	0.3	2.9 ± 0.6	2.8 ± 0.6	0.4
Dietary AGE intake (kU/day)	18047 (IQR 13103 to 25941)	5515 (4206 to 8631)	0.001	17201 (12476 to 23857)	20447 (14093 to 25044)	0.6
Energy intake (kcal/kg/day)	25.8 ± 5.5	21.5 ± 6.3	0.001	24.7 ± 7.0	26.1 ± 6.8	0.3
Protein intake (g/kg/day)	1.1 ± 0.3	1.0 ± 0.3	0.4	1.1 ± 0.4	1.2 ± 0.3	0.3
Fat intake (g/day)	70.5 ± 20.8	55.2 ± 20.0	0.003	67.5 ± 26.3	72.8 ± 27.1	0.2
Systolic blood pressure (mmHg)	138 ± 9	138 ± 18	1.0	147 ± 17	145 ± 16	0.8
Diastolic blood pressure (mmHg)	80 ± 7	83 ± 9	0.2	84 ± 8	84 ± 9	0.7
eGFR (ml/min/1.73m²)	38.6 ± 11.9	37.5 ± 13.6	0.5	51.1 ± 20.1	49.9 ± 18.7	0.4
Haemoglobin (g/L)	137 ± 16	135 ± 14	0.3	137 ± 15	134 ± 17	0.2
Serum albumin (g/L)	37.4 ± 4.0	36.5 ± 3.5	0.5	36.1 ± 2.7	36.1 ± 2.6	1.0
C reactive protein (mg/L)	2.0 (0.7 to 6.1)	2.1 (0.7 to 5.5)	0.5	2.6 (0.8 to 9.7)	1.5 (0.7 to 5.4)	0.2
Total cholesterol (mmol/L)	4.8 ± 1.2	4.8 ± 1.4	0.6	4.8 ± 0.9	4.5 ± 0.8	0.09
Weight (kg)	88.7 ± 17.8	87.4 ± 18.5	0.046	85.9 ± 22.1	86.5 ± 22.5	0.3
Body mass index (kg/m²)	28.6 ± 3.7	28.2 ± 4.1	0.08	28.5 ± 4.9	28.7 ± 5.1	0.2
MAMC (cm²)	28.1 ± 3.1	27.1 ± 2.6	0.2	28.2 ± 4.5	27.6 ± 3.1	0.4
Triceps skinfold thickness (mm)	16.3 ± 5.2	17.2 ± 7.4	0.4	18.7 ± 6.6	19.4 ± 6.5	0.5
Handgrip strength (kg)	33.8 ± 11.6	34.3 ± 10.1	0.7	29.9 ± 8.8	29.0 ± 8.7	0.3
SGA score	6.7 ± 0.5	6.9 ± 0.4	0.3	6.6 ± 0.5	6.8 ± 0.4	0.1

AGE, advanced glycation end-products; AU, arbitrary units; eGFR, estimated glomerular filtration rate; IQR, interquartile range; iPTH, intact parathyroid hormone; kU, kilounits; MAMC, mid-arm muscle circumference; SGA, subjective global assessment.
P-values in columns are for comparison of baseline and 6-month data within each group.

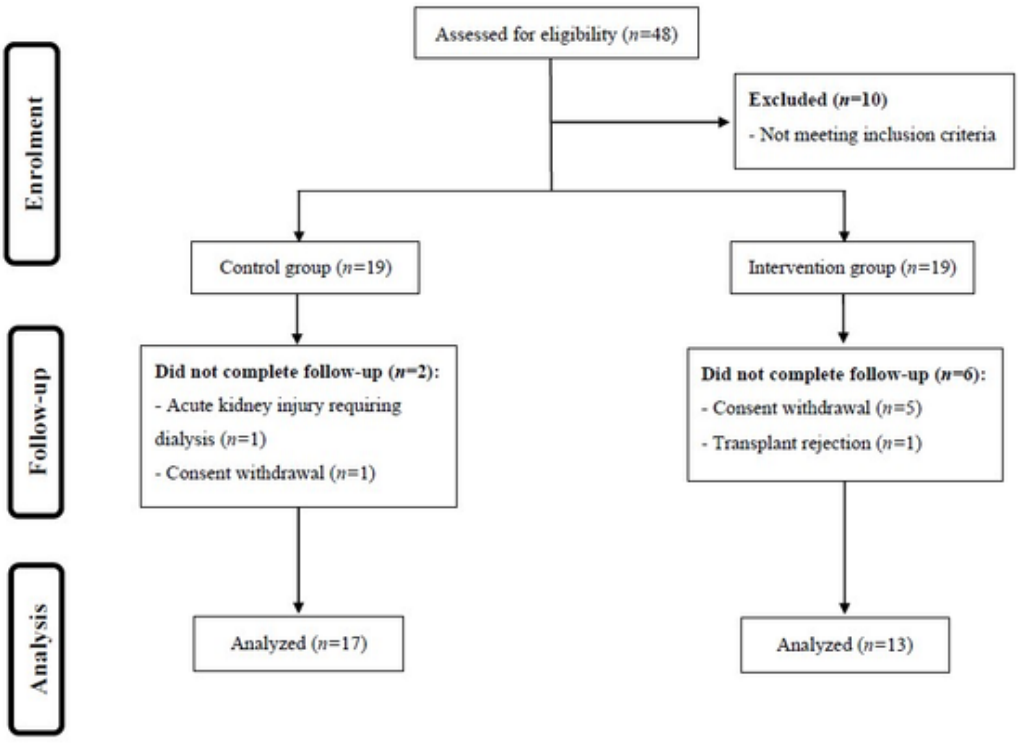

Figure 1. **The Consolidated Standards of Reporting Trials (CONSORT) flowchart of participant progression through the study.**

Monday 5th June 16:00 – 17:00

Track E2 – Living with Kidney Disease 2

Poster: 166
Submission: 299

Investigating energy requirements and nutritional status in haemodialysis patients via indirect calorimetry – are current predictive equations reliable?

Mr Giuseppe Scapellato[1], Ms Helena Jackson[1], Ms Sarah Illingworth[2]

[1]St George's University Hospitals NHS Foundation Trust, London.
[2]London Metropolitan University, London

Introduction: Up to 54% of patients on haemodialysis (HD) are malnourished[1]. Effective nutrition plans to address malnutrition require a correct determination of resting energy expenditure (REE). Predictive equations are based on limited scientific evidence, increasing the likelihood of under- and over-feeding[2].

Aims:

- To evaluate the use of the indirect calorimetry (IC) as part of routine dietetic care for patients on HD.

- To compare measured REE by IC with predicted REE by Parenteral & Enteral Nutrition Specialist Group (PENG) 2018 equations[2].

- To determine whether HD affects the measured REE (mREE).

Methods: A convenience sample of ten patients consented to participate in this audit and Trust approval was granted.

IC was used to measure REE prior to and at the end of a HD session and compared with the predicted REE by PENG 24 kcal/kg dry weight and PENG 35 kcal/kg fat-free mass (FFM) equations. Lean tissue mass (LTM) and dry weight were determined by bioimpedance analysis and nutritional status was assessed by subjective global assessment (SGA) and by a renal nutrition screening tool (iNUT) as part of routine care.

Results: Of the 10 participants, nine reported IC measurement was comfortable and one reported it was slightly uncomfortable due extreme hot weather temperatures.

There was no statistical significance between mREE prior to [1798+420 kcal/day, (mean ± SD)] and at the end of HD (1825+367 kcal/day, $p = 0.6274$). The mREE was not statistically significant from predicted REE by PENG dry weight (1992+729 kcal/day, $p = 0.6983$), however there was a statistical significance between mREE and PENG FFM equation (1446+462 kcal/day, $p = 0.0090$). Acceptable prediction of REE (90–110% adequacy) was found in four patients out of 10 by using the PENG dry weight equation and in

two patients by PENG FFM equation. The limits of agreement were clinically significantly wide between both equations and mREE according to Bland and Altman analysis. There was a strong positive correlation between LTM and mREE ($r = 0.77$, $p = 0.0092$). Three patients were identified within the malnutrition category by SGA and of these, two were within the iNUT malnutrition category (67% sensitivity, 88% specificity).

Conclusion: IC was well tolerated by patients, can be performed anytime during HD and is a practical tool to provide a measurement of REE in patients on HD in a clinical setting. iNUT may be a practical and valid shorter alternative to SGA for clinical care and further studies.

For the group, PENG dry weight equation gave better REE prediction than the FFM equation. However, there are inaccuracies in using predictive equations to estimate REE for individual patients on HD. There is a clinical role for the use of the IC in routine care to avoid the risk of under feeding in a population group at risk of malnutrition. This may improve the nutritional care of these patients.

References :

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2. Todorovic and Manfrici (2018). A pocket guide to clinical nutrition. 5th edition

Monday 5th June 16:00 – 17:00

Track E2 – Living with Kidney Disease 2

Poster: 167
Submission: 395

A nested qualitative study exploring the acceptability of a low advanced glycation end-product diet in kidney transplant recipients.

Dr Daniela Viramontes Hörner[1], Prof Maarten W Taal[1,2], Dr Janson Leung[2], Ms Ellen Patullo[2], Ms Catherine Johnson[2]

[1]Centre for Kidney Research and Innovation, Academic Unit for Translational Medical Sciences, School of Medicine, University of Nottingham, Derby.
[2]Department of Renal Medicine, University Hospitals of Derby and Burton NHS Foundation Trust, Derby

Introduction**:** Advanced glycation end-products (AGEs) are uremic toxins that result from hyperglycaemia, oxidative stress and cooking foods using dry-heat methods. AGE accumulation can be measured by skin autofluorescence (SAF) and increased SAF is a strong predictor of death and graft loss in kidney transplant recipients (KTR). Previous studies have reported that reduction of dietary AGE intake decreases circulating AGEs, suggesting that a low-AGE diet may also decrease SAF. This qualitative study aimed to explore the acceptability to participants of a study investigating the impact of a low-AGE diet on SAF.

Methods**:** For the feasibility study, thirty-eight KTR were equally randomised to a usual diet (control group) or a low-AGE diet (intervention group). Thirty participants (control group, n=17; intervention group, n=13) completed 6 months of follow-up. A sample of fifteen participants (intervention group, n=10; control group, n=5) were interviewed to determine the acceptability of the intervention and the study process.

Semi-structured interviews were audio-recorded and transcribed by a Trust-approved transcription service. Interviews lasted 6-45 minutes and were conducted either face-to-face, by video or telephone calls.

Data analysis followed the seven-stage process of framework analysis. Transcripts were inductively coded within NVivo, and themes were identified using reflexive thematic analysis.

Results**:** Mean age and transplant vintage were 58±10 years and 114±65 months, respectively. All interviewed participants were of white ethnicity and 80% were male.

Participants were positive about their involvement in this study with all taking the opportunity to reflect on their motivation to participate.

When considering the study process 3 themes emerged. Most participants described the ease of completing food diaries, though it was tiresome for a few. All described the convenience of aligning

study visits with routine transplant follow-ups, and the quality and accessibility of supportive information.

For those in the intervention cohort 4 themes were identified:

- Participants described the importance of household support and the unexpected health benefits to other household members of following a low-AGE diet.
- Several appliances to help with allowed cooking methods were highlighted by participants, with one commenting "if you hadn't got some way to steam or pressure-cook, you kind of face a challenge".
- Almost all participants described how their palate had changed and taste improved as they became more adventurous with food.
- Appearance was an unanticipated challenge as several participants described the initial shock of no browned-meat as unappetising, inedible and for one "like dog food" Higher cost was an important consideration for three participants, whilst almost all described the difficulties in following a low-AGE diet when eating out.

Discussion**:** These findings provided insight into participants' views and experiences of a feasibility study exploring the impact of a low-AGE diet on SAF in KTR. However, not interviewing those participants who withdrew is a limitation, given the high drop-out rate observed in the intervention group. Nevertheless, these findings provide assurance around participants' acceptability of the intervention and study process and can be used to inform a larger trial to determine the effect of dietary AGE restriction on SAF in KTR.

Monday 5th June 16:00 – 17:00

Track E2 – Living with Kidney Disease 2

Poster: 168
Submission: 485

Hand Grip Strength a simple useful tool

Mrs Yvonne Bradburn

Dorset County Hospital, Dorchester

Introduction: Hand grip strength (HGS) has been shown to be a useful, non-invasive and reliable measure of protein-energy and functional status.

Face to face in centre haemodialysis clinics were restarted following COVID in April 2021. As a change to practice dietetic consultations have become part of the clinic rather than patients being reviewed whilst on the dialysis unit. Introduction of the measurement of HGS using a Jamar digital hand grip dynamometer has been incorporated into this nutritional assessment.

Methods: Data was collated from those patients with 2 or more HGS measurements taken by the same dietitian to reduce observer errors. Patients are seen in a dedicated clinic with the same consultant and dietitian present. Due to dialysis schedules patients have appointments at about the same time at each clinic visit. Their HGS measurement timings are therefore consistent and patients have only been compared with their own previous results.

Results: 71% male (44/62) and 29% (18/62) female have been included. 74% (33 male, 13 female) were on incentre haemodialysis, 15% (6 male, 3 female) on home haemodialysis and 11% (5 male, 2 female) on peritoneal dialysis.

During the period April 2021 to January 2023 4 patients were transplanted.

2 patients transferred from peritoneal dialysis to haemodialysis due to ultrafiltration failure. Not surprisingly their weights decreased due to the fluid removal on haemodialysis yet their HGS results remained unchanged.

2 incentre haemodialysis patients provide particularly interesting results:

Case 1 is a 66 year old male refused consideration for transplantation due to a high BMI 41.5 made the decision to lose weight. With ongoing dietetic support BMI is now 35 whilst his HGS has remained stable.

Case 2 is a 69 year old male diagnosed in June with squamous cell carcinoma of the mandible and subsequent resection in August 2022. Not surprisingly weight and HGS started to decline in March 2022 3 months before diagnosis. Patient currently gastrostomy fed with minimal oral intake. Regular dietetic assessment and support in place.

Case 3 is a 49 year old man on home haemodialysis. Questionable as to whether he is managing his full dialysis hours due to work commitments and is borderline for meeting his protein requirements as eating only twice a day during the week. Gradual decline in weight and HGS noted. A support plan can now be put in place.

Discussion: HGS is a simple and reliable measure which is now used by the dietitians in all renal clinical areas except in transplant patients due to lack of workforce capacity. A decrease in HGS is indicative of loss of strength which is often due to a deterioration in health that may not always be clinically obvious. HGS is an important measure that can form part of the holistic assessment of care for each individual patient

Monday 5th June 16:00 – 17:00

Track F1– Patient Involvement, Education & Outcomes 1

Poster: 169
Submission: 070

Dialysis education and options for late presenters – an on-going dilemma

Dr Yimeng Zhang, Dr Jyoti Baharani

University Hospitals Birmingham NHS Foundation Trust, Birmingham

Introduction: Pre-dialysis education forms a crucial part of dialysis preparation, which is associated with a greater patient survival and a higher proportion of patients on home dialysis modalities such as peritoneal dialysis (PD). Often, acute start dialysis patients start and remain on in-centre haemodialysis (ICHD) without the benefit of an informed decision making process or education on the other options available. In the UK, late presentation occurred in 16.3% of the dialysis starts in 2020. The literature surrounding education provision in this population is sparse. The aim of this review is to evaluate the available evidence from current methods of education provision to the acute dialysis start population and the associated outcomes.

Methods: We carried out searches on scientific databases with an additional review of relevant references for selected papers. Studies were selected based on their inclusion of adults who have initiated on dialysis following an acute kidney injury, or chronic kidney disease patients not previously known to the renal service or have a functional dialysis access.

Results: Publications on the utilisation of formal education for acute dialysis starts have described a holistic education pathway with multimedia provision of information and interactive experiences. Motivational interviewing techniques and individual counselling skills are used to explore patient's priorities and wishes. Demonstration of dialysis modalities and tours of the facilities have also been helpful. Family and a support network are of upmost importance and were involved early in the education process. All studies involved the one or a group of trained specialist nurses as the lead educators. They provided information over a period of three to five sessions. In most cases, formal education was initiated as an inpatient, if possible before the initiation of acute dialysis.

86-100% of acute start dialysis patients get initiated on and remain with ICHD. Studies have demonstrated a significant decrease in the use of ICHD following the initiation of education programme. Following formal education, 21-58% of acute start dialysis patients chose PD, 10%-24% home HD, 33-58% ICHD. The introduction of an education programme has brought the number of patients maintained on an independent form of dialysis similar to those in the planned dialysis start population. Patients were able to commence PD without needing temporary HD, hence avoided complications associated with such. Younger patients, particularly those under the age of 75 ($p<0.0001$) and males ($p=0.006$) more likely to be influenced by the education programme to select PD, as well as those with higher initiation albumin level. The unadjusted 5 year survival rates among discharged patients were similar between home and ICHD groups (73% vs 71% respectively), with a comparable age of death.

Conclusion: Patients who have been acutely initiated on dialysis are required to make rapid decisions with limited information. A holistic and targeted education programme in the acute dialysis start population has been proven feasible. Adaptations are likely required for each centre; however, various education methods have been shown to be effective, with an increased number of patients choosing an independent dialysis modality when given the choice.

Monday 5th June 16:00 – 17:00

Track F1– Patient Involvement, Education & Outcomes 1

Poster: 170
Submission: 083

Educating acute dialysis patients – can we do better?

Dr Yimeng Zhang, Dr Jyoti Baharani

University Hospitals Birmingham NHS Foundation Trust, Birmingham

Introduction: Pre-dialysis education is associated with improved patient survival and a higher proportion of patients choosing home dialysis. Acute start dialysis patients usually start haemodialysis (HD) for speed and ease. More often than not, these patients who have started in-centre haemodialysis (ICHD) remain on it without the benefit of informed decision making (Marrón et al. 2005). The limited literature on education provision in acute dialysis demonstrates that comprehensive and tailored education delivery is possible and may result in an increase of home modality uptake to numbers similar to the planned dialysis population (Covic et al. 2010, Hanko et al. 2011). We wished to review our acute start population to look at dialysis modality education provision, long term modality choice and outcomes to identify areas for improvement.

Method: We carried out a retrospective data collection of patients who started dialysis acutely over a 64-month-period (01/16-04/21). We included those previously known to the Advanced Kidney Care (AKC) service but not planned to start dialysis at the time of admission. Data were obtained from an electronic patient database (PROTON), hospital discharge and clinic letters. Information on patient education, ongoing dialysis modality, renal recovery and mortality was recorded over 12 months.

Results: 556 patients were started on acute dialysis in the study period, median age 70 (range 16-96). 102 (18%) of these continued to require dialysis on discharge. All patients were initially started on HD, 5 using a pre-existing arteriovenous fistula (AVF) and the remaining via a central venous catheter. 2 were awaiting fistula formation and 1 had a fistula awaiting maturation. 7 patients had opted for PD but had no PD access and 1 patient had previously decided on conservative management. 12 (12%) patients had a PD catheter inserted during their admission, 11 of those continued on PD, 1 did not tolerate this and was discharged with a tunnelled dialysis line.

Of those 102 who remained dialysis dependant, 16 (16%) were previously known to AKC. 30 (29%) patients were known to our renal department but did not have immediate plans for renal replacement therapy. 33 (32%) were not known to us but had pre-existing kidney disease. 23 (23%) were not known to us and were not documented to have pre-existing kidney disease.

At one year, 12 patients were on PD, 1 home haemodialysis, 57 on in centre HD (44 via an AVF). 1 patient transferred out, 7 were dialysis independent and 24 had died. We estimated that a third of patients who remained dialysis dependant did not have any form of formal education.

Discussion: Dialysis dependency acutely results in a significant number of patients remaining on long term dialysis – all of who commence HD and will likely stay on ICHD. Dialysis education is sub-standard

when patients need dialysis acutely and do not recover and ICHD often becomes the default. A structured inpatient education programme to support patients initiating dialysis in an unexpected manner would be beneficial, with the aim of empowerment and enhancement of patient choice towards a home dialysis modality.

Monday 5th June 16:00 – 17:00

Track F1– Patient Involvement, Education & Outcomes 1

Poster: 171
Submission: 094

Renal Patient Led Advisory Network: ensuring patients shape kidney care improvement across all systems

Mr Faizan Awan[1], Mrs Hilaria Asumu[2], Mr Steven Hewitt[3], Mrs Stella Ridgway[2], Mr Keith Pennington[2], Mrs Ayesha Edmondson[2], Mrs Christy Millar[4], Mr Ian Standland[2], Mrs Tara Brook[4], Ms Holly Loughton[2], Mr Rob Finnigan[5], Mrs Leeanne Lockley[6], Mrs Smeeta Sinha[7]

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[2]RPLAN, Manchester.
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[6]UKKA / KQUiP, Liverpool.
[7]NHS, Salford

Introduction: Renal Patient Led Advisory Network (RPLAN) was created following a successful North West England Quality Improvement (QI) event which highlighted the value of patient engagement.

The event highlighted the lack of patient voices in the setting of strategic direction of improvement within systems. As patients are key stakeholders for QI, they are not always actively encouraged or provided with training to support system change or QI.

Methods: We wanted to retain the high degree of patient involvement in QI across the North West and targeted a diverse group of patients with an invitation to join RPLAN. Initially, the primary purpose of the group was to support and develop group members to contribute their knowledge and lived experience to positively improve the QI programme across the North West.

Over the last 2 years this has progressed by integrating RPLAN into the North West Kidney Network (NWKN). RPLAN ensures that the patient Voice is central to all activities.

Results: RPLAN was established in September 2020, and since then we have achieved the following:

1. Create the name and logo for RPLAN, and contributed to the design of the NWKN logo.
2. Establish and maintain monthly meetings to update each other and professionals on current RPLAN and NWKN activities.

1. Set up an accessible social media presence

- Twitter - 304 @RPLANNW
- Instagram -106 rplan_nw

- Facebook -180 RPLAN North-West

1. Produced a vaccination leaflet during the initial stages of vaccine roll out to myth bust misinformation that we had noticed was being spread, to make sure our patient cohort were fully and properly informed.
2. Collaborated with our Kidney Information Networks (KIN), notable Greater Manchester KIN (GMKIN) and Cheshire and Merseyside KIN (CaMKIN) to disseminate information and gather feedback.
3. Participate in KQuIP Essential QI workshops to improve learning and to support regional teams on their QI projects.
4. Development of patients as leaders
5. Nationally represented RPLAN by attending presenting and speaking at UKKW 2022
6. Co-designed & co-produced North West KQuIP QI projects on topics like home dialysis and transplantation.

1. RPLAN is now a formal and central part of the NWKN ensuring the patient Voice is heard and included in all aspects of projects and work.

1. RPLAN continues to engage our patient cohort to improve services and make sure recent technologies can be as seamless as possible.
2. Integrating the Lancashire and South Cumbria (LaSCKIN) region into the Kidney Information Network (KIN) so no region in the North West is left behind.
3. Paitents attended and contributed to future improvement plans at the NW Kidney Network Launch on 15th Nov 2022

Discussion: It is of paramount importance to ensure patients are on board and included to drive improvement in all current and future activities across the North West. This is to ensure a patient centred, holistic approach to the improvement and development of services across all systems. RPLAN has successfully delivered a model for patient leadership and engagement within North West England which can be replicated and learned from across UK.

Monday 5th June 16:00 – 17:00

Track F1– Patient Involvement, Education & Outcomes 1

Poster: 172
Submission: 098

Experience and Outcome of Peritoneal Dialysis Catheter Insertion in a Single Tertiary Centre Renal Unit

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Salford Royal Hospital Renal Department, Salford

Introduction: Peritoneal dialysis catheter insertion (PDCI) pathways are important in increasing home dialysis prevalence. We sought to explore the outcomes following successful PDCI at our centre.

Methods: Retrospective electronic database review at a single tertiary centre including patients who had successful PDC insertion between January 2018 to December 2018. Outcomes were monitored at 30 days, 6 months and 1 year post insertion. Catheter survival was defined as functioning catheter to date of failure censoring for death, elective switch to haemodialysis or kidney transplantation and; temporary catheter dysfunction was defined as self resolving drainage problems.

Results: Overall, 62 patients had successful PDCI, aged 61 ± 16 years, 33 male, 3 had polycystic kidney disease, 44 had hypertension and 25 had diabetes. Charlson Comorbidity Index (CCI) score was <2 in 35 patients , 3-4 in 20 and >5 in 7. 5% (3/62) had PD peritonitis within 30 days of insertion and 8% (5/62) at 1 year. 2 patients had an exit site infection within 30 days of insertion. 3 patients had PD fluid leak of which 1 was a surgical PDCI. 95% (56/59) of the patients had a functioning catheter at 1 month, 76% (38/50) at 6 months and 65% (32/49) at 1 year. 20% (11/56) of the patients had at least 1 episode of catheter dysfunction at 1 month, 18% (5/38) at 6 months and 3% (1/32) at 1 year. 2 patients who had medical PDCI required manipulation within 6 months and 1 within a year. 17 patients were switched to HD and 2 patients had a kidney transplant.

Discussions: These data confirm good “real world” outcomes following successful PDC insertion in a cohort of ESRD patients and complication rates were comparable to those of ISPD and RA guidelines. The limitations are in its retrospective nature and small sample size.

Monday 5th June 16:00 – 17:00

Track F1– Patient Involvement, Education & Outcomes 1

Poster: 173
Submission: 099

Improving the non-attendance rates at the renal young adult clinic: the value of the renal youth worker

Mrs Jessica Goode, Miss Alison Way, Mrs Helen Sant, Dr Richard Fish

University Hospital of North Midlands NHS Trust, Stoke on Trent

Introduction: Our unit had recognised a trend of young adults (16-25 years of age) not attending their regular follow up appointments within allocated clinic slots. As a result, a dedicated young adult service was implemented, encompassing a renal consultant, clinical nurse specialist and a dedicated youth worker; in the hope that this would improve attendance numbers and patient outcomes. A young adult clinic was established once a month for patients aged 16-25 years of age, where patients are able to meet with clinicians and talk to the youth worker. The youth worker aims to telephone each patient one week before their planned appointment to remind them and check that they have had their blood tests done, and also contact those who did not attend (DNA) the week after clinic to find out what help they need to attend their next appointment. In addition the youth worker supports patients outside of the clinic setting.

Methods: A retrospective analysis of clinic attendance numbers from February 2021-January 2023. At the time of analysis, young adults with a pre-existing renal condition, diagnosed during childhood or adolescence, or attending with a new diagnosis, who were aged 16-25 were included. Our analysis compared attendance rates during the time a youth worker has been in post versus when there has been no specialist youth work provision.

Results: During the study period, 194 patients were offered appointments at the renal young adult clinic; of these, 91 were offered an appointment when there was no renal youth worker in post (10 months), with a DNA rate of 15%. In comparison, when a youth worker was in post, 103 appointments were offered and only 10 patients DNA'd, giving a DNA rate of 9.7% (an absolute reduction of 5.3%).

Discussion: Our data suggests that having a renal youth worker in post considerably reduces the incidence of non-attenders to the young adult clinic. For example, in the month of November 2022 there was 100% attendance at the young adult clinic. Of note, when the youth worker had telephoned patients a week before the planned clinic, 40% were unaware that they had an appointment. Sometimes patients DNA due to factors beyond the control of the youth worker. Reducing the numbers of patients not attending the young adult clinic ensures that they are in regular contact with health professionals; can have regular monitoring of their medication and subsequent changes can occur in a timely manner; and changes in their health are recognised quickly. This will be expected to lead to improved health outcomes overall. Furthermore, improved attendance and patient engagement reduces costs to the NHS trust for missed appointments.

Monday 5th June 16:00 – 17:00

Track F1– Patient Involvement, Education & Outcomes 1

Poster: 174
Submission: 145

Safety of early PD catheter reinsertion after catheter removal for PD related infections.

Dr Pooja Banerjee, Dr Duminda Basnayake, Dr Subash Somalanka, Dr Pritpal Virdee, Dr Bhrigu Sood

St Helier's Hospital, London

Introduction: Peritoneal dialysis (PD) related infections remain common and serious complication of PD. In cases of severe /persistent PD peritonitis failing antibiotic therapy, there is often a need to remove the PD catheter. The optimum timing of catheter reinsertion is a matter of debate. There is building evidence for early reinsertion of PD catheters.

Aim: Aim of our study was to see the outcomes of early PD catheter reinsertion (< 6 weeks) after catheter removal for catheter-related infections (PD peritonitis, or exit site or tunnel infection).

Methods: This was a single centre retrospective review of outcomes for patients who underwent PD catheter removal and reinsertion for PD related infection between January 2020 to January 2022.

Results: Twenty five patients (18:7::M:F) underwent PD catheter reinsertion over this period. The original reason for PD catheter removal was peritonitis (18), exit site infection (4) and tunnel infection (3). Causative organisms were - Staphylococcus aureus 9 (all MSSA), Gram-negative 9 (Pseudomonas 4), others six and culture-negative 1.

22 out of 25 catheters were reinserted percutaneously whereas three were reinserted surgically. Catheters were reinserted simultaneously in 4 (16%), within a week for 11 (44%), within 1-2 weeks for 9 (36%), and one was inserted within 2-4 weeks (4%). Mean follow up period was 11.1 months (SD ±7.1months).

Discussion: Over this follow-up, 6 patients had repeat peritonitis with same organism (S aureus 4, atypical Mycobacterium 1 and Pseudomonas 1). Of these 6 patients, 4 had reinsertion within a week and 2 had reinsertion in 1-2 weeks' time and all the repeat episodes occurred after 4 weeks of reinsertion.

Conclusion: Early reinsertion of PD catheter after removal for PD related infection is a safe and feasible option and avoids the need for temporary haemodialysis.

Monday 5th June 16:00 – 17:00

Track F1– Patient Involvement, Education & Outcomes 1

Poster: 175
Submission: 161

A Delphi survey identifying priority outcomes for self-management in non-dialysis chronic kidney disease

Ms Naeema A Patel[1,2], Dr Courtney J Lightfoot[1,2], Professor Alice C Smith[1,2]

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[2]Leicester NIHR Biomedical Research Centre, Leicester

Introduction: Effective self-management is important for people living with Chronic Kidney Disease (CKD) and is underpinned by the individual having a good level of knowledge, skills, and confidence (patient activation) and appropriate support from their healthcare team. Theory- and evidence-based tools and resources for self-management education and support are required to increase patient activation and encourage health-promoting behaviours. Robust evaluation in both research settings and clinical practice should be based around outcomes which are meaningful and valued by stakeholders, but these are not established for CKD education and self-management interventions. We conducted a UK-wide Delphi survey to identify consensus-based important outcomes for the various stakeholder groups involved.

Methods: An online survey-based Delphi process was conducted, including both patient and professional participants. In Round One, participants were asked to describe their top 3 most important outcomes for CKD self-management. Individuals with CKD and their significant others (SOs) were invited via social media adverts, and professional participants were invited by direct email. The free-text responses were collated and analysed inductively using conventional content analysis to identify the dominant themes and constituent items. In Round Two, the same participants were asked to rate each item on a 9-point Likert scale (1=least and 9=most important). The median rating of each theme was calculated overall and is reported.

Results: A total of 135 participants responded to Round One: 64 (47%) CKD/SOs; 69 (51%) kidney healthcare professionals (HCPs); 2 individuals identified in both groups. The response rate of professionals to direct invitations was 58%. Round One analysis produced 28 outcome items which were categorised into 5 main themes: clinical; knowledge, skills, and confidence to manage own health; behaviour and self-care; psychological and social factors; healthcare usage.

44 (69%) of invited CKD/SOs and 53 (77%) HCPs responded to Round Two. Table 1 shows the median ratings for each theme. The highest-ranked overall and for both groups was “clinical”, while “healthcare usage” was ranked the lowest.

Table 1. Median ratings (and interquartile range (IQR)) for each theme

Theme			
	Overall	CKD/SO	HCPs
Clinical	8.0 (7.5-9)	7.9 (7.5-9)	8.1 (7.1-9)
Knowledge, skills, and confidence	7.6 (7-9)	7.5 (7-9)	7.6 (6.8-9)
Behaviour and self-care	7.5 (7-8.5)	7.4 (6.6-8.9)	7.6 (7-8.5)
Psychological and social factors	7.3 (6-8.5)	7.3 (6-9)	7.3 (6-8)
Healthcare usage	7.1 (6-8)	7.1 (6-8)	7.2 (6-9)

Discussion: This Delphi survey identified a range of potential benefits for successful self-management in non-dialysis CKD, falling into 5 broad categories. Both CKD/SO and HCP participants ranked clinical outcomes, such as improved blood pressure control and avoiding the need for dialysis or transplant, as the most important, followed by factors relating to patient activation (knowledge, skills, and confidence to manage health).

This work identifies what each stakeholder group wishes to gain from engagement with CKD education and self-management. This information is essential for the design of both the resources themselves, and the clinical trials and healthcare service evaluations which assess them, and subsequently for the strategies used to support commissioning and uptake by both HCPs and patients.

Monday 5th June 16:00 – 17:00

Track F1– Patient Involvement, Education & Outcomes 1

Poster: 176
Submission: 163

Running a clinical trial virtually: lessons learnt from a multicentre randomised controlled trial evaluating a digital health intervention for CKD

Ms Gurneet K Sohansoha[1,2], Ms Noemi Vadaszy[1,2], Dr Thomas J Wilkinson[1,3], Dr Courtney J Lightfoot[1,2], Professor Alice C Smith[1,2]

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[2]Leicester NIHR Biomedical Research Centre, Leicester.
[3]NIHR Applied Research Collaboration East Midlands, Leicester Diabetes Centre, Leicester

Introduction: Digital health interventions (DHIs) have the potential to provide a widely accessible and cost-efficient approach to delivering health and lifestyle education, especially in the post-COVID era. As for all interventions, robust effectiveness evaluation is essential to support appropriate and sustained implementation. My Kidneys & Me (MK&M), an education/self-management DHI for chronic kidney disease (CKD) developed by our team, was evaluated in a multi-centre randomised controlled trial (RCT) (SMILE-K). To pragmatically deliver MK&M, SMILE-K was designed with virtual study processes allowing for minimal face-to-face participant contact. Here we report the recruitment metrics of SMILE-K to inform and improve future design and delivery of DHIs.

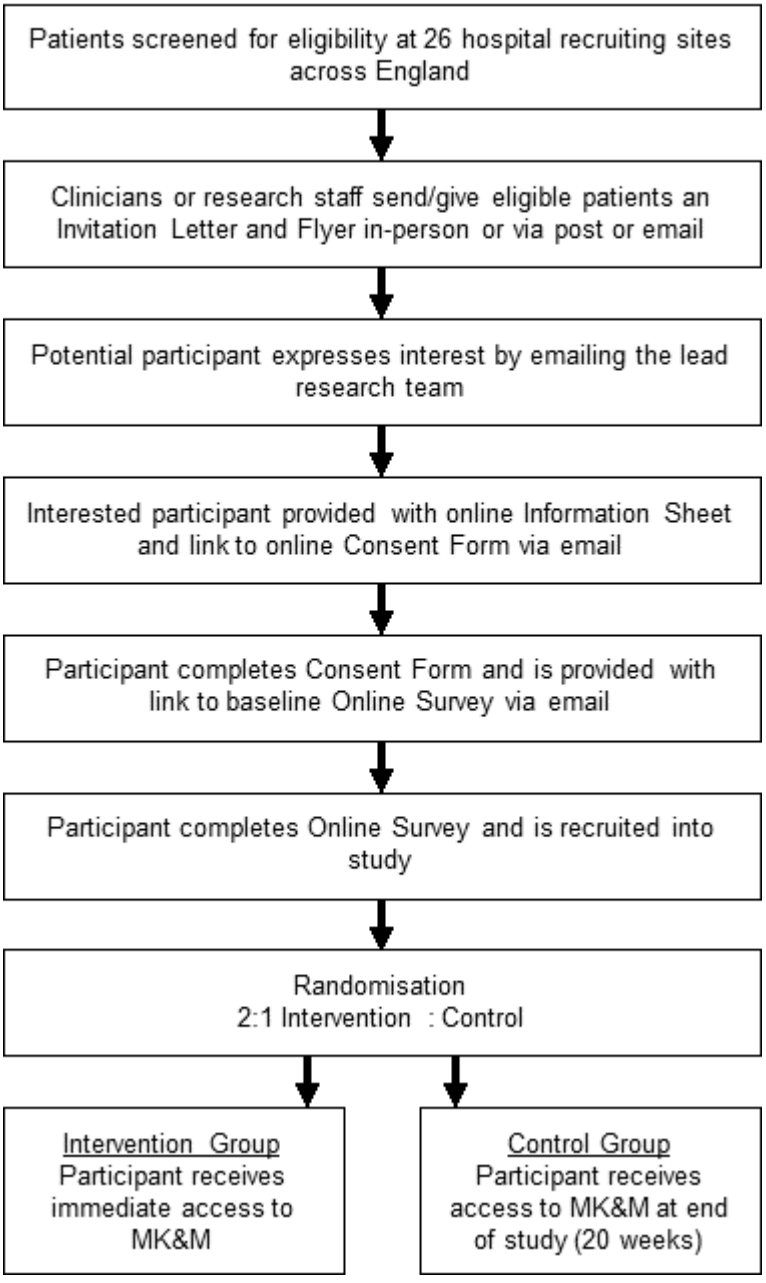
Methods: Participants were randomised 2:1 to intervention or control, with outcome measures collected via an online survey. The recruitment process is summarised in Figure 1. Briefly, eligible adult CKD patients were identified by their clinical teams and provided with an invitation letter and flyer via appropriate method. Patients express interest by emailing the lead study team, who then sent sequential email links to the information sheet and consent form, followed by the baseline outcome measure survey, and finally, if randomised, MK&M.

Results: Recruitment was conducted at 26 hospital sites in England between May 2021 and December 2022. In total, 6619 invitations were issued: 4934 (74%) by post, 883 (13%) in-person, 616 (9%) by post following remote consultation; and 251 (4%) by email from recruiting sites. A total of 875 (13% of the 6536 invited) people expressed interest, of which 533 (/875, 60%) consented. Of the 533 consented, 5% (265/4934) were invited via post, 14% (120/883) in-person, 17% (103/616) via post following remote appointment, and 2% (5/251) via email. Of those consented, 80% (424/533) completed the baseline survey and were randomised/recruited. The mean age of recruited participants was 74 years (±9.0; range:20-88) and 94% were White British. The median time from expression of interest to consent was 1 day (range: 0-100), and consent to randomisation was 6 days (range: 0-197).

Discussion: These results demonstrate that DHI RCT recruitment via virtual methods provides the opportunity to reach a high number of eligible participants. However, only 13% of invited patients expressed interest, and just 7% were recruited into the study. Most invitations were issued by post with

no prior approach or explanation. This route resulted in a markedly lower response rate than invitations issued after discussion with a healthcare professional, either remotely or in-person. At the consent stage, a high level of loss was observed suggesting that reading the information sheet and completing the online consent form unassisted was a deterrent. As is common for research conducted without specific strategies to engage disadvantaged groups like minority ethnic communities, there was disproportionate representation of White ethnicity; however, there was a wide age range including participants in their 80s. In conclusion, our experience highlights factors, such as better efforts to engage more with disadvantaged groups, which require consideration for future design of virtual trials and delivery of DHIs to maximise access to their potential benefits.

Figure 1 : SMILE-K Recruitment Process



Monday 5th June 16:00 – 17:00

Track F2 – Patient Involvement, Education & Outcomes 2

Poster: 177
Submission: 201

A Safe Protocol for Same Day Discharge Following Total Parathyroidectomy for Tertiary Hyperparathyroidism

Mr. Andrew Houghton[1], Dr. Kanwaljit Sandhu[1], Miss Emiko Sultana[1], Miss Nina Al-Saadi[2], Dr. Sophie McDonald[1], Miss Jessica Chang[3]

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[2]Russells Hall Hospital, Dudley.
[3]Good Hope Hospital, Birmingham

Introduction**:** Total parathyroidectomy on patients with tertiary hyperparathyroidism traditionally required an inpatient hospital stay to monitor patients for postoperative hypocalcaemia. Our centre developed a safe protocol in 2015 which enables total parathyroidectomies to be carried out as a day-case procedure. This protocol, developed in conjunction with the renal physicians, involves giving the patient oral alfacalcidol preoperatively for 5 days and close monitoring of the calcium levels postoperatively to permit safe same day discharge.

Methods**:** A single centre retrospective study was carried out on all patients who underwent a total parathyroidectomy for tertiary hyperparathyroidism between February 2005 and December 2022. A comparison study was done for the patients before and after the protocol was introduced in 2015. Data were collected regarding the patient comorbidities, perioperative calcium level, post-operative calcium, potassium and parathyroid levels, length of hospital stay, operative procedure details, hospital readmission, and 30-day morbidity.

Results**:** 57 patients underwent total parathyroidectomy during the study period (22 before protocol and 35 after the protocol). After introduction of the protocol, 40% of patients were discharged on the same day, compared to only 4.54% previously. The range duration of inpatient hospital stay was reduced from 0-13 days (Mean: 4 days) to 0-3 days (Mean: 0.77 days). Reasons for prolonged hospital stay in the remaining patients included refractory hyperkalaemia requiring dialysis, complications secondary to anaesthesia, as well as hypocalcaemia in a few cases (40.9% before the introduction of the protocol and 5.71% after). No patient required readmission during the 30-day post-operative period.

Discussion**:** Day-case surgery for total parathyroidectomy can be achieved safely in patients with a preoperative regimen of alfacalcidol and close monitoring of calcium levels postoperatively, emulating a virtual ward round. With careful patient selection, day case total parathyroidectomy surgery can be widely adopted without the risk of morbidity from undiagnosed hypocalcaemia postoperatively.

Monday 5th June 16:00 – 17:00

Track F2 – Patient Involvement, Education & Outcomes 2

Poster: 178
Submission: 213

How do religious and cultural factors impact the haemodialysis experience of ethnic minority patients?

Miss Adya Trivedi[1], Professor James Burton[2], Dr Victoria Cluley[2]

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Introduction: Approximately three million people in the UK have chronic kidney disease. Within this population, ethnic minorities are five times more likely to develop this condition. Haemodialysis is a popular yet intrusive treatment option that can cause significant disruption to patients' lives. Literature suggests that religion and spirituality are two factors that can ease patients' adjustment to dialysis. However, there is a paucity of studies exploring patients' opinions in this area and even less on the experiences of ethnic minorities.

This qualitative study aimed to explore the impact of religion and culture on the haemodialysis experience of ethnic minority patients in the UK. The study also aimed to investigate the bi-directional relationship between religion and culture, and haemodialysis.

Methods: Fifteen patients were recruited across three renal dialysis units in the UK using opportunistic and purposive sampling techniques. Patients were screened for ethnic and religious background, then approached and consented for interview. The table below outlines the participants' demographic data.

Patient ID	Religion	Age	Sex	Ethnicity	Time on Dialysis
1	Muslim	38	Male	Bangladeshi	2 years
2	Hindu	72	Male	Indian	2 years
3	Hindu	30	Male	Indian	4 years
4	Muslim	41	Male	Asian	4 months
5	Hindu	61	Female	Indian	4 months
6	Jehovah's Witness	66	Female	Caribbean	1 year
7	Muslim	58	Female	Indian	24 years
8	Roman Catholic	51	Male	Other	11 months

9	Muslim	34	Male	Indian	13 years
10	Hindu	56	Female	Indian	9 years
11	Catholic	49	Male	Asian	18 years
12	Muslim	31	Male	Asian	8 years
13	Hindu	84	Male	Indian	2 years
14	Christian	32	Male	Angolan	2 years
15	Muslim	51	Male	Indian	1 year

Table one: Patient demographic data

Semi-structured interviews lasting 40-60 minutes were conducted using a flexible topic guide to focus discussion on religion, culture, and haemodialysis. Interviews were transcribed verbatim, and transcripts were analysed thematically using NVIVO12 software. Following the framework for reflexive thematic analysis, transcripts were coded using open coding and repeating codes were grouped into sub-themes, which were refined into the final themes.

Results: The following five themes were identified across the interview transcripts:

- The Role of God
- Religious practice as a source of strength and comfort
- The importance of prayer
- Disruption to religious practice
- Changes in cultural foods due to renal diet specifications

Discussion: Despite religion being a significant factor in aiding patients' coping, haemodialysis caused disruption to religious and cultural practices that were important parts of patients' self-identity as ethnic minorities in the UK. Food and prayer were particularly affected. Here we propose the term 'cultural disruption' to describe these changes that patients experienced.

Acknowledgement of the importance of religion, faith and culture for people on dialysis would aid the holistic support available to haemodialysis patients. Additionally, because of the disruption caused by dietary restrictions to culturally important foods and fast days, the development and use of a cultural food toolkit may enable dieticians to better support patients' adjustments to renal dietary requirements.

Monday 5th June 16:00 – 17:00

Track F2 – Patient Involvement, Education & Outcomes 2

Poster: 179
Submission: 231

Kidney biopsy quality improvement

Dr Abbey Smith[1], Dr Fiona Trew[2], Ms Debra Sweeney[2], Ms Carol Allan[2], Ms Paula Cowan[2], Ms Margaret Dodds[2], Dr Saeed Ahmed[2]

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Introduction: Renal biopsy is an integral part of clinical practice in nephrology. The commonest complication is bleeding[1]. This ranges from frank haematuria in 1 in 10 biopsies, to heavier bleeding requiring transfusion in 1 in 50, or very rarely requiring nephrectomy in 1 in 3000 biopsies[2].

At Sunderland Diagnostic and Interventional Nephrology (SDIN) department most biopsies are a day case procedure. Post-procedure care is 8 hours of observation and safety netting.

Reports show that 67% of complications present within 8 hours, however, 91% of major complications present at 24 hours[1]. This suggests that the post-biopsy monitoring period should be 24 hours due to bleeding risk[1].

Given most biopsies are performed as outpatients, we aimed to develop a process for self-monitoring and community follow up. Our aim was to improve post-biopsy monitoring, provide a higher standard of care, and improve patient satisfaction.

Methods: To objectively grade the level of haematuria, a urine colour sheet was produced. This illustrated various levels of haematuria with a corresponding numerical value[3]. Post-biopsy patients scanned a QR code to obtain a digital copy of the urine colour sheet.

Patients took a urine sample one day post-biopsy and compared this to the urine colour sheet. Patients had a telephone appointment with nursing staff and provided the haematuria numerical value. If there were concerns regarding this, the SDIN consultants were informed and decided if the patient requires further monitoring or a review.

A pre- and post-biopsy questionnaire was created to evaluate patient understanding, and opinion on quality of care.

Results: 118 patients were included in the pre-biopsy questionnaire. 97.5% of patients stated they understood the biopsy process, 98.3% felt their questions answered, and 100% felt safe.

The level of haematuria scores varied. The most common score was between 1 and 3 which was 97.3%, meaning no visible haematuria[3]. 2.7% of patients had visible haematuria which was scores 4 to 8[3].

95% of patients completed the post-biopsy questionnaire. 99.1% of patients stated there was a 'High quality of service and staff' and 100% of patients felt safe. 96.4% of patients stated they understood the urine colour. 80.3% had no suggested improvements and those with suggestions focused on more entertainment and snacks.

Discussion: The data shows the urine colour sheet was easy to understand. Most patients monitored 24 hours post-biopsy had minimal haematuria. However, some had visible haematuria, thus supporting the need of an increase monitoring time to 24 hours. With this improved post-biopsy outpatient monitoring process, a reduction in the inpatient post-biopsy time has now been implemented from 8 hours to 6 hours. Our data provides evidence that patients are extremely satisfied with the quality of care and staff at SDIN and felt safe.

Reference:

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2. City Hospital Sunderland. Renal biopsy Patient information leaflet. 2008 Oct. Ref:266/08
3. Smith A. 'Urine colour Sheet'. 2020 Nov.

Monday 5th June 16:00 – 17:00

Track F2 – Patient Involvement, Education & Outcomes 2

Poster: 180
Submission: 245

A quality improvement project exploring the diagnostic experiences, preferences around care and impact of disease on patients with ANCA-associated vasculitis.

Dr Richu Philip, Miss Linda Coughlan, Miss Sarah Logan, Professor Lorraine Harper, Dr Dimitrios Chanouzas

University Hospitals Birmingham NHS Foundation Trust, Birmingham

Introduction: Anti-neutrophil cytoplasmic antibody (ANCA)-associated vasculitis is a rare, chronic, auto-immune condition that can have life-changing impact on patients. Hence, it is paramount to ensure that a patient centred approach is taken to its management. This QI project aimed to explore the experiences of vasculitis patients during diagnosis, their preferences around ongoing care, as well as understanding the physical, emotional and social impact of living with the disease.

Methods: A questionnaire with a series of closed and free text qualitative questions was designed and approved for patient dissemination. Data collection was done over a five week period between November and December 2022 in an outpatient clinic setting of a UK tertiary vasculitis centre. Surveys were given in person to patients with face-to-face clinic appointments, surveys were also posted to patients who had virtual appointments within the same specified time period. Data was extracted digitally, free text answers were copied verbatim, and narrative synthesis of the qualitative data was conducted to identify themes.

Results: A total of 71 survey responses were received, 79% were completed in person and 21% were returned via post following virtual appointments.

88% of respondents felt that they received adequate information at the time of diagnosis and 78% felt emotionally supported. Positively influencing factors were empathetic, knowledgeable staff and clear explanation of condition and treatment. Delay in diagnosis, limited understanding from GPs and lack of mental health support were factors that negatively impacted diagnosis.

66% of respondents preferred face-to-face appointments, 8% preferred virtual appointments and 24% showed an equal preference. Patients found face-to-face appointments to be more personable with improved rapport and communication, importance of a physical examination was also noted. Of those who showed an equal preference or preference towards virtual appointments, common reasons were convenience, as well as fear of Covid-19 transmission within hospital settings.

73% of respondents strongly agreed or agreed that vasculitis had an impact on their physical health, 46% felt it affected their mental health and 56% felt it had an impact on their social life. Fatigue, breathing difficulties and reduced mobility were the most commonly reported physical ailments. Many respondents reported low mood, emotional labiality and heightened health anxiety. Patients felt socially isolated with friends, family and workplaces struggling to understand vasculitis. Several reported being

less sociable post Covid-19 due to fear of mixing with crowds in view of immunocompromising treatment regimens.

Discussion: In a period where virtual appointments are more commonly utilised, the above findings highlight the importance of continuing to allow provision for face-to-face appointments. The results demonstrate the degree of impact that the condition can have on patients and the importance of clinicians to be mindful of the patient's holistic needs, particularly the need for psychological services. Simple steps such as offering an explanation to the patient's loved ones or workplace can positively improve outcomes. It is also interesting to note the lingering effects of the pandemic– clinicians ought to be considerate of patient anxieties surrounding Covid-19 and provide advise and reassurance where needed.

Monday 5th June 16:00 – 17:00

Track F2 – Patient Involvement, Education & Outcomes 2

Poster: 181
Submission: 293

Exploring Solutions to prevent venous needle dislodgements and vascular infiltrations during haemodialysis.

Ms Gracy Kumar, Mr Simeon Edwards

Mid & South Essex NHS Foundation Trust, Chelmsford

Infiltrations (or "blows") and dislodgements of steel catheters in haemodialysis are serious concerns for healthcare professionals and patients alike, yet reports of prevalence vary: between 5.2% and 71% for infiltrations [1,2] and 45.7% for dislodgments [3]. They are time-consuming and costly to the NHS due to escalation, and potentially postponed treatment. To address this issue, the dialysis nursing team at our hospital developed new eligibility criteria for Diacan Flex, a flexible plastic catheter comprising a blood septum and wings for stability to reduce dislodgement, for use during haemodialysis.

Previously, only patients with cognitive impairments who may be unable to keep their arms still throughout treatment received a plastic catheter. In September 2022, we expanded our eligibility criteria to additionally include history of dislodgement or infiltration, known metal allergy, and evidence of blood vessel injury. In total, 20 patients undergoing thrice-weekly dialysis were now eligible to use Diacan Flex. A non-comparative, observational audit was conducted on the impact of the new catheter on dislodgments, infiltrations and for needle stick injuries. In addition, patients and staff provided feedback on their experiences of a steel catheter versus Diacan Flex.

Patients represented a variety of arteriovenous fistula sites: 60% were brachiocephalic, 30% were radio cephalic and 10% were brachiobasilic. 25% of fistulae were right-sided; 75% were left-sided. Over the three months September – November 2022, we found no incidents of catheter dislodgement, infiltration in patients and no needle stick injuries with Diacan Flex.

Eight patients provided feedback. All respondents stated they would recommend the flexible catheter over steel to other patients (n=7 strongly recommend, n=1 recommend), with one patient stating "I don't feel the [flexible] needle, with sharp [steel] needles I could feel the sharp inside my veins." All patients stated that the flexible catheter was more comfortable than steel (n=5 much more comfortable, n=3 more comfortable), with one patient adding "I love the new needles, it allows me to move my arm without mak[ing] the machine alarm." Finally, all patients responded that they rarely (n=7) or never (n=1) experienced bruising, needle blow or pain with the flexible catheter, whereas most patients stated that they experienced this with steel catheters (n=1 always, n=4 very often).

The expanded use of Diacan Flex at our hospital was successful, resulting in no dislodgements, infiltrations or sharps injuries over a three-month period, which has the potential to save nursing time and resources at our hospital. Moreover, all patients voiced comfort and satisfaction with needling, demonstrating that the device improves patient experience.

[1] Lee, T., Barker, J., & Allon, M. (2006). Needle infiltration of arteriovenous fistulae in hemodialysis: risk factors and consequences. American journal of kidney diseases, 47(6), 1020-1026.

[2] Marticorena, R. M., Dacouris, N., & Donnelly, S. M. (2018). Randomized pilot study to compare metal needles versus plastic cannulae in the development of complications in hemodialysis access. The Journal of Vascular Access, 19(3), 272-282.

[3] Wu, H. W., Lin, H., Chen, K., Lin, Y., & Hu, H. (2020). The analysis of risk factors for the patients experienced venous needle dislodgement or bleeding during dialysis. Nephrology, Dialysis, Transplantation, 35(Supplement3).

Monday 5th June 16:00 – 17:00

Track F2 – Patient Involvement, Education & Outcomes 2

Poster: 182
Submission: 297

Use of Simulation to encourage palliative discussions in Renal Patients

Dr Pratik Solanki, Dr Ewe Teh, Dr Julien Morlet, Dr Kate Hadley-Brown, Ms Stephanie Smith, Ms Carly Toll, Dr Katie Chong, Karen Nagalingam

East and North Herts NHS Trust, Stevenage

Introduction: High fidelity simulation has provided a unique learning experience for trainees in a number of different fields. It provides an ability to simulate an acutely unwell patient and allows trainees to clinically examine and formulate a management plan in a safe environment. Likewise, the opportunity to debrief after the event and discuss different facets of the session ensures further development of learning and reflection. In the majority, simulation is used in these cases with an emphasis on 'saving lives'. Although palliative care related simulation sessions are now available, the nuances of dialysis or pre-dialysis patients are very rarely considered.

Methods: A high fidelity simulation suite was used for the session. Two different scenarios were developed for the Internal Medicine Trainees (IMT) and were conducted over a 2 year period. One involved an elderly gentleman on dialysis with poor cardiac function. The other involved a pre-dialysis elderly gentleman with a similar history. As the scenario advances, the IMTs were expected to consider discussion of the patient with renal or intensive care. There was an emphasis on communication with both the patient and the family and consideration of wishes.

Results: In total, there were 12 trainees who experienced the scenario with an additional 36 who observed via video in a separate room. They were all involved in the discussion after the scenario. The sessions were highly evaluated. A main topic for discussion was consideration of patient and family choice especially in light of the pre-morbid state of a patient. Interestingly, a number of the trainees felt more comfortable making resuscitation and escalation decisions if the similar patient had presented without renal involvement (such as a patient with significant heart failure) then those on dialysis or being considered for dialysis.

Discussion: Conducting these types of simulation where the aim was not to 'save' the patient was incredibly enlightening. Seeing the struggles that IMTs have in making these decisions for renal patients reflects on both the experiences and teaching they have received in the past. It is an important consideration that all simulation days have at least one scenario where palliation and the communication surrounding this should be the main focus from a learning objectives perspective. We aim to conduct further similar simulation sessions in the future, with the development of a multi-disciplinary approach including nurses and allied healthcare professionals.

Monday 5th June 16:00 – 17:00

Track F2 – Patient Involvement, Education & Outcomes 2

Poster: 183
Submission: 315

Audit of Haemodialysis patients with diabetes using Free Style Libre sensors to assess if there is any difference between blood glucose levels on dialysis days vs non-dialysis days.

Miss Nicola Crockford

Dorset County Hospital, Dorchester

Introduction: KDIGO reports that the number of people with diabetes is projected to grow from 450 to 700 million by 2045, and that >40% of people with diabetes are likely to develop chronic kidney disease (CKD) and require dialysis treatment.

Evidence shows that optimising diabetes management continues to be important in CKD. Patients should be encouraged to continue to attend both diabetes reviews as well as their renal appointments for better outcomes. Reducing the occurrence of hyperglycaemia improves both serum potassium and fluid management. (Bain et al 2021)

Methods: This study was undertaken as there was no local data that had assessed the use of FreeStyle Libre in haemodialysis patients. The aim was to assess if there was any difference in blood glucose levels on dialysis days v's non-dialysis days. There were 69 patients dialysing at the base unit, of which 21 (30%) people have diabetes (type 1 & type 2). 9/21 (42.8%) were under the care of the diabetes secondary care team with 5/9 (55%) using a FreeStyle Libre sensor. At the time of the audit there was only access to the base hospital FreeStyle Libre view account and unfortunately not the community account or those of the other local hospitals. Of the 5 people using a FreeStyle Libre sensor, 3 patients had type 2 diabetes (60%).

Results: Blood sugar information was missed in the 3 patients with type 2 diabetes because they did not scan sufficiently. 2 of them were unable to upload the data themselves from their device onto the Libreview account and so had to rely on Health Care Professionals (HCPs).

There were no significant trends identified in the 2 patients with Type 1 diabetes. One patient was scanning and adequately uploading their data, and the other Type 1 patient had numerous in-patient admissions to different hospitals during the study period, where uploading the data onto the base Libreview account was not possible. This patient also relied on HCP's to upload the data.

Discussion: Although the study set out to look at blood sugar control on non v HD days it has highlighted some other far more important issues -

- Patient poor performance regarding scanning frequency and data downloads.
- Patients unaware of technology updates and device support
- Lack of dietetic access to community and other local hospital Libre accounts.

- No funding for a dedicated diabetes specialised nurse to provide support to patients on the dialysis unit.

In conclusion all patients who are initiated on any diabetes technology require ongoing education, support and assessment from all members of both the renal and diabetes MDT.

References:

KDIGO 2020 Clinical Practice Guideline for diabetes Management)

ABCD (Association of British Clinical Diabetologists) Bain et al 2021, clinical practice guidelines for management of hyperglycaemia in adults with diabetic kidney disease.

Monday 5th June 16:00 – 17:00

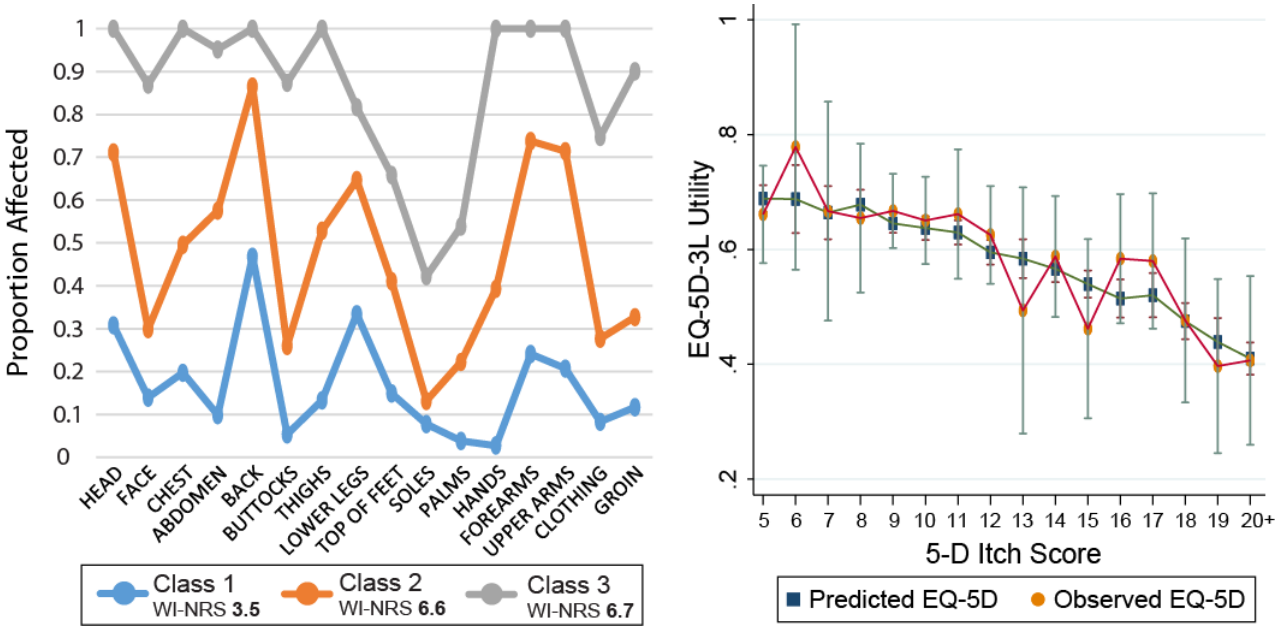
Track F2 – Patient Involvement, Education & Outcomes 2

Poster: 184
Submission: 348

CKD-associated pruritus severity and its association with body distribution and EQ-5D health-related quality of life: a UK multicenter study of people with kidney failure on haemodialysis

Dr Pann Ei Hnynn Si[1], Dr Mónica Hernández-Alava[2], Dr Alessandro Sasso[2], Dr Matthew Gittus[1], Dr Richard Powell[3], Miss Louese Dunn[1], Dr James Fotheringham[1,2]

[1]Sheffield Kidney Institute, Sheffield.
[2]School of Health and Related Research, University of Sheffield, Sheffield.
[3]University Hospitals Plymouth NHS Trust, Plymouth



Introduction: Chronic Kidney Disease associated pruritus (CKD-aP) is common affecting 40% of people with kidney disease receiving dialysis. It is associated with decreased health-related quality of life (HRQoL) as assessed using disease-specific instruments. A better understanding of how the severity of CKD-aP is related to the distribution of affected body parts and generic of HRQoL assessed using the EQ-5D instrument could improve the identification, assessment, and treatment of CKD-aP including advocating for access to new therapies.

Methods: Prevalent in-center haemodialysis patients from five centers prospectively completed the EQ-5D-5L HRQoL questionnaires, the severity-based worst itch numeric rating scale (WI-NRS) and multi-dimensional 5-D itch pruritus disease specific quality of life instruments. Latent class mixture models were used to identify clusters of patients with similarly affected body parts as assessed through the 5-D itch and map the pruritus measures to the EQ-5D utility value (1 being perfect health and 0 being dead,

heavily skewed). Patient demographics, comorbidities, dialysis prescription and anti-pruritus medications were collected.

Results: Pruritus data on 485 respondents were obtained. No pruritus was reported in 164 (33.8%), with 117 (24.1%) reporting mild, 123 (25.4%) reporting moderate and 81 (16.7%) reporting severe pruritus. Commonly affected body parts included groin (22%), upper arms (21%), forearms (11%), and back (10%). Anti-pruritus medication use across CKD-aP severity (none to severe) was 40.6%, 38.5%, 36.6% and 55.6%, and varied by body part with 38.8%, 21.0% and 14.5% use in those affected in the upper limbs, groin and lower legs respectively. Latent class analysis identified three groups of patients who had progressively worsening severity and number of body parts affected, but the distribution of affected body parts was relatively constant (left-hand figure) and reduction in EQ-5D by affected body part was similar. Although the WI-NRS and 5-D itch instruments correlated with each other, only the 5-D itch had a strong relationship with EQ-5D-3L: Controlling for age, sex, diabetes, and years receiving dialysis, predicted EQ-5D utility dropped linearly from 0.69 to 0.41 (right-hand figure).

Discussion: Contemporary UK data shows CKD-aP remains highly prevalent amongst people with kidney failure on dialysis. Severe CKD-aP was commonly reported despite half of the patients with severe CKD-aP receiving antipruritic medication, illustrating a high unmet need and likely undertreated. Although there were similar reductions in HRQoL, medication use varied by body part and those whose groin is affected may be reporting other body parts to access therapies. High use of CKD-aP medications in none or mild severity may represent more severely affected individuals benefiting from these drugs as the cross-sectional nature of the study means those who reported no pruritus may have had pruritus in the past which resolved in response to the medications prescribed and reported in these analyses. Overall, as it worsens CKD-aP appears to affect a similar distribution of body parts. Pruritus instruments that include domains that are broader than just pruritus severity more closely approximate the EQ-5D generic HRQoL measure and therefore more strongly advocate for the value of treating this unpleasant condition. Funded by CSL Vifor.

Monday 5th June 16:00 – 17:00

Track F3 – Patient Involvement, Education & Outcomes 3

Poster: 185
Submission: 357

A report of the pilot Paediatric Patient Reported Experience Measure - a first for kidney patients under 18 years of age in the United Kingdom.

Dr Andrew Lunn[1], Ms Amanda Busby[2], Ms Rebecca-Leigh Flanagan[2], Dr David Wellsted[2]

[1]Nottingham Children's Hospital, Nottingham.
[2]University of Hertfordshire, Hertfordshire

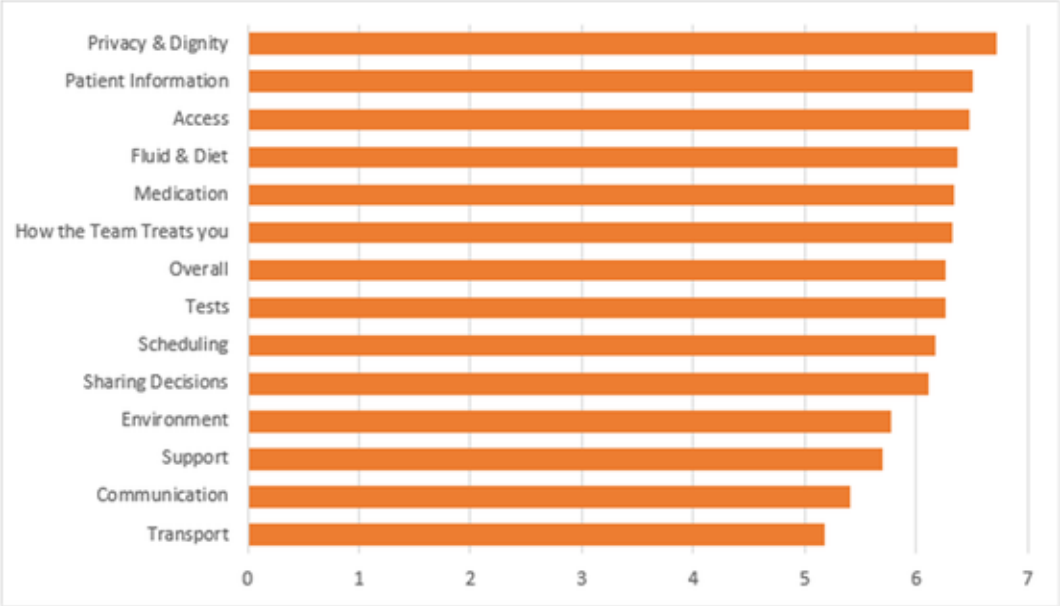
Introduction: The Kidney Patient Reported Experience Measure (Kidney PREM) is a national annual survey of adult kidney patients in the UK supported by the UK Kidney Association and Kidney Care UK, developed in conjunction with the University of Hertfordshire. It is an established measure helping individual units understand more about their patients experience of care, demonstrating areas for improvement and providing a national picture of patient experience.

Chronic Kidney Disease (CKD) requiring kidney replacement therapy (KRT) affects 63.8 per million age related population in under 16 year olds with care received in 13 Paediatric Nephrology centres across the UK. These children and young people(CYP) will need kidney care throughout their life. Capturing the experience of this group, and those not yet receiving KRT, is important to understand their care needs now and in the future. No published tools exist to do this.

Methods: Members of the BAPN / KQuIP patient experience group reviewed the existing Kidney PREM making minor adjustments relevant to CYP. Existing online data collection methods were utilised with demographic questions directing participants to the appropriate PREM questions. Kidney PREM champions in local centres encouraged completion by CYP aged 12 years and older and parents/carers of CYP of all ages receiving care in Paediatric Nephrology centres in the UK. Data were analysed to describe demographics and responses in accordance with methods used to analyse the adult Kidney PREM.

Results: 285 responses were received from all Paediatric Nephrology centres in the UK and across all ages. This represented 165 male patients and 116 female patients consistent with the known demographics of CKD in the UK. 65 (23%) of these responses were from CYP, 158 (55%) were from parents/carers of those under 12 years and 62 (22%) from parents/carers of those 12 years or older. 131 (46%) responses were received for patients on KRT (73 (26%) transplant, 34 (12%) HD, 24 (8%) PD) representing 16% of the UK population of CYP under 16 years receiving KRT. 154 responses were received for patients with pre-dialysis CKD. Each question was scored from 1-7, with 7 the most favourable response. Nationally, Overall experience was rated highly (6.27, Figure 1). Themes with the highest scores were Privacy and Dignity (6.72), Patient Information (6.50), and Access to the Kidney Team (6.47). The lowest scoring themes were Support (5.70), Communication (5.40), and Transport (5.18). Differences to adult data e.g. a larger proportion of responses from those not on KRT and higher scores in Themes of Shared Decision Making need to be explored.

Figure 1



Discussion: This pilot survey is the first Patient Reported Experience Measure in under 18 year olds with kidney disease. Results demonstrate that a paediatric Kidney PREM is feasible, with further development underway to build on these findings. Developing a Kidney PREM for use in all ages enhances the potential for such a measure to be used to direct future quality improvement in paediatric nephrology and in adult nephrology as the patients kidney care journey passes through childhood and into adulthood.

Monday 5th June 16:00 – 17:00

Track F3 – Patient Involvement, Education & Outcomes 3

Poster: 186
Submission: 359

Collaborative cross-sector working to support people with kidney disease

Submitted on behalf of the Welsh Kidney Network (WKN), Mr Richard Holmes

Welsh Kidney Network, Cardiff

Introduction: As all forms of kidney replacement therapy (KRT) are life maintaining, patients in Wales receiving KRT were classified as 'clinically extremely vulnerable' (CEV) throughout the COVID-19 pandemic. Of particular concern were patients reliant on in-centre haemodialysis (ICHD), who, due to need to travel and receive treatment in-centre up to four times per week, were unable to shield as specified by Welsh Government. The Welsh Kidney Network (WKN) recognised this high risk population and in response to increasing COVID-19 cases, assembled a working group at the onset of the pandemic to ensure patients with kidney disease in Wales all had access to the same reliable information on how to both maintain their safety, and manage their physical and mental wellbeing during the pandemic.

Work to date: The so-named 'Collaborative' group, which includes third sector partners 'Popham Kidney Support', 'Kidney Care UK', 'Kidney Wales' and the 'Wales Kidney Research Unit', have held 71 virtual meetings to date, including 27 in 2020, 27 in 2021 and 17 in 2022. The group's work has involved:

- Development of a series of patient newsletters (Figure 1), available in Welsh and English; production and distribution of 17 editions to ~1200 patients, with 23,800 hard-copies printed and electronic versions also made available.
- Production and distribution of special bulletin for COVID-19 vaccine, with 1000 hard-copies printed and electronic versions also made available.
- Securing and distributing 50 iPod touches to 18 dialysis units in Wales, to help patients access online resources and improve digital literacy.
- Hosting a series of webinars, with health board specialists providing expert advice to patients.
- Promotion of self-referrals to kidney charities, resulting in >450 enquiries during April to August 2020, which may otherwise have been directed to NHS staff.
- Co-production of 'Worried Sick' survey, and presentation of evidence to Welsh Government.
- Sharing learning with 'Think Kidneys' and 'Advancing Health Care Awards Esteem Recognition Scheme'.
- Receiving positive feedback from multidisciplinary teams across Wales (Figure 2).
- In 2022, helping establish the Welsh Kidney Patient Network (WKPN), hosted by the WKN.

Discussion: While the primary purpose of the working group described may have been to support CEV patients with kidney disease in Wales throughout the COVID-19 pandemic, its benefits likely extend beyond this. By bringing together cross-sector multidisciplinary expertise and developing a means for providing timely, reliable and consistent information to all KRT patients in Wales, the work described here offers significant opportunity to continue to improve the wellbeing of patients with kidney disease

in Wales. By requiring minimal resource, the authors suggest that this new collaborative group also aligns with a value based healthcare approach.

Figure 1: Example of one newsletter produced by group

Kidney patient Covid 19 update

ISSUE 12
JANUARY 2021

Kidney Care UK · Kidney Wales · Aren Cymru · Paul Popham Fund · Uned Ymchwil Arennol Cymru Wales Kidney Research Unit

Welcome to the latest edition of this newsletter, where we will focus on the Covid 19 Vaccine that many of us will be receiving over the coming weeks and months..

Previous editions are also available online www.kidneyresearchunit.wales/news.htm?id=94

We hope you enjoy reading this edition!

COVID 19: all you need to know about the virus and the vaccine

Covid 19 is caused by a new coronavirus, known as SARS-Cov-2. It was first identified in late 2019. It is very infectious and can lead to severe respiratory disease.

Many people who are infected may not have any symptoms or only have mild symptoms. These commonly start with cough, fever, headache and loss of taste or smell.

Some people will feel very tired, have aching muscles, sore throat, diarrhoea and vomiting, fever and confusion. A small number of people then go on to have severe disease which may require hospitalisation or admission to intensive care.

Remember!

Covid 19 is spread through droplets breathed out from the nose or mouth, particularly when speaking or coughing. It can also be picked up by touching your eyes, nose and mouth after contact with contaminated objects and surfaces.

There is no cure for Covid 19 although some newly tested treatments do help to reduce the risk of complications.

You will also no doubt have heard about vaccines for Covid 19 in recent weeks.

The purpose of this update is to give you as a kidney patient up to date information about:

1. What the vaccine is
2. What it does
3. Answer your most frequently asked questions and
4. Sign post you to trusted sources of further information and wider support.

Key messages in this newsletter:

1. **The vaccine is safe. Your kidney care team and the Welsh Renal Clinical Network strongly advise you to have the vaccine when offered.**
2. **When you are called for a vaccine you should make it a priority to attend - if you have any concerns or questions speak to your kidney care team.**
3. **The biggest defence for you against Covid 19 is still to maintain the golden rules, HANDS, FACE, SPACE**

What is a vaccine?

A vaccine is a medicine given to people to help protect you getting sick from known diseases. Vaccines work with your immune system. Your immune system is the name given to the complex network of cells, tissues and organs that stops you becoming very sick or unwell. A vaccine simply helps your immune system to fight off known diseases.

Is getting Covid19 really as bad as they say?

Covid 19, the condition caused by Coronavirus (also known as SARS COV2) is the biggest health emergency in living memory. It is a global pandemic. Nearly 2 million people have died across the world and many more have been left with serious health complications. Very sadly many more will die before the pandemic ends. The NHS has never faced a challenge of this scale before.

In Wales people are continuing to get infected, and once the virus starts to spread as it is now, it can do so rapidly. Even if you, your family or friends haven't experienced it first hand, that doesn't mean it isn't a threat. Sadly, the learning from the first wave of the pandemic is that people with significant kidney disease such as those on dialysis, those with kidney transplants and those in the advanced kidney care clinic (also called the low clearance clinic) are at high risk of becoming very sick if they contract Covid 19.

Being vaccinated will help to protect you and reduce the spread of this deadly virus. The vaccine is proven to reduce the severity of symptoms and is the best way to protect you against Covid 19 as well as following the HANDS, FACE SPACE messages.

Why are Vaccines important?

Vaccines are safe, effective and save lives.

Vaccines teach your immune system how to protect you from diseases. It's much safer for your immune system to learn this through vaccination than by catching the diseases and attempting to treat them.

Vaccines can reduce or even eradicate some diseases, if enough people are vaccinated. Since vaccines were introduced, diseases like smallpox and polio that used to kill or disable millions of people are gone from the UK. This has been achieved through mass vaccination programmes, which build protection amongst the whole population. This is why it is important to vaccinate as many people as possible.

The vaccine will be provided free through the NHS. It may take a while to get to everybody who is eligible, but, when you are invited, make sure you get yours.

Most people have said they would get a Covid 19 vaccine when it's available, including HM The Queen!

Reality check

This is the biggest vaccination programme ever attempted. Nothing like this has even been imagined before let alone operationalised by our NHS. It is therefore unlikely that everything will go exactly 'to plan'. The best thing you can do to make this work and help the teams who are working hard to implement the vaccine programme and take us out of the pandemic is to attend your vaccination appointment(s) when called and stick to the government guidelines, HANDS, SPACE, FACE.

Figure 2: Examples of feedback received from unit dialysis nurses regarding the newsletter

"I have so much going on now, it is nice to be able to refer to the newsletter, I love the way the information is presented, it really helps to have patients reading about the experiences of other patients – they don't feel so isolated or silly for feeling the way they feel."

"It has been such a challenging time for everybody having this information in real time, presented so beautifully, I look forward to each edition, the masks, distance aware badges and the recipes! It has often helped us keep things in perspective whilst working on the unit."

Monday 5th June 16:00 – 17:00

Track F3 – Patient Involvement, Education & Outcomes 3

Poster: 187
Submission: 442

Co-designing an equitable electronic symptom management plan for people with kidney disease.

Miss Helen Chadwick[1], Mr Robert Finnigan[2], Dr Miranda Scanlon[3], Mr Faizan Awan[2], Dr Nicola Anderson[4], Dr Rosie Donne[5], Ms Gloria Munoz-Figueroa[6], Ms Rachel Gair[7], Professor James Burton[8], Dr Sabine van der Veer[1]

[1]University of Manchester, Manchester.
[2]Patient representative, Lancashire.
[3]Kidney Research UK, Peterborough.
[4]University of Birmingham, Birmingham.
[5]Department of Renal Medicine, Salford Royal NHS Trust, Manchester.
[6]Epsom and St Helier University Hospitals NHS Trust, Surrey.
[7]UK Renal Registry, Bristol.
[8]University Hospitals of Leicester NHS Trust, Leicester

Introduction**:** People with chronic kidney disease often suffer from several symptoms at once, which can greatly affect their quality of life. But all too often, their symptoms go unaddressed, even when treatments are available. Patients Know Best (PKB; the national kidney patient portal) does not currently have a functionality to support the management of kidney symptoms. Therefore, the aim of this research is to develop an electronic symptom management plan in PKB and assess its potential impact on health equity.

Methods**:** We conducted three online co-design focus groups with seven kidney patients and five kidney professionals. Over the course of the three focus groups, we went from an initial prototype version of the electronic symptom management plan in PKB to a more refined version based on participants' feedback. We have planned three additional online focus groups with patients, carers and professionals to assess the potential impact of the new symptom management plan on kidney health equity. We will focus primarily on people from ethnic minority groups, those who are 70 years of age or older, and those living in deprived areas. We will record, transcribe and thematically analyse the equity focus group discussions, and present findings as requirements for equitable use of the electronic symptom management plan.

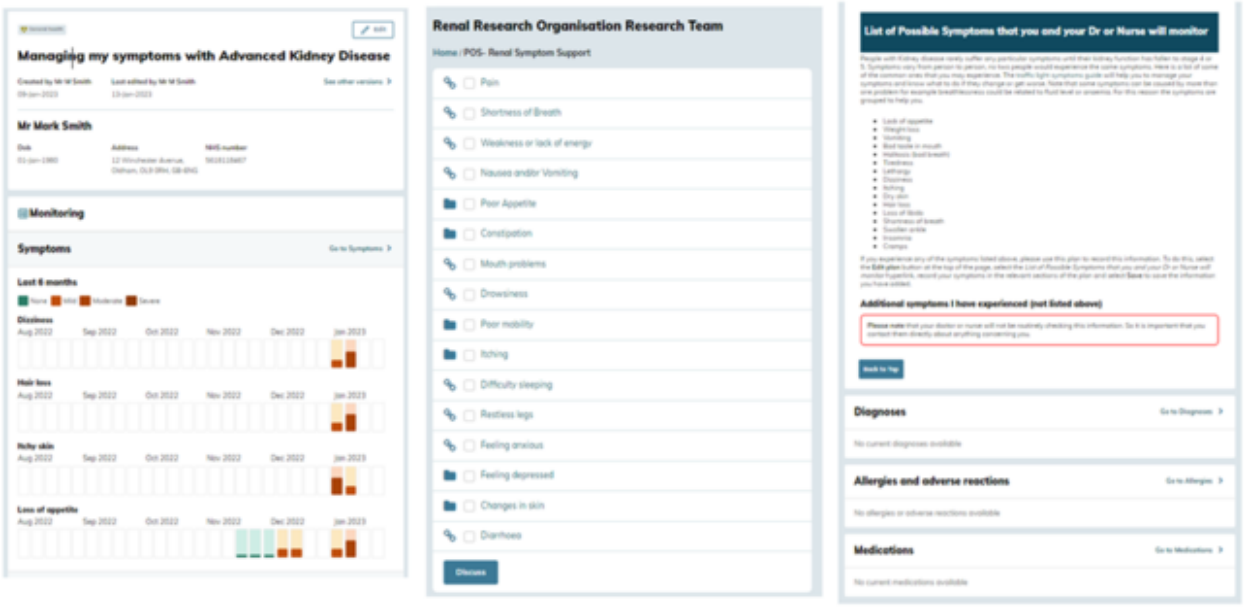
Results**:** Preliminary findings from the co-design focus groups suggested broad support for developing a management plan in PKB dedicated to kidney symptoms, rather than incorporating symptom reporting and management into a general kidney disease management plan. The symptom management plan should facilitate symptom reporting alongside an overview of medications and non-pharmacological strategies specific to the patient's situation. Participants expressed preference for a symptom-reporting functionality where changes could be monitored over time by themselves, as well as for ongoing symptom review by the kidney team. For the electronic plan to support self-management, participants

agreed that building a central library of symptom management resources would be beneficial for kidney patients and professionals. They also stressed the importance of having supporting materials to help people use the PKB portal in general and the symptom management plan in particular. Figure 1 shows screenshots of the first iteration of the symptom management plan.

We anticipate the equity focus groups to demonstrate how people from the aforementioned underserved groups might engage with the electronic symptom management plan, reveal any potential barriers and facilitators to using the plan, and generate mitigation strategies to improve its accessibility and uptake.

Discussion**:** By synthesising the findings of the co-design and equity focus groups, we will produce a final version of the electronic symptom management plan that is ready for use in UK kidney centres. We will also produce a functional description to inform the design of symptom management plans in systems other than PKB. Ultimately, we expect electronic symptom management plans to become widely available for all people with kidney disease, thereby contributing to improving symptom burden and quality of life.

Figure 1. Screenshots of the symptom monitoring, action plan, and library functionalities.



Acknowledgements**:** This work is supported by funding from Kidney Care UK.

Monday 5th June 16:00 – 17:00

Track F3 – Patient Involvement, Education & Outcomes 3

Poster: 188
Submission: 444

Kidney PREM 2022: Exploring differing rates of returns across centres in the UK

Ms Amanda Busby[1,2], Dr Alan Hancock[2], Ms Ranjit Klare[3,2], Mrs Catherine Stannard[3,2], Miss Lucy Mackintosh[1,2], Miss Rebecca Flanagan[1,2], Dr David Wellsted[1,2], Professor Kenneth Farrington[1,4,2]

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Introduction: The validated, annual Kidney Patient Reported Experience Measure (Kidney PREM) enables people living with kidney disease to share their experience of the care they receive. It contains 38 items across 13 themes of care (e.g., Communication, Transport) and an 'Overall' question. Initially, Kidney PREM was predominantly paper based, with resource packs posted to centres, and an online version available. The COVID-19 pandemic prohibited paper surveys, so during 2020 all data were collected online resulting in improved quality of data and exceptional volume and calibre of free-text comments. Given this, alongside environmental and time considerations, focus shifted to promoting online completion in 2021 and 2022, with paper available to ensure equity of access. Despite known benefits of online completion, centre engagement is variable. This work explores centre-level response rates to ascertain whether lessons can be learnt, and improvements made.

Methods: Resources were distributed in September 2022, the quantity calculated according to the size of their kidney replacement therapy (KRT) population. Some centres were sent additional surveys upon reasonable request. Online Kidney PREM ran from 1st October until 11th November, and centres distributed paper surveys during the same period. Staff members were asked to input the centre's identifying code prior to issuing.

Participants returned completed paper surveys to the UK Kidney Association (UKKA) via freepost envelope by 9th December, which were scanned with specialist software. The dataset was compiled early January 2023 and merged with online results.

Results: Across centres, 15,210 paper surveys (Table 1) were distributed (range 50 to 1400) of which 4,033 (26.6%) were returned. A further 7,030 (63.5% of total) were received online, totalling 11,063 valid responses. Nine centres recorded no paper surveys, although received online responses (range 1 to 262). Just four centres had over 50% of their paper surveys returned; each were sent fewer than 200. Twenty-nine units requested additional copies; return rate ranging from 4.0% to 61.1%. Only two of these received more surveys than first issued. Quality of data received varied by survey type; strikingly, the centre name was missing in 636 paper (15.8% of returns) and 252 (3.6%) online surveys. Additionally, treatment was missing for 484 (12.0%), ethnicity for 152 (3.8%) and age for 394 (9.8%) of paper respondents, but fully completed by those online.

Conclusion: Response variation across centres raises several considerations. Operational matters could be reviewed by the PREM working group and harmonised in relation to the quantity of paper surveys issued and requests for additional copies. Timely resource distribution could reduce the burden on centre staff, ensuring they are more fully prepared when Kidney PREM 2023 launches. The return rate at centre/regional level highlights several apparent anomalies, e.g., few/no paper returns for some and limited returns (despite additional copies requested) for others. Further exploration with centre staff and patients about reasons for variations in response type, rate and quality could support high-quality Kidney PREM completion, fuelling local and national initiatives to improve patients' experience of kidney care, and at the same time help optimise use of resources.

Table 1 Kidney PREM 2022 Returns by Centre and Region

Region	Initial Paper Sent	Additional Surveys Requested	Total Paper Sent	Online Returns	Paper Returns	Total Returns	Proportion Paper Returned	Proportion responses online
East of England	1050	50	1100	649	209	858	19.0%	75.6%
London	1750	460	2210	1964	703	2667	31.8%	73.6%
Midlands	1900	1025	2925	858	547	1405	18.7%	61.1%
North East & N Cumbria	800	350	1150	376	318	694	27.7%	54.2%
North West	1000	130	1130	280	168	448	14.9%	62.5%
South East	700	550	1250	894	317	1211	25.4%	73.8%
South West	900	235	1135	671	264	935	23.3%	71.8%
Yorkshire and Humber	950	400	1350	316	296	612	21.9%	51.6%
Northern Ireland	600	30	630	88	229	317	36.3%	27.8%
Scotland	1500	0	1500	285	131	416	8.7%	68.5%
Wales	570	260	830	397	215	612	25.9%	64.9%
Missing Centre Name				252	636	888		
TOTAL 2022	**11720**	**3490**	**15210**	**7030**	**4033**	**11063**	**26.5%**	**63.5%**

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Track F3 – Patient Involvement, Education & Outcomes 3

Poster: 189
Submission: 449

Measuring and improving treatment decisions in Advanced Kidney Care Clinic

Mr Michael Angelo Diaz, MS Eleri Wood

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Introduction: Sayeed et.al 2020 conducted a study about dialysis regret and yielded that 21% of their respondents expressed decision regret. One vital role of the Advanced Kidney Care (AKC) clinic is to minimise decision regret by educating and supporting patients approaching CKD5. This project aims to look at how well patients understand their chosen treatment modality including the risks, benefits and to explore if they've received enough support to make this decision.

Methods: We decided to use the SURE survey (see box 1) to measure patient certainty, level of Satisfaction with decision making and process in our AKC clinics. In 2019 a SURE test accuracy for decision conflicts was conducted and revealed that this tool measures acceptable psychometric properties for screening decisional conflict (Boland et.al). Inclusion criteria includes those who have been seen in AKCC for at least 6 months, has already made an RRT decision/ unable to plan but not in denial, Speaks and understand the English Language or has someone with them able to interpret.

The study was conducted in cycles: (1) pilot to look at processes and how well clinicians and patients engage in the study; (2) roll out the survey across all sites and (3) assess clinical impact. Clinics were prepared in advance to identify eligible patients who were then given the survey to complete independently after seeing the clinician and before leaving the Department. If patient responded as 'no' to any of the four questions they were deemed as "unsure" and an alert was placed to prompt clinician to address next appointment. Moreover, the interventions used to address the uncertainty was documented on the clinician's clinic letter.

Cycles 1 and 2 are complete and reported here; cycle 3 due to be completed and reported at UKKW.

Results: 173 (78%) patients completed the survey (Table 1). Completion rate by self-reported ethnicity and gender showed no clear pattern (Table 1).

132 (76%) of respondents answered "YES" to all questions, 41 (24%) answered "no" to at least one question and categorised "unsure". A higher proportion of "unsure" were black than those who were "sure" (Figure 1). A higher proportion of "unsure" respondents were female than those who were "sure" (Figures 2).

Discussion:

- This study looked at decision making amongst a racially diverse group of patients. High respondent levels shows both clinicians and patients engaged in survey. We plan to analyse non-respondents assess reasons for non-participation.
- The majority of patients were “sure” demonstrating that they felt they had enough information and support to make their treatment decision.
- Data suggested that women and people of black ethnicity were more likely to be “unsure”. Whether that’s indicative that they are truly less “sure” or more willing to admit uncertainty is currently unknown.
- In cycle three interventions will be offered to those who were “unsure” and all respondents re-tested to see if interventions increase decision confidence.

Figure 1A-B : Racial Identity of “sure” and “unsure” respondents

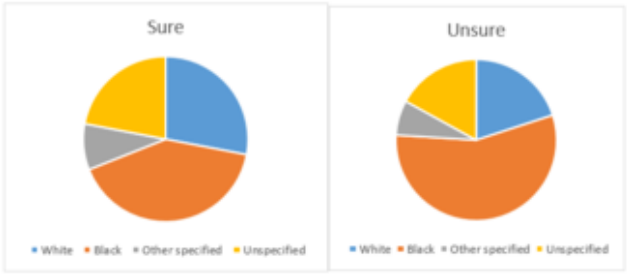

Figure 2A-B: Gender proportion of “sure” and “unsure” respondents

Box 1

SURE survey:

(1) Do you feel SURE about the best choice for you?

(2) Do you know the benefits and risks of each option?

(3) Are you clear about which benefits, and risks matter most to you?
(4) Do you have enough support and advice to make a choice?

Table 1: SURE survey completion

	Completed	%	Not returned	%
Total	173	78	48	22
White	45	26	19	40
Black	77	44	19	40
Other	15	9	8	17
Unspecified	36	21	2	4
male	114	66	30	62.5
female	59	34	18	37.5

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Track F3 – Patient Involvement, Education & Outcomes 3

Poster: 190
Submission: 460

Tackling kidney health inequalities: the renal social work contribution

Ms Margaret Eyre[1,2], Mrs Janet Hopkins[1,2]

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Introduction: Inequalities in health have been recognised for many years, with the Black Report in 1980 concluding that these were not mainly attributable to failings in the NHS, but rather to social inequalities influencing health: income, education, housing, diet, employment, and working conditions. The Report recommended a wide range of strategies to combat these inequalities, but sadly it received little attention from the government and was not widely distributed. Over the last 12 years, inequalities have increased considerably, with the Covid pandemic bringing them into sharp focus, and the current cost of living crisis sees many even in professional roles having to resort to food banks.

A report on Inequalities in Kidney Health was published by Kidney Research UK in 2019, but we as renal social workers were surprised to see that none of the authors had a social policy or social work background, given the obvious socioeconomic factors. We therefore decided to look at the various issues identified in the report and explore the intersection between the renal social work role and these concerns.

Method : We began by auditing our referrals for the previous year, reviewing referral type and actions taken. We then drew up a list of the issues identified that linked to those in the report and considered our impact on this group of patients.

Results : Around 70% of our referrals were for material support: finances/benefits, grant applications, help reclaiming transport costs, referrals for NHS dentists, employment and concerns re unsuitable housing. Socioeconomic status is highlighted in the report as one of the key indicators of poor kidney health, with those from lower income groups more likely to have CKD, to have a quicker disease progression and to die earlier; lower numbers are transplanted, they more often experience rejection and fewer access home therapies. Another common area is mental health: research shows that people with severe mental illness are more likely to be on RRT; in addition, those who have experienced trauma in early life have reduced life expectancy and more commonly develop chronic diseases. Research has shown cognitive impairment to be much more prevalent amongst dialysis patients than nurses estimate, yet a good understanding of treatment aims is key to concordance. Finally, people from minority ethnic groups progress more quickly towards kidney failure and less commonly receive a transplant; the reasons for this are complex and include socioeconomic status.

Discussion: Having a renal social worker embedded in the MDT has many benefits: they can advocate for patients, particularly those who lack a voice due to disadvantage; helping patients navigate the complicated and punitive benefits system, together with applying for grants, can be a life-saver, and

helping secure appropriate housing is vital to maximise health. Supporting those with lower-level mental health problems and cognitive impairments, together with their carers, can be key to treatment concordance; likewise, providing information in accessible formats for patients and their families is vital.

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Track F3 – Patient Involvement, Education & Outcomes 3

Poster: 191
Submission: 463

Impact of COVID-19 on patient experience of kidney care, a rapid review

Miss Lucy Mackintosh[1], Professor Kenneth Farrington[1], Professor Paula Ormandy[2], Ms Amanda Busby[1], Ms Ranjit Klare[3], Dr Christina Silver[4], Ms Maria Da Silva-Gane[5], Dr Shalini Santhakumaran[6], Mr Paul Bristow[7], Dr Shivani Sharma[1], Dr David Wellsted[1], Dr Joseph Chilcot[8], Dr Sivakumar Sridharan[5], Dr Retha Steenkamp[6], Ms Tess Harris[9], Ms Susan Muirhead[9], Ms Vicky Lush[10], Dr Sarah Afuwape[11]

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In March 2020 the World Health Organisation declared a pandemic state due to the outbreak of SARS-COV-2, later renamed Coronavirus Disease 2019 (COVID-19). COVID-19 is an acute respiratory syndrome resulting in fever, cough or loss of sense of smell, and in some cases severe symptoms of pneumonia, organ failure and death. Kidney patients on active interventions are more susceptible to severe COVID-19 infection and associated complications because of immunosuppression.

As a result of the pandemic, healthcare delivery in the UK changed to ensure continued delivery of safe care for patients by favouring remote consultations over face-to-face clinics, consequently patients in need of care experienced long waiting times and inaccessibility due to backlogs, elective care, and chronic workforce shortages. To improve our understanding of how the COVID-19 pandemic impacted patient experience of kidney care, a rapid review of the literature was conducted.

Methods: Search terms including ‘coronavirus’, ‘kidney care’, and ‘patient reported experience’ and similar were used in the databases Medline, Scopus, and Worldwide Science, identifying a total of 1,117 articles. The review was conducted in accordance with Cochrane Rapid Review interim guidance. Following removal of duplicates (n=75) and screening of titles and abstracts for eligibility (correct timeframe conducted during COVID-19, describes patient reported experience, and focusses on individuals living with chronic kidney disease), 61 full articles were retrieved. This led to a further 43 studies being excluded.

Results: Seventeen articles were included in the final synthesis of data which included extracting data based on purpose, setting, methods, and results, the articles explored three clear themes: 1. Remote Consultation and telemedicine (n=9), 2. Psychological Impact (n=2) and 3. Patient Satisfaction and Patient Reported Experience (n=6). Patients generally reported being satisfied with the remote consultations describing them as convenient, allowing them to avoid hospital visits. However, there were concerns about missing potentially important findings due to the lack of opportunity for physical examination, and issues including digital literacy and technical difficulties.

There were clear differences in psychological impact between treatment modalities, with transplant recipients expressing feelings of instability dominated by a dread of having to return to dialysis dependence. In contrast, individuals on home treatments tended to feel safer, avoiding the potential hazards associated with attendance at kidney units.

Similarly, articles looking at patient experience found differences between treatments, with transplant recipients feeling COVID-19 was likely to impact their ability to work, access medications and travel to hospital for appointments. However, patients receiving haemodialysis in-centre had mixed views with some having increased anxiety due to the pandemic and other's finding no associated negative impacts during COVID-19.

Conclusion: The findings of this review echo those in other healthcare contexts by elucidating the disruption of COVD-19 to patient experience of kidney care. Existing literature, however, focusses only on aspects of patient experience, notably the introduction of telemedicine replacing hospital consultations, and patient satisfaction. There is a need to develop a fuller understanding as recovery plans continue to evolve to guide specific policy agendas that can support patient experience during future public health crises.

Monday 5th June 16:00 – 17:00

Track G1 – Pharmacology, Medicines Management including Anaemia & MDB 1

Poster: 193
Submission: 084

Introduction of an Acute Hyperkalaemia Protocol for Ambulatory Care in a University Health Board

Miss Megan Barker

Cardiff University School of Medicine, Cardiff. University Hospital of Wales, Cardiff

Introduction: Sodium zirconium cyclosilicate (SZC) (Lokelma®) was approved in 2018 to treat hyperkalaemia in adults. It is a non-absorbed compound that preferentially binds to potassium ions in exchange for sodium and hydrogen ions in the GI tract, increasing faecal potassium excretion and thereby lowering serum levels. It has a rapid onset of action, reducing K+ levels within 1 hour of administration[1]. NICE guidance advises that SZC has a role "within emergency care for acute life-threatening hyperkalaemia alongside standard care" (≥ 6.5mmol/L)[2]. This audit looks to see how many patients received this drug in the acute setting compared with standard care alone in a university health board over a 6-month period.

Methods: A filter was run on bloods that had been sent to biochemistry from the emergency department (ED) to identify all patients triggering a high potassium warning (≥6mmol/L). Relevant data was collected and retrospectively analysed to quantify the use of SZC.

Results: Seventy-nine patients presented to the ED with moderate to severe hyperkalaemia between November 2021 and May 2022, with serum values ranging from 6mmol/L to 8.4mmol/L. Only 5 (6.3%) of these patients received SZC as part of their initial hyperkalaemia treatment within the ED. Furthermore, of the 37 patients who had acute life-threatening hyperkalaemia (≥6.5mmol/L), only 2 (5.4%) received SZC as part of their acute treatment.

All 5 patients treated with SZC achieved normokalaemia, however, it took significantly longer for their serum levels to normalise compared to the 58 whose potassium was normalised without SZC (p=0.026). Two (40%) of the 5 SZC patients passed away during their subsequent admission, compared to a mortality of 27% within the 74 who did not receive SZC.

Discussion: With such a small percentage of our patients receiving SZC, we are not achieving the standard of care recommended by NICE guidance i.e. considering SZC for anyone with acute life-threatening hyperkalaemia. The patients who did receive SZC had worse outcomes than those who did not, though the reliability of this is questionable due to the small number of patients receiving the treatment. Our health board does not currently have a local hyperkalaemia protocol so, in the case of refractory hyperkalaemia, clinicians in ED would have most likely consulted the renal team, who would have been the ones to suggest SZC. This would explain the longer time for normalisation of serum potassium levels in the SZC group.

As a result of this audit, a new hyperkalaemia protocol has been devised for the health board which incorporates SZC and states that it can now be authorised by any medical consultant or specialist registrar (as opposed to just the renal team). This will hopefully not only increase its use but also encourage its correct use.

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2. National Institute for Health and Care Excellence. Sodium zirconium cyclosilicate for treating hyperkalaemia. TA599. London: NICE; 2022 [accessed 29 May 2022]. Available from: https://www.nice.org.uk/guidance/ta599/resources/sodium-zirconium-cyclosilicate-for-treating-hyperkalaemia-pdf-82607272135621

Monday 5th June 16:00 – 17:00

Track G1 – Pharmacology, Medicines Management including Anaemia & MDB 1

Poster: 194
Submission: 116

Causes of death in patients with anaemia of chronic kidney disease (with/without diabetes mellitus) in the ASCEND-ND trial

Prof Ajay K. Singh[1], Mr Michael Aarup[2], Dr Brian Lee Claggett[1], Mr Alexander R. Cobitz[3], Prof Vladimir A. Dobronravov[4], Dr Colin A. Hutchison[5], Prof Laurent Juillard[6,7], Dr Bart Maes[8], Mr Stephen Mallett[9], Dr Antonello Pani[10], Prof Mai Ots-Rosenberg[11], Dr Bonnie C. Shaddinger[3], Prof Frank M. Strutz[12], Prof Marc G. Vervloet[13], Dr Christopher Wanner[14], Prof Andrzej Więcek[15], Prof John J. McMurray[16], Mrs Catherine Clair[3]

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Introduction**:** Cardiovascular (CV) aetiologies, including diabetes mellitus (DM), are the most common cause of death among chronic kidney disease (CKD) patients. This post-hoc analysis of adjudicated causes of death in patients with anaemia of CKD with/without DM in the ASCEND-ND trial investigated the safety of daprodustat (Dapro), a hypoxia-inducible factor prolyl hydroxylase inhibitor, for treatment of anaemia of CKD in non-dialysis patients.

Methods**:** ASCEND-ND (NCT02876835) was a global, randomised, open-label, phase 3 CV outcome trial. Patients received daily oral Dapro or subcutaneous darbepoetin alfa (Darbe). Outcomes were centrally adjudicated. Survival data for the intent-to-treat population was analysed using Kaplan-Meier methods (DM vs non-DM).

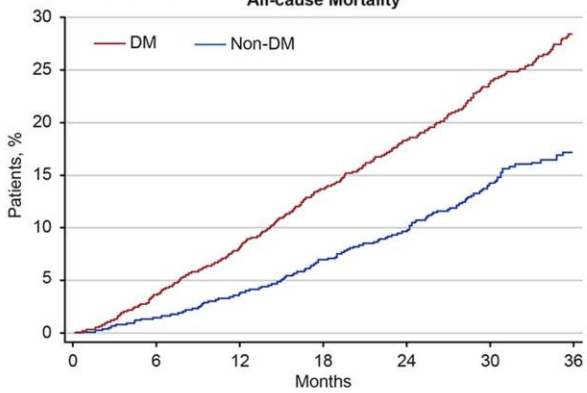
Results**:** Of 3872 randomised patients (DM n=2194, non-DM n=1678), baseline characteristics were broadly balanced across treatment arms, although DM patients were older, had greater body mass index and systolic blood pressure, and more CV disease/CV medication use than non-DM patients. All-cause mortality was significantly higher in DM vs non-DM patients (hazard ratio [HR]=1.87, 95% confidence interval [CI]: 1.57–2.23; Figure 1A); this association did not differ by treatment (HR=1.87 [Dapro] vs 1.86 [Darbe]; p=0.96). Infection and CV mortality each accounted for approximately 30% of deaths independent of DM status (Figure 1B).

Discussion**:** In patients with anaemia of CKD not on dialysis, the overall death rate was higher in DM patients, but cause of death was similar regardless of DM status; infection in patients with or without DM was the most frequent cause of death.

Encore statement**:** This abstract is an encore of abstract #TH-PO685 presented at the American Society of Nephrology (ASN) 2022 meeting (Orlando, FL, USA, and Virtual, 3–6 Nov 2022). The full citation is as follows: AK Singh, M Aarup, BL Claggett, AR Cobitz, VA Dobronravov, CA Hutchinson, L Juillard, BD Maes, S Mallett, A Pani, M Ots-Rosenberg, B Shaddinger, FM Strutz, MG Vervloet, C Wanner, A Więcek, JJ McMurray: Causes of Death in Patients with Anemia of CKD (With/Without Diabetes Mellitus) in the ASCEND-ND Trial [Abstract]. J Am Soc Nephrol 33, 2022: 241.

Funding**:** This study was funded by GSK (208808).

A Kaplan-Meier curve



B Causes of death

	DM** N=2194	Non-DM N=1678
Total deaths, n (%)	**418 (100)**	**181 (100)**
CV-related deaths, n (%)	**108 (26)**	**51 (28)**
Sudden cardiac death	46 (11)	19 (11)
Heart failure/cardiogenic shock	22 (5)	11 (6)
Stroke	18 (4)	7 (4)
Acute MI	12 (3)	6 (3)
Other CV	10 (2)	8 (4)
Non CV-related deaths, n (%)	**205 (49)**	**92 (51)**
Infection (including sepsis)	122 (29)	58 (32)
Renal	31 (7)	11 (6)
Malignancy	19 (5)	6 (3)
Other	33 (8)	17 (9)
Undetermined, n (%)	105 (25)	38 (21)

Shown in B are the causes of death in DM and non-DM patients. Data are presented as the number (%) of patients that died from each cause, with the percentage calculated using the total number of deaths as the denominator. *Acute MI, heart failure, stroke, sudden cardiac death, and other CV deaths comprise overall CV mortality; **Patients with current diabetes reported at screening.
CKD, chronic kidney disease; CV, cardiovascular; DM, diabetes mellitus; ITT, intent-to-treat; MI, myocardial infarction.

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Track G1 – Pharmacology, Medicines Management including Anaemia & MDB 1

Poster: 195
Submission: 136

Home haemoglobin monitoring for the titration of erythropoietin stimulating agents in chronic kidney disease; a pragmatic trial

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Introduction: Worldwide approximately 20 million people live with chronic kidney disease (CKD) and renal anaemia. Multiple steering committees have recommended the development of more individualised and empowering patient pathways; patient self-testing in their own homes using a point-of-care-testing (POCT) device for the titration of erythropoietin stimulating agents (ESA) represents a clear example of such a pathway. Until now no haematology POCT devices and pathways have been trialled in this space. We describe the results of a year of use of a small POCT device, Conformité Européene marked for home-use, with its associated eHealth pathway, in the home monitoring of ESA therapy in CKD patients.

Methods: In this pilot trial we used a POCT device designed for self-testing, able to measure Hb from a drop of capillary blood obtained via a finger-prick (Luma, Entia, UK). The device results can be transferred to an associated mobile application via a QR code generated by the device. The app shares patient results with their HCPs via a web-based portal. We transferred the Luma derived results into our renal information management system which allowed the results to be viewed separately, alongside, lab derived full blood count (FBC) results. The pilot ran from August 2020 to March 2022 in a single tertiary renal centre in the UK. All non-pregnant non-dialysis-dependant renal patients over 18 years of age on ESAs were considered for inclusion onto the trial. Participants received the Luma device via post and were trained remotely via video and phone calls by Entia staff. Participants were encouraged to self-test twice weekly for up to 1 year with data being collected on a pragmatic basis. Traditional ESA monitoring using lab FBC continued during this period. Lab and Luma results were compared.

Results: Twenty-seven (90%) of trained participants tested for >15 weeks with lab FBC performed during the testing period. The study population generated 1498 Luma and 137 lab Hb results. The mean number of tests per week was 1.7. The mean raw average difference between Luma vs. lab Hb was 1.74 g/L (95% CI -15.8 – 19.2) with the mean 8-point-moving- average (8PMA) difference of 0.40 g/L (95% CI -0.40 – 1.2). The percentage Luma results differing by >10% lab results was 30.9%, dropping to 17.7% using the 8PMA. Questionnaires were sent to all participants; 9 (30%) responded. All participants stated that they preferred Luma to the traditional method of ESA monitoring and would recommend the pathway to others.

Discussion: We present the largest and longest running trial of a home-testing haematology POCT device that we are aware of in the literature. The Luma data suffered from the intrinsic variability in precision associated with capillary blood sampling but provided data appropriate for clinical decision making.

Cost-effectiveness analysis is required. Despite the challenges required to integrate and upscale these home-testing pathways, new models of care, empowering, home-based, and utilising advances in information and communications technology, are clearly required and desired by both patients and healthcare professionals; pilots such as our own form a basis for such work.

Monday 5th June 16:00 – 17:00

Track G1 – Pharmacology, Medicines Management including Anaemia & MDB 1

Poster: 196
Submission: 148

Indirect treatment comparison between daprodustat and roxadustat in non-dialysis patients with anaemia associated with chronic kidney disease: an analysis of energy/fatigue as measured by the SF-36 Vitality score

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Introduction: Prolyl hydroxylase inhibitors (PHIs) are oral agents that might increase availability of anaemia treatment options for patients with chronic kidney disease (CKD). The 36-Item Short Form (SF-36) Vitality score is a patient-reported measure of energy/fatigue – common and important outcomes in patients with CKD. Direct comparative evidence on health-related quality of life from randomised controlled trials (RCTs) between PHIs has not been identified. We conducted an indirect treatment comparison (ITC) of changes in SF-36 Vitality score observed in placebo-controlled RCTs of daprodustat and roxadustat.

Methods: Four pivotal phase 3, double-blind, placebo-controlled RCTs evaluating either daprodustat (ASCEND-NHQ [submitted for publication]) or roxadustat (ALPS, ANDES, OLYMPUS) in anaemic non-dialysis CKD patients were identified. Aggregate data for pre-specified SF-36 Vitality score endpoints – change from baseline to week 28 in ASCEND-NHQ, and from baseline to the average across weeks 12 to 28 for the three roxadustat RCTs – were used in our analyses. Posterior probability distribution estimates and pairwise comparisons were generated using Bayesian Markov Chain Monte Carlo

methods with non-informative priors. A 95% credible interval (CrI) for mean least squares mean (LSM) difference in change in SF-36 Vitality score between treatments above zero demonstrated superiority.

Results: In pairwise comparisons, respective posterior mean LSM differences for daprodustat (5.37, 95% CrI 0.78, 9.93) and roxadustat (0.67, 95% CrI 0.02, 1.32) demonstrated significantly improved SF-36 Vitality score relative to placebo, and daprodustat demonstrated a significantly improved SF-36 Vitality score relative to roxadustat (4.70, 95% CrI 0.08, 9.31).

Discussion: Our analyses suggest superiority of daprodustat compared with roxadustat for the SF-36 Vitality score, which could be important to patients with anaemia of CKD. A potential limitation of this ITC is the differences in timepoints of SF-36 Vitality endpoints across studies; however, our analyses used pre-specified endpoints that considered dosing algorithms and expected haemoglobin rate of rise from PHIs.

Encore statement: This abstract is an encore of the abstract “Indirect Treatment Comparison between Daprodustat and Roxadustat in Non-Dialysis Patients with Anemia Associated with Chronic Kidney Disease: An Analysis of Energy/Fatigue as Measured by the SF-36 Vitality Score” presented at the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) 2022 meeting (National Harbor, MD, USA, and Virtual, 15–18 May 2022).

Funding: This study was funded by GSK

Monday 5th June 16:00 – 17:00

Track G1 – Pharmacology, Medicines Management including Anaemia & MDB 1

Poster: 197
Submission: 154

Erythropoiesis-Stimulating Agent Hyporesponsiveness and Anaemia Management in the ASCEND-D Trial

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Introduction**:** Erythropoiesis-stimulating agent (ESA) hyporesponsiveness is characterised by high-dose ESA and greater use of intravenous (IV) iron. Hypoxia-inducible factor prolyl hydroxylase inhibitors (HIF-PHIs) may be beneficial for iron homeostasis/utilisation. Data comparing HIF-PHIs vs ESA in hyporesponders are limited.

Methods**:** ASCEND-D (NCT02879305) was a phase 3 randomised trial of daprodustat (Dapro) vs ESA in dialysis patients (pts; N=2964). ESA hyporesponsiveness was defined as baseline ESA-resistance index >2.0 or epoetin dose >450U/kg/week. Both treatment groups used protocolised dosing of study drug and iron to achieve/maintain haemoglobin (Hb) 10.0–11.0g/dL. A rescue algorithm for anaemia management allowed use of IV iron and/or red blood cell (RBC) transfusion, with discontinuation of study drug for persistent Hb <9g/dL or >2units RBC transfusion. Statistical analyses included analysis of covariance with treatment x subgroup interactions.

Results**:** At baseline, 12% of pts were ESA-hyporesponsive (ESA-HR) (Table). During the trial, higher Dapro and ESA doses were required in the ESA-HR vs non-ESA-HR group. Mean change in Hb from baseline to weeks 28–52 for Dapro vs ESA: ESA-HR group, 0.01g/dL; non-ESA-HR group, 0.21g/dL (p-interaction=0.04). Mean IV iron use was lower with Dapro vs ESA in the ESA-HR group (−31.7mg) but similar in those not ESA-HR (6.9mg; p-interaction=0.09). A greater number of RBC transfusions and discontinuations due to rescue therapy was seen in Dapro vs ESA in ESA-HR pts; the opposite was observed in non-ESA-HR pts.

Discussion**:** Baseline responsiveness to ESA led to different patterns of anaemia management for Dapro vs ESA, with evidence of lower IV iron utilisation with Dapro in those who were ESA hyporesponsive at baseline.

Encore statement**:** This abstract is an encore of abstract #TH-PO686 presented at the American Society of Nephrology (ASN) 2022 meeting (Orlando, FL, USA, and Virtual, 3–6 Nov 2022). The full citation is as follows: SS Waikar, DW Coyne, FR McCausland, KL Johansen, V Jha, GT Obrador, PR Bhatt, S Mallett, AM Meadowcroft, AK Singh: Erythropoiesis-Stimulating Agent Hyporesponsiveness and Anemia Management in the ASCEND-D Trial [Abstract]. J Am Soc Nephrol 33, 2022: 242.

Funding: This study was funded by GSK (208807).

	Hyporesponsive at baseline		Not hyporesponsive at baseline	
	Daprodustat	ESA	Daprodustat	ESA
Number, n/N (%)	183/1487 (12%)	180/1477 (12%)	1285/1487 (86%)	1279/1477 (87%)
Baseline Hb, g/dL	9.89	9.99	10.40	10.44
Median dose of study drug, wk 48				
Daprodustat, mg	10.0	-	6.0	-
Epoetin alfa, U	-	15000	-	6000
Darbepoetin, μg	-	200	-	150
RBC transfusions, units/100 PY	97.6	78.9	31.9	41.7
No. requiring rescue leading to discontinuation, n/N (%)	14/183 (7.7%)	5/180 (2.8%)	39/1284 (3.0%)	48/1279 (3.8%)
Change in Hb from baseline to wks 28–52				
No. with baseline and evaluation period Hb*	183	180	1284	1279
Adjusted mean change from baseline (SE)†	0.11 (0.065)	0.11 (0.068)	0.31 (0.024)	0.11 (0.024)
Adjusted mean treatment difference (two-sided CI)†	0.01 (-0.17, 0.19)		0.21 (0.14, 0.27)	
p-value‡	0.04			
On-treatment average monthly IV iron dose during day 1 to wk 52				
No. on randomized treatment n/N (%)	183/183 (100%)	178/180 (99%)	1279/1284 (>99%)	1276/1279 (>99%)
Adjusted mean IV iron dose, mg (SE)§	111.4 (9.59)	143.1 (9.72)	88.1 (3.59)	95.0 (3.60)
Adjusted mean treatment difference (two-sided 95% CI)§	-31.7 (-58.2, -5.2)		6.9 (-16.8, 3.1)	
p-value‡	0.09			

*Includes both observed and imputed values; †Based on an analysis of covariance model with terms for treatment, baseline hemoglobin, dialysis type, region, subgroup and treatment by subgroup interaction; ‡Interaction test for heterogeneity of treatment effect across subgroups; §Based on an analysis of covariance model with terms for treatment group, baseline IV iron dose, dialysis type, region, subgroup and treatment by subgroup interaction. P-values are interaction values.
CI, confidence interval; Dapro, daprodustat; ESA, Erythropoiesis-stimulating agents; Hb, hemoglobin; IV, intravenous; PY, patient-years; RBC, red blood cell; SE, standard error; wk, week.

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Monday 5th June 16:00 – 17:00

Track G1 – Pharmacology, Medicines Management including Anaemia & MDB 1

Poster: 198
Submission: 199

Evaluation of guidelines for dosing and monitoring of intraperitoneal vancomycin for the treatment of peritoneal dialysis related infections: a multidisciplinary approach.

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Intra-peritoneal (IP) Vancomycin is commonly used as an empirical antimicrobial agent in treating Peritoneal Dialysis (PD) related infections to provide cover against gram-positive organisms. This approach was recommended by the International Society of Peritoneal Dialysis (ISPD) guidelines for the management for PD related infections, however they did not advocate routine therapeutic dose monitoring until 2016.[1] Following this recommendation, we developed guidance for monitoring trough vancomycin levels. Local guidelines use ISPD dosing advice of 30mg/kg, with an initial dosing interval dependent on 24-hour urine output; every 5 days if above 500ml and every 7 days if below 500ml. Subsequent dose intervals are altered dependent on vancomycin levels (target range 10-15mg/L). The aim of this study was to evaluate whether the guidance for vancomycin prescribing and monitoring were adhered to, whether therapeutic levels were achieved and whether there were differences in infection outcomes between patients with and without therapeutic levels.

Data were gathered, from vancomycin prescriptions and Vital Data, for all patients who received IP vancomycin between 2016 and 2022. Vancomycin doses, dose intervals and levels were recorded for all patients where available, alongside their urine output, the causative organism and infection outcome.

Data from 167 patients were collected, with 75 patients excluded, due to lack of data.

- Are prescriptions within current guidelines?

	Initial dose (n=92)	Subsequent doses (n=159)
Yes	50 (54%)	84 (53%)
No	42 (46%)	65 (41%)
Level not taken	NA	10 (6%)

- In those who did receive correct prescriptions, are doses achieving target vancomycin levels?

	Initial dose (n=50)	Subsequent doses (n=84)
Yes	22 (44%)	19 (23%)
No, subtherapeutic levels	17 (34%)	4 (5%)
No, high level	8 (16%)	43 (51%)
Leven not taken	3 (6%)	18 (21%)

- Does larger urine output have any adverse effect on initial vancomycin levels?

Urine output	<500ml	500ml-1L	>1L	Unknown
Subtherapeutic levels (n=17)*	1	2	13	1
High levels (n=8)*	1	1	5	1
In range (n=22)	2	8	10	1
*P>0.05				

- Do subtherapeutic vancomycin levels adversely influence infection outcome?

Infection consequence	Relapse infection	Repeat infection
1 Subtherapeutic level^	2	0
>1 Subtherapeutic level^	1	1
Therapeutic or high levels	6	11
^P>0.05		

There is no consensus around optimum IP vancomycin dosing or the role of interpreting trough levels. Some studies show a correlation with higher vancomycin levels and lower infection relapse rates.[1] Even though there is no correlation seen in the data collected, improvement in adherence to local prescribing guidelines is required to ensure patients are treated appropriately.
The PD MDT has incorporated closer working in peritonitis management, which includes pharmacist prescribing, electronic prescription records and nurse communication, to ensure patients are receiving doses and levels at the appropriate time. Changing our current guidelines isn't supported by the above data, as there seems to be no correlation with urine outputs and subtherapeutic levels. However, an MDT approach, including individualisation of dosing could provide better management of therapy and clearer evidence for future guideline review.

1. Li PK-T, Chow KM et al. ISPD peritonitis guideline recommendations. Peritoneal Dialysis International. 2022;42(2):110-153.

Monday 5th June 16:00 – 17:00

Track G1 – Pharmacology, Medicines Management including Anaemia & MDB 1

Poster: 199
Submission: 240

The effect of supplementary prescribing by a dietitian at a haemodialysis unit.

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Introduction: Historically, renal consultants had the sole responsibility for the medicines management of chronic kidney disease mineral and bone disorders (CKD MBD) at dialysis units in the UK. Following a change in legislation, dietitians have been able to supplementary prescribe after completing a prescribing course. Supplementary prescribing requires the patient, consultant and dietitian to agree and complete a clinical management plan (CMP) prior to prescribing. With support and guidance from the renal consultant at a haemodialysis unit, dietetic supplementary prescribing was introduced for the management of CKD MBD in April 2021.

Methods: The impact of introducing dietetic supplementary prescribing at one haemodialysis unit was analysed. Phosphate, calcium and parathyroid hormone (PTH) levels were analysed for all patients that were prescribed phosphate binders, alfacalcidol or cinacalcet by the supplementary prescriber between April 2021 and April 2022. Patients who commenced Etelcalcitide, had a parathyroidectomy, had a kidney transplant or had a medication review with the consultant during the data collection phase were excluded.

Results: Following exclusions, 25 patients' bone parameters were evaluated. This equated to around a quarter of the dialysis unit size at the time. The dietitian prescribed phosphate binders and alfacalcidol in equal proportions.

Hyperphosphataemia

90% of patients' phosphate levels improved following supplementary prescribing. Mean reduction in phosphate levels was 0.35mmol/L 1 month post intervention. This reduced further to 0.49mmol/L 3 months post intervention compared to baseline.

Hypocalcaemia

All patients' corrected calcium levels were within the normal range (2.15-2.55mmol/L) following initiation of supplementary prescribing. These remained in range 3 months post intervention. Mean increase in corrected calcium levels were 0.31mmol/L and 0.36mmol/L 1 month and 3 months post intervention respectively compared to baseline.

Hypercalcaemia

100% of patients' corrected calcium levels improved following supplementary prescribing. Mean reduction of corrected calcium levels were 0.15 and 0.14 respectively 1 month and 3 months following supplementary prescribing. 1 patient's corrected calcium levels remained high at month 3 so they required subsequent reviews by the supplementary prescriber post month 3.

Hyperparathyroidism

Mean reduction in PTH levels was 664mmol/L at month 3 and 780mmol/L at month 6 when compared to baseline.

Overall bone parameters

The impact on the overall bone parameters at the dialysis unit were small. A large proportion of patients with deranged levels did not have a CMP due to logistical difficulties and therefore could not have medications altered by the supplementary prescriber.

	Before commencing supplementary prescribing (April 2021 n=100)	1 year after commencing supplementary prescribing (April 2022 n=111)
Hyperphosphataemia (≥2.0mmol/L)	26%	22% (46% of these patients did not have a CMP)
Deranged calcium (<2.15 & > 2.55mmol/L)	17%	12% (42% of these patients did not have a CMP)
Hyperparathyroidism (>600mmol/L)	30%	24% (52% of these patients did not have a CMP)

Discussion**:** 90-100% of patients who were reviewed by the dietetic supplementary prescriber had improvements in their bone parameters. These results suggest that dietitians are able to manage CKD MBD medications alongside renal consultants. In the future, eliminating the need for CMPs by allowing independent dietetic prescribing may lead to improved results.

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Track G2 – Pharmacology, Medicines Management including Anaemia & MDB 2

Poster: 200
Submission: 335

Optimisation of Vancomycin therapy in in-centre haemodialysis patients

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[2]University Hospitals of Derby and Burton NHS Foundation Trust University Hospitals of Derby and Burton NHS Foundation Trust, Derby

Optimisation of Vancomycin therapy is crucial for haemodialysis (HD) patients. Patients often experience sub – therapeutic therapy leading to prolonged courses of antibiotics and recurrence of clinical problems. Causes considered were twofold: inadequate dosing by prescribers and poor concordance with therapy concordance (due to prolonged time on dialysis and an excess of fluid from Vancomycin administration). A trial of a new dosing protocol responding to pre-dialysis levels was implemented with the aim of increasing the number of patients in the therapeutic range.

128 Vancomycin levels were recorded from the old and new protocol. Vancomycin dosing was increased by a 13-20% across all ranges to increase subsequent levels. Vancomycin was administrated at a faster rate to improve patient acceptability, as patients often expressed a lack of interest in staying longer than needed after their dialysis. The Vancomycin was also given in a smaller volume.

The new trial protocol showed more levels in the 15-20mg/L blood level range. Overall, 56% of pre-Vancomycin levels were therapeutic with the new protocol compared to 44% of doses that were therapeutic levels on the old protocol. Vancomycin was given at a maximum concentration of 10mg/ml. 100% of patients stayed for doses with the new administration rate and volume. Data on patient concordance was not collected formally for the old protocol, but anecdotal evidence suggested that it was less than 100%.

The findings of this study showed that giving HD patients a higher dose (with appropriate monitoring) achieved greater therapeutic response. We anticipate optimised therapy will ensure patients' infections are treated properly and potentially reduce the risk of repeated courses and concerns about res

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Track G2 – Pharmacology, Medicines Management including Anaemia & MDB 2

Poster: 201
Submission: 350

Protocolised Anaemia Management for In-Centre Haemodialysis Patients: A Prospective Single Centre Audit

Dr Mohana Das[1], Dr Mohammed Osman[2], Mr Dale Henderson[3], Dr Neil Hoye[1]

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[3]Diaverum, Darlington

Introduction: Anaemia is a common complication of CKD, associated with left ventricular dysfunction and heart failure, reduced exercise tolerance and quality of life. The use of iron therapies and erythropoiesis-stimulating agents has improved care for patients with renal anaemia. Despite this, adoption of national treatment guidelines incorporating recent high-quality trial data into routine clinical practice has been suboptimal with considerable inter-centre variation.

Our renal unit was identified as a national outlier for in-centre haemodialysis (ICHD) anaemia performance following publication of the 24th UK Renal Registry report. A local audit cycle to understand the underpinnings of this variation was undertaken with a further aim of assessing whether protocolised ICHD anaemia management could improve prospective anaemia performance.

Methods : An audit incorporating the current NICE-accredited UK Renal Association guideline standards was conducted in June 2022. Twelve retrospective months of satellite ICHD patient anaemia management data were obtained from a computer data search. After data analysis from the 65 identified patients, we implemented an anaemia management protocol before prospectively re-auditing the effect of this intervention over a subsequent four-month period.

Results: Sixty-seven patients were identified during the re-audit, 57 of whom also had data in the original data analysis period. After adoption of protocolised care, significantly more patients (27% versus 8%, $p < 0.05$ by chi-squared testing) maintained their haemoglobin within target range (100 – 120 g/L). The mean monthly darbepoetin alfa dose fell from 105mcg to 90mcg (5262 IU/week to 4500 IU/week), a 14% reduction with an estimated cost saving of £5902/month. The mean monthly dose of ferric derisomaltose was 319mg post-intervention from a baseline of 295mg, translating to a modest additional monthly cost of £284. Interestingly, 75% of patients were receiving ferric derisomaltose following protocolised care, whereas 94% were on therapy prior to the intervention. Despite this, mean ferritin levels increased from 546 µg/L to 640 µg/L.

Discussion: Historically, haemodialysis quality assurance takes place on a monthly basis, albeit with a multidisciplinary approach at our centre. Protocolising anaemia management is appealing, not only to reduce clinical variation and clinician time, but also drug expenditure. Our audit cycle (admittedly limited, amongst other things, by a small, single centre design with non-identical patient cohorts), suggests protocolised ICHD anaemia management can be beneficial for patient care. Despite a fall in

mean monthly darbepoetin alfa dose and the number of patients receiving ferric derisomaltose, target haemoglobin levels were maintained in a significantly greater proportion of patients, and mean ferritin levels increased. This suggests protocolised ICHD anaemia management care can improve both iron prescribing and subsequent diligent darbepoetin alfa therapy. The potential cost savings (conservatively calculated at over £100,000 annually in a single satellite unit) suggest there may be substantial financial as well as clinical benefits from adopting such a change. Further work is required to assess whether more meaningful clinical endpoints (including major cardiovascular events and arteriovenous access thrombosis rates) can also be influenced by such protocolised therapy.

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Track G2 – Pharmacology, Medicines Management including Anaemia & MDB 2

Poster: 202
Submission: 358

Dietitian prescribing practice in CKD: does it align with person-centred care?

Mrs Nicki Ruddock[1,2], Professor Nicola Thomas[2], Dr Sharon Rees[2]

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Introduction: Dietitian prescribing became a reality in 2016 when legislation changed. However, it has not yet been fully evaluated. Existing literature comprises case studies and an opinion piece. In kidney care, dietitians are well-placed to use this new role to support Chronic Kidney Disease – Mineral Bone Disorder (CKD-MBD) management amongst other clinical aspects of care. Person-centred care has been identified as a priority within CKD management by both care providers (NHS England, 2021) and patients (Kidney Care UK and The Renal Association, 2020). Therefore, as a first step, exploring the person-centredness of dietitians' prescribing practice will provide insight into the potential for person-centred outcomes and experiences to be achieved.

Method: A survey was designed to capture information about characteristics of kidney dietitian prescribers and their practice. The Person-Centred Practice Inventory – Staff (PCPI-S) (Slater et al, 2017), underpinned by the Person-Centred Practice Framework (PCPF), was incorporated (with permission) to evaluate three core domains necessary to support person-centred practice: pre-requisites (attributes of the healthcare professional), care environment (context in which care is delivered) and person-centred processes (activities required to deliver care).

The PCPI-S captures opinions on 59 statements within 17 constructs to explore the 3 core domains: strongly disagree = 1, disagree = 2, neutral = 3, agree = 4 and strongly agree = 5. The survey was distributed via the BDA RNG and survey responses were collated and analysed. Additionally, a scoping exercise was undertaken to identify how many prescribing kidney dietitians there are in the UK to be able to contextualise the findings.

Results: There are 19 qualified kidney dietitian prescribers in the UK, but five are not currently using their prescribing qualification: one newly qualified, two moved into roles not requiring prescribing, one on a career break and one on maternity leave.

10 surveys were completed and returned (10/14 those eligible = 71%).

Renal dietitian prescribers are working as band 6, band 7 and band 8a dietitians. The mean length of time working with people with CKD is 14.7 years. The majority are prescribing ≤ 5 items per month and phosphate binders and active vitamin D are the most commonly prescribed medications.

The PCPI-S shows the mean scores for the five constructs situated in the pre-requisites domain range between 4.1 – 4.6. Scores are lower within the seven constructs of the care environment domain with

scores ranging from 3.6 – 4.3. The person-centred processes scores across five constructs range from 4.2 – 4.6.

Conclusions: Only a small number of renal dietitians are prescribing in the UK: these dietitians have many years of experience working with people with CKD. CKD-MBD management is the clinical area where most prescribing is taking place. Dietitian prescribers are confident in their professional attributes and the person-centred processes required to support person-centred practice. However, their prescribing role within the wider care environment is less well-established. This, as well as the patients' perspectives on the person-centredness of dietician prescribing, will require further research.

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Track G2 – Pharmacology, Medicines Management including Anaemia & MDB 2

Poster: 203
Submission: 408

Predicting a new future with HIF-PHI: Analysis of the IV iron requirements for the management of Anaemia of CKD.

Miss Megan Kupa[1], Mr Lee White[2], Miss Ella Hartigan[1], Mr Aled Richards[2], Mr Chris Brown[2], Professor James Birchall[1], Dr William Ford[1], Mr Owain Brooks[2]

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[2]Swansea Bay University Healthboard, Swansea

Introduction**:** Anaemia of chronic kidney disease (ACKD) is characterised as a low level of haemoglobin (Hb) in the blood. Current first-line treatment options for ACKD are injectable erythropoiesis-stimulating agents (ESAs) that stimulate the bone marrow to produce red blood cells. ESAs can cause a transient increase in demand for iron which needs to be intravenously (IV) administered in a clinical setting requiring clinic resources and increased travelling for the patients. NICE suggests a high-dose-low-frequency (HDLF) approach to IV iron, in patients not on dialysis, which should limit this impact but is not always implemented. Roxadustat, a hypoxia-inducible factor propyl hydroxylase inhibitor (HIF-PHI), has recently been approved as an oral treatment option for managing ACKD in non-dialysed CKD patients that can reduce the IV iron requirements associated with ESA therapies. This study aims to investigate the existing clinical practice relating to administration of ESA therapies and associated iron requirements to both review current clinical management of these patients and provide a baseline to compare against the new HIF-PHI therapies as they begin to be used in patients.

Methods**:** This retrospective, longitudinal cohort study examined clinical data from ACKD patients starting ESA treatment between 01/01/2019 and 31/12/2020. Data from 492 non-dialysis patients treated under the South West Wales Renal Service was analysed for baseline demographics, ESA dosing, Hb response and iron requirements 12 months prior to and post-commencement of ESA therapy.

Results**:** The mean Hb of patients commencing ESA therapy increased from 90.1g/L (t0) to 111.3g/L. 93.4% of these patients achieved Hb levels within the target range of 100-120g/L with this taking a mean of 51 days (range 1-586). 185 patients (38.2%) received IV iron within 12 months of commencing ESA, an increase of 52.4% in comparison to pre-ESA requirements. In the 12 months following ESA commencement, IV iron requirements were provided for with either HDLF (defined as ≥ 500mg[1]) or low-dose high frequency (LDHF). The mean cumulative iron requirement was 691mg, given over an average of 1.6 infusions. 29.9% of HDLF vs 48.3% of LDHF required a second infusion. Patients travelled an average of 27.9 miles (range 1.8 – 93.2) to local satellite centres to receive IV iron.

Discussion**:** Clinical trial evidence[2] has shown half the number patients on HIF-PHI require IV iron compared to ESA, and of those IV iron doses are halved. These “real world” sample data allow for comparison with clinical trial data to model the impact of service provision using HIF-PHI. This requires consideration not only of clinical outcome and drug costs but also the associated financial and patient experience costs due to the requirements for in-centre IV iron.

1. Liu L, Cheng H, et al. High-dose versus low-dose iron sucrose in individuals undergoing maintenance haemodialysis: a retrospective study. BMC Nephrol. 2021 Oct 27;22(1):350. doi: 10.1186/s12882-021-02570-0
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Monday 5th June 16:00 – 17:00

Track G2 – Pharmacology, Medicines Management including Anaemia & MDB 2

Poster: 204
Submission: 417

Cholecalciferol supplementation in a large cohort of peritoneal dialysis patients with Vitamin D deficiency and its effect on management of secondary hyperparathyroidism.

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University Hopsitals Birmingham NHS foundation trust, Birmingham

Introduction: A large proportion of patients with chronic kidney disease (CKD) are vitamin D deficient (plasma 25-hydroxyvitamin D (25(OH)D) < 25 or 30 nmol/L) and this contributes to the development of CKD–mineral bone disease (CKD–MBD). We know that Vitamin D levels < 30nmol/L poses a major risk factor for the presence of severe secondary hyperparathyroidism. Vitamin D is now suggested as first-line therapy to treat SHPT with low 25 (OH) D insufficiency. There aren't yet evidence-base comprehensive guidelines for the management of vitamin D in relation to CKD–MBD in dialysis patients.

Methods: We introduced a protocol to guide the management of secondary hyperparathyroidism and Vitamin D deficiency /insufficiency in patients on peritoneal dialysis. We monitored the effects of Vitamin D replacement on PTH, calcium and avoidance of calcimimetics over 24 month period.

Patient with Vitamin D deficiency were supplemented with:

Cholecalciferol 50,000 IU weekly for 6 weeks followed by maintenance dose of 800IU daily.

Results: We identified a large number of patients who had Vitamin D insufficiency in >80 % of cases and Vitamin D deficiency in 50% of the cases). There was adequate Vitamin D replacement in all cases achieving levels >70 nmol/L. No cases of hypercalcemia and hypervitaminosis were identified. There was a modest improvement in PTH levels and not a clinically significant decrease in prescribing calicimemtics or secondary biochemical outcomes. There were no cases of surgical parathyroidectomy.

Discussion: We require large RCT's with clinically significant endpoints (fracture, parathyroidectomy, death) to assess the efficacy of vitamin D compounds for CKD and dialysis patients.

Monday 5th June 16:00 – 17:00

Track G2 – Pharmacology, Medicines Management including Anaemia & MDB 2

Poster: 205
Submission: 478

Time for dietitians to be Independent Prescribers? – A survey investigating the perspectives of UK kidney dietitians

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[3]University Hospitals of Leicester NHS Trust, Leicester

Introduction: Non-medical prescribing (NMP) involves healthcare professions other than doctors or dentists and is safe and as effective as medical prescribing (Weeks et al., 2016). Benefits of NMP include reduced delays for prescriptions, increased patient satisfaction and less pressure on the medical workforce.

Whilst dietitians are permitted to practice as supplementary prescribers (SPs), other professions, including physiotherapists, nurses, podiatrists, pharmacists, paramedics and therapeutic radiographers, work as independent prescribers (IPs). Supplementary prescribing requires an individualised clinical management plan (CMP) for each patient, which involves onerous administration, and may impact the implementation of dietitian prescribing (Bissell et al. 2008; Tully et al. 2007).

The interest in independent prescribing amongst kidney dietitians, and the role, scope and potential patient impact has not been studied.

Methods: An anonymised survey was designed to capture i) limitations of supplementary prescribing ii) interest in undertaking NMP qualification if dietitians were IPs iii) products dietitians would prescribe iv) number of patients that could benefit and v) perceived NHS efficiency benefits. The survey was distributed to kidney dietitians via the BDA Renal Nutrition Group (RNG) in January 2023.

Results: 109 dietitians (36% RNG members) responded; 90 surveys were fully completed. 11 of 90 are currently SPs and all 11 (100%) said the limitations of supplementary prescribing limit the number of patients they prescribe for; 4 of 11 (40%) are not prescribing for any patients due to current job roles. 2 of 11 (18%) are prescribing for over 100 patients, and 5 in 11 prescribe for 5-30 patients annually.

49 of the remaining 79 (62%) stated they would undertake NMP if dietitians were able to be IPs. 48 of 79 (61%) said independent prescribing would result in significant improvements in NHS efficiency around prescribing. If able to become IPs, dietitians reported they could prescribe for 15 to 520 patients per year (mean 177, median 100).

Products that dietitians already prescribe as SPs, or would prescribe as IPs include: phosphate binders, vitamins (for regular supplementation and for managing refeeding risk), active vitamin D, calcimimetics,

intradialytic parenteral nutrition, potassium binders, oral nutritional supplements, enteral feeds, laxatives and fibre supplements.

Discussion: Extended roles for Allied Health Professionals (AHPs) are part of the NHS Long Term Plan and AHP Strategy for England. Independent prescribing would allow the workforce potential of dietitians to be better met. Kidney dietitians are well placed to use prescribing to support the clinical management of patients. One key identified area is mineral bone disorders, a condition that often requires multiple medications, and regular dose adjustments. The limitations around supplementary prescribing impact on its implementation in practice; it restricts the number of patients that dietitians can prescribe for and deters dietitians from undertaking the prescribing qualification. There is an evident role for dietitian IPs in kidney care and this could result in benefits to patients as well as increased NHS efficiency.

Monday 5th June 16:00 – 17:00

Track H1 – Translational & Laboratory Science 1

Poster: 206
Submission: 180

Tissue-resident B cells determine susceptibility to urinary tract infection by orchestrating macrophage polarisation

Dr Ondrej Suchanek[1,2,3], Dr John Ferdinand[1,2], Dr Zewen K. Tuong[1,2], Dr Sathi Wijeyesinghe[4], Dr Anita Chandra[5], Dr Ann-Katrin Clauder[6], Dr Larissa N. Almeida[6], Dr Simon Clare[7], Dr Katherine Harcourt[7], Mr Christopher J. Ward[1,2], Dr Rachael Bashford-Rogers[8], Dr Trevor Lawley[7], Prof Rudolf A. Manz[6], Prof Klaus Okkenhaug[5], Prof David Masopust[4], Prof Menna R. Clatworthy[1,2,7]

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[4]Department of Microbiology and Immunology, Centre for Immunology, University of Minnesota, Minnesota.
[5]Department of Pathology, University of Cambridge, Cambridge.
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[7]Wellcome Sanger Institute, Wellcome Genome Campus, Hinxton.
[8]Wellcome Trust Centre for Human Genetics, University of Oxford, Oxford

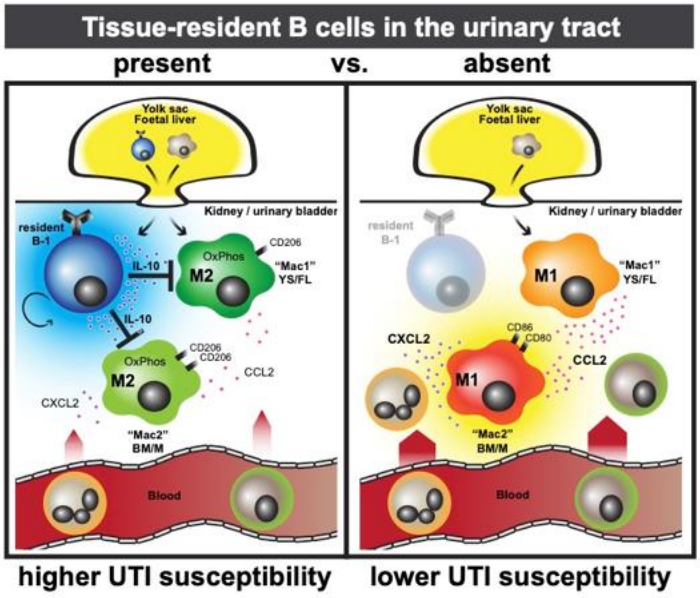
Background**:** Urinary tract infection (UTI) is an important clinical problem. More than half of women and 1 in 10 men will be affected during their lifetime. Many of these affect the lower urinary tract but recurrent pyelonephritis can lead to scarring and chronic kidney disease. There is an increasing appreciation that tissue-resident immune cells, such as macrophages, play an important role in defence against infection, but only little is known about B lymphocytes in this context. Here we sought to address the question of whether B cells reside in the kidney and bladder in homeostasis and to determine their phenotype and contribution to local organ immunity.

Methods and Results: Using intravenous labelling and parabiosis, we identified a population of bona-fide self-renewing, tissue-resident B cells that included non-naïve and innate-like $CD5^+$ B-1 cells, in murine kidneys and urinary bladder (but also in liver and lung). The size and phenotype of this B cell subset was influenced by genetic background, age, and microbiome, with an expanded population evident after co-housing with pet-store mice. Although kidney B cells had less diverse Igh repertoire compared to blood, their seeding was largely independent of their B-cell receptor specificity. In human kidneys we found a similar enrichment for non-naïve B cells compared to blood and spleen.

Using two strains of genetically modified mice with higher ($PI3K\delta^{E1020K-B}$) or lower (μMT^-) numbers of tissue-resident B cells, we tested the function of these cells during UTI. Surprisingly, the number of tissue-resident B cells inversely correlated with bacterial clearance. We found that these B cells were spatially co-localised with kidney macrophages and skewed their polarization towards an anti-inflammatory M2 phenotype, leading to reduced anti-microbial responses. This effect was, at least in part, driven via IL-10.

Conclusion: In conclusion, our data identify a critical role for tissue-resident B cells in modulating local immunity in the urinary tract, determining the inflammatory ‘set-point’ of resident and recruited myeloid cells, with important clinical implications for the use of B-cell depleting therapies and conditions such as infection, transplant rejection, fibrosis or autoimmunity.

Graphical Abstract:



Monday 5th June 16:00 – 17:00

Track H1 – Translational & Laboratory Science 1

Poster: 207
Submission: 189

Assessing the utility of Sonoclot to assess Thrombotic Risk in Proteinuric Pregnancies

Dr Sayra Monir, Dr Matt Hall

Nottingham University Hospitals, Nottingham

Introduction: Consensus guidelines on the management of kidney disease in pregnancy recommend low molecular weight heparin (LMWH) prophylaxis is offered to women with nephrotic syndrome and considered in women with sub-nephrotic proteinuria. However, there is a lack of international agreement on appropriate thresholds and no evidence to identify women at greatest risk of venous thromboembolism (VTE) attributable to proteinuria during pregnancy. We designed a pilot study to evaluate the feasibility and utility of using the Sonoclot Analyser System to generate thrombophilic data within a renal-obstetric clinic. Sonoclot assesses viscoelastic properties of blood samples during clotting to generate activated clotting time, clot rate and platelet function.

Methods: Patients attending the combined renal-obstetric clinic at our centre were invited to participate based on inclusion criteria (age ≥ 18 years, confirmed pregnancy, pre-pregnancy CKD stage G1 to G5) and exclusion criteria (no known primary thrombophilia, treatment with LMWH in 24 hours prior to consent, suspected or confirmed (superimposed) pre-eclampsia). Demographic, pregnancy-specific and renal-specific clinical and biochemical data were obtained from routine clinical care. An additional whole blood sample was obtained for immediate Sonoclot analysis (within 2 minutes of phlebotomy) and a citrated sample stored for analysis 12 to 36 hours later. Sonoclot analyses were performed according to manufacturer's instructions using gbACT+ test kits. Fresh samples and citrated samples (after addition of 40µl 0.25M calcium chloride per 1ml blood) were analysed in duplicate with 330µl of blood per test. Participants were invited to donate a sample in each pregnancy trimester and at 6 week post-partum visit if determined appropriate as part of standard care. The primary outcome for this feasibility project was proportion of participants with complete data per visit. The primary data outcome was correlation of clot rate to log[urine protein:creatinine ratio (PCR)]. Clot rate values between fresh and citrated samples were compared by Bland-Altman plot.

Results: Thirteen participants attended 22 study visits at the time of this analysis. Demographic and standard laboratory test data were obtained from all patients at all visits.

Sonoclot data from fresh blood samples was obtained from 15 of 22 visits (68%). Missing data were due to incomplete clot traces caused by insufficient or clotted samples. Sonoclot data from citrated samples were obtained from 20 of 22 visits (91%). Missing data were due to incomplete reversal of citrate with calcium in early samples leading to an adjustment in the sample preparation protocol.

Univariate analysis did not identify a significant correlation between clot rate and log[urine PCR] in fresh ($p=0.52$) or citrated ($p=0.84$) samples. Clot rate values significantly correlated between fresh and

citrated samples (Pearson r=0.586, p=0.035) without proportionate bias (p=0.692) suggesting validity in using citrated samples for future studies.

Discussion: It is feasible to collect and analyse fresh and citrated blood samples with Sonoclot within our renal-obstetric clinic. Analysis of citrated samples within 36 hours will allow consideration of a regional approach to patient participation and clarification of the utility of Sonoclot in evaluating thrombotic risk in proteinuric pregnancies.

Monday 5th June 16:00 – 17:00

Track H1 – Translational & Laboratory Science 1

Poster: 208
Submission: 214

Phenotypic Characterisation of Novel Immortalised Human Distal Convoluted Tubule Cells

Miss Chutong Zhong, Dr Alessandra Grillo, Dr Keith Siew, Dr Stephen Walsh

University College London, London

Introduction: The distal convoluted tubule (DCT) is responsible for fine-tuning the final excretion of sodium, potassium, calcium and magnesium in the urine. The study of rare monogenic diseases (namely Gordon and Gitelman syndromes) have highlighted the physiological importance of the DCT in blood pressure control. However, the most commonly used cellular models of this segment are either not truly kidney cells (e.g. studies have shown HEK293 are more likely of neuronal lineage) or of murine origin, and thus there is need for advanced human DCT (hDCT) models. Recently, 4 immortalised hDCT models isolated from human urine hav been created by Dr Tetsuro Kusaba, but have not been biochemically or functionally characterized.

Method: Four immortalised hDCT cell lines gifted from Dr Kusaba (Kyoto Prefectural University of Medicine, Japan) were cultured as previously described (Ikeda et al., 2020). hDCT cells were used for analysis at 80-90% confluency and lysed either with TRI reagent for high quality RNA or in the presence phosphatase and protease inhibitors for protein extraction. Western blot analysis and RT-qPCR analysis were performed on DCT-specific markers and markers of other segments for exclusion purpose, including NCC (SLC12A3), SPAK, CAB39/ MO25 and parvalbumin.

Result: Western blot analysis on total cellular lysates by using NCC antibody detected three different states of NCC in all four hDCT cell lines. qPCR detected the presence of NCC mRNA at Cq 29.57-32.18 across all four samples (Human kidney positive control Cq 27, and HEK293 negative control Cq 45). Western blot analysis on membrane protein lysates of hDCT1 and hDCT3 detected SPAK and CAB39/MO25 in cell lines. Interestingly, RT-qPCR did not detect parvalbumin expression in all of the four hDCT cell lines, which indicates that four cell lines may represent different portion of DCT, as parvalbumin is distributed in DCT1 in human.

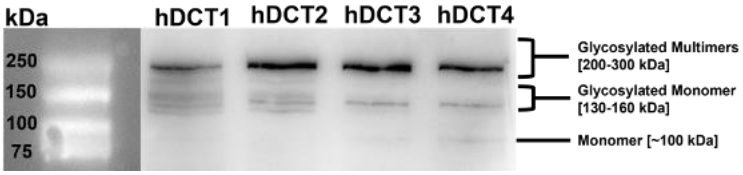


Figure 1: Expression of NCC in four hDCT cell lines gifted from Dr Kusaba. Protein extractions were subjected to immunoblot analysis with the NCC 906-925 antibody.

	hDCT1	hDCT2	hDCT3	hDCT4	Positive control
Parvalbumin	33.2	--	30.88	--	31.41
human β-actin	19.21	13.31	12.93	12.50	20.14

Table 1: Expression of parvalbumin in four hDCT cell lines gifted from Dr Kusaba. hDCT2 and hDCT4 do not express parvalbumin. RNA isolated from a healthy human adult kidney tissue was used as positive control.

Discussion: The preliminary western blot and qPCR results confirmed NCC expression in all four hDCT cell lines and the position of bands agreed with previous studies (de Jong, Willems, Mooren, et al., 2003; Zhang et al., 2015a). Further experiments will be performed using other key markers expressed in DCT, including TRPM6 and parvalbumin, Calbindin, KS-WNK1, WNK4, human isoforms of SPAK and NCC. These cell lines could be the first validated hDCT cellular models which reflect the human DCT physiology and can be adapted to 3D cell culture system for functional experiments

Monday 5th June 16:00 – 17:00

Track H1 – Translational & Laboratory Science 1

Poster: 209
Submission: 230

Targeted Isolation of Urine-derived Renal Tubule Cells for Personlised Medicine

Miss Chutong Zhong, Dr Alessandra Grillo, Dr Keith Siew, Dr Stephen Walsh

University College London, London

Introduction: The kidney regulates blood pressure and electrolyte homeostasis through the complex actions of the nephron; a heterogenous structure made up of 14+ segments. Rare monogenic tubular diseases are often characterised by impairment of specific tubular segments. Isolation and characterisation of patient-specific urine-derived renal tubular epithelial cells (uRTEC) from disease-relevant segments can assist diagnosis and treatment planning.

Method: Freshly voided urine samples collected from healthy volunteer and patients from tubular disease clinics were pelleted by centrifugation at 400 RCF for 10min at RT, and the cell pellet was washed with a 50:50 mixture of DMEM:F12 (supplemented with 10% FBS, 100U/ml penicillin, 100µg/ml streptomycin, 1X insulin-transferrin-selenium, 2.5µg/ml nicotinamide, 500µg/ml hydrocortisone). Targeted isolation and enrichment of segment-specific cells was performed using an magnetic beads conjugated to target-specific antibodies/lectins. Cells were then seeded to either 6-well or 12-well plate. Primary urine-derived cells were either fixed using 4% w/v formaldehyde-PBS for 15min at RT at 60% confluency, or lysed with TRI reagent at 90% confluency for RNA isolation. Cell types were validated by staining with fluorescently-tagged marker antibodies/lectins and qPCR of segment specific mRNAs.

Result: Primary urinary cells successfully cultured from patients' urine samples with different morphologies presented and can be maintained to the third passage. As can be seen in the figure, (unenriched) cells from several patients stained positively with Dolichos Biflorus Agglutinin(DBA) indicating the presence of distal convoluted tubule cells. These was validated by confirmation of expression of NCC (and absence of NKCC2, AQP2, Megalin).

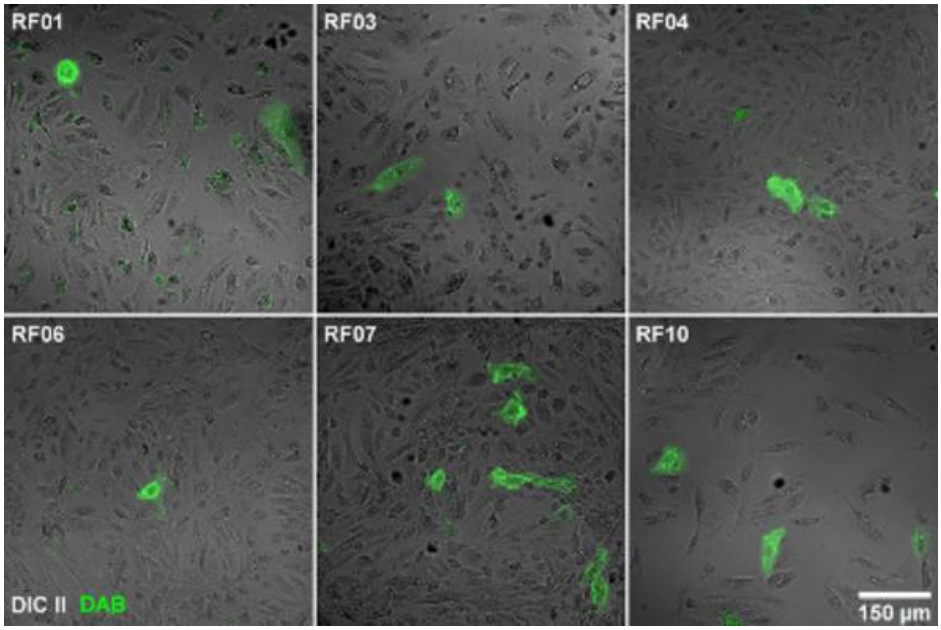


Figure 1: DBA-positive cells were identified in uRTEC cultured from different patients' urines.

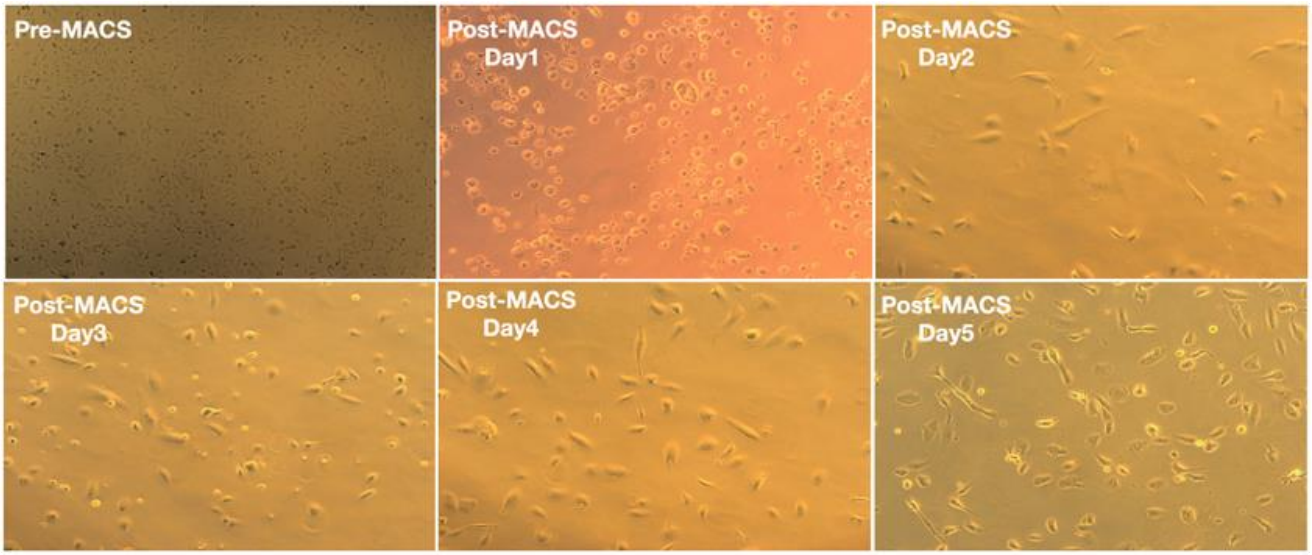


Figure 2: Pre/Post-MACS isolation of patients' primary urinary cells.

Discussion: uRTEC can be routinely isolated from patient's urine, targeted for enrichment, and successfully subcultured for several passages. Future work, would aim to immortalise and utilise these cells in 3D "Organ-on-a-Chip" systems, where we could potentially artificially reconstruct patient's tubules from primary urinary cells and conduct individualised pharmacological experiments to optimize treatments, thereby bringing true personalised medicine to nephrology.

Monday 5th June 16:00 – 17:00

Track H1 – Translational & Laboratory Science 1

Poster: 210
Submission: 238

Molecular dynamic studies of the central pore of aquaporin 1

Dr Aled Lloyd, Dr Karl Austin-Muttitt, Dr Jonathan Mullins

Swansea University, Swansea

Introduction: Aquaporins are tetrameric proteins. Each protein contains a pore and the tetrameric arrangement forms a larger central pore1. There is evidence from studies of the wide variety of plant aquaporins that the central pore may be involved in the transport of gases such as CO2, though this has not been confirmed for the human forms of aquaporin2. The presence of a hydrocarbon solvent molecule in the central pore in a crystal structure led to the alternative hypothesis that small lipids could be transported through this pore.

Methods: The scaffold used was the published crystal structure PDB 1J4N3. Threading modelling using the I-TASSER server and suite was undertaken to obtain monomeric structures of human AQP1. Oligomerisation of the monomeric structure obtained was performed by Homology modelling using MODELLER.

The input file for the molecular dynamics simulation in GROMACS was generated using CHARMM-GUI. POPC was chosen to represent the phospholipid bilayer. MD systems were assembled using the multicomponent assembler of CHARMM-GUI with the AQP1 tetramer embedded in a membrane with either pure liquid CO2 or octane as a solvent. The GROMACS simulation was run on a GPU in Google co-labs. VMD software version 1.9.4a53 was used to visualise the output of the molecular dynamics simulation.

Results: Both CO2 and octane were entirely excluded from the central pore of AQP1 for the duration of a 1 nanosecond MD simulation.

Discussion: The inner surface of the central pore of the AQP1 tetramer is non-polar or hydrophobic in character. The main amino acids present are LEU, LYS, VAL and GLY. While there is some published evidence supporting a role for CO2 transport through aquaporins we have been unable find support for this in MD simulations. Our findings regarding the transport of small gas molecules are in keeping with publications that have found gas transport with human AQP systems occurs at a similar rate to that expected through a membrane alone2.

The presence of a short chain hydrocarbon solvent in the central pore of a crystal AQP led us to test the hypothesis that small lipids may be transported through the pore. No evidence to support this hypothesis was identified in our simulation.

Conclusion: We have found no evidence that CO2 or octane are transported through the central pore of human AQP1

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Monday 5th June 16:00 – 17:00

Track H1 – Translational & Laboratory Science 1

Poster: 211
Submission: 252

Investigating use of the biodesix microsampling device for longitudinal biomarker studies in inflammatory kidney diseases and renal transplantation

Dr Kashif Anwari[1,2], Dr Louise Oni[3,4], Professor Alan Salama[1,2]

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[4]Alder Hey Children's Hospital, Liverpool

Introduction: There has been an increase in the availability of devices allowing home testing of urine, blood and most recently nasopharyngeal aspirates 1. The biodesix is a lateral flow microsampling device that has been validated in the performance of proteomics 2, and potentially could be used by renal patients at home to collect blood and urine, then sent by post for subsequent laboratory analysis. We investigated whether this device could be used to identify changes in patients with a) glomerulonephritis flares using urine (normalized CD-163) and blood (anti-PR3 antibody levels, serum-PR3 antigen levels) and b) renal transplant dysfunction (measuring donor specific antibodies, DSA), by comparing measurements with conventional methods of isolating serum and urine.

Methods: Following ethical approval and informed consent, blood or urine samples were obtained from healthy controls and patients with glomerulonephritis during disease flare and during remission, and in renal transplant patients with positive anti-HLA antibodies and calculated reaction frequency of >90%. 250uL of the sample was placed on the paper of a biodesix device and left to incubate at room temperature on a flat surface for between 5-10 days. The plasma component of the biodesix paper was treated in a standardized manner, reconstituted with 500uL of PBS, vortexed for 5 minutes and then centrifuged in 0.45um spin filters for 3 minutes. Finally, samples were analyzed using commercially available ELISA kits (CD-163, anti-PR3 antibody, serum-PR3 antigen) and via Luminex (DSA). Biodesix samples for all patients were compared with centrifuged blood/urine.

Results: All patients with active glomerulonephritis (n=7) demonstrated raised normalized-CD163 levels with the biodesix device and were comparable with levels from standard urine isolation; although in 2 patients there was a variance between the samples, all were considered positive. Additionally, serum samples showed concordance in levels of PR3-antibody levels and serum-PR3 antigen levels (n=7). Luminex revealed almost identical HLA profiles for biodesix samples when compared with whole blood in transplant patients (n=4), although the absolute mean fluorescence intensity values differed and were predominantly lower for biodesix samples.

Discussion: We have demonstrated that the biodesix device can provide comparable data to standard urine/blood collection and can be used to identify glomerulonephritis flares and potentially the development of de novo DSAs. These devices provide numerous potential benefits including patient convenience, the ability to perform more frequent longitudinal monitoring with earlier detection of

abnormalities, and access to a wider patient cohort for biobanking. Further work to validate the biodesix device in these cohorts, particularly intra-patient variability, is currently being assessed.

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Monday 5th June 16:00 – 17:00

Track H1 – Translational & Laboratory Science 1

Poster: 212
Submission: 340

Complications of percutaneous kidney biopsy and pre-procedure risk assessment.

Dr Pooja Banerjee, Dr Bhrigu Sood

St Helier's Hospital, London

Introduction: Kidney biopsy provides important diagnostic and prognostic information about kidney disease; however, frequency of complications has not been systematically studied. This often causes inconsistency in the information provided to patients during the consent process and also the safety practices like criteria used to consider admission to hospital for overnight observation post biopsy. This is a large dataset of renal biopsy complications presented along with comparison of the trend observed during the previous years.

Methods: Data was collected from local renal database where the biopsy procedure notes along with risks and complications reviews are logged regularly, over one year period from 1st October 2021 to 30th September 2022.

Results: 338 biopsies were performed over the aforesaid period, 280 were native kidney and 58 were transplant kidney biopsies. Commonest indication (52%) was rising creatinine/ AKI. eGFR was < 30 in 140 people who underwent kidney biopsy.

5% (17) had post biopsy bleed, of which frank haematuria occurred in 3.8% (13). 3 people (0.9%) needed blood transfusion, CT renal angiogram was done in 10 patients(2.9%), of whom 1 needed embolization (0.3%). There was no mortality and none required a nephrectomy.

Analysis of risk factors associated with risk of bleeding shown in previous studies, like hypertension, low haemoglobin and platelets, low eGFR, presence of AKI, kidney dimension, number of passes were not found to be significantly different in people who had bleeding complications. Apart from bleeding, other complications encountered were other organ obtained in biopsy sample (no adverse clinical consequence) (0.6%), specimen inadequacy (1.2%) and syncopal episodes (0.9%).

Complications	2021-22	2019	2018	2017	2012	2011	2010	2009
Non-diagnostic	1.2%	1.5%	4.0%	2.1%	-	5.4%	6.8%	10.0%
Macroscopic Haematuria	3.8%	5.7%	2.5%	3.5%	3.8%	3.6%	2.8%	3.0%
Blood transfusion	0.9%	2.2%	1.1%	1.4%	1.5%	2.2%	1.7%	5.0%
CT angiogram	2.9%	2.2%	2.1%	3.5%	0.7%	1.1%	1.0%	-

Embolisation	0.3%	0.8%	0.7%	1.4%	0.0%	0.7%	0.3%	0.4%
Surgery	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Death	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Discussion: Renal biopsy is relatively safe procedure with low risk of complications. In our cohort, the rate of minor/ major post biopsy bleeds appears to be lower compared to previous reports, probably due to high volume of biopsies performed, strict adherence to preprocedural check list and optimisation of risk factors pre biopsy.

Monday 5th June 16:00 – 17:00

Track H1 – Translational & Laboratory Science 1

Poster: 213
Submission: 343

Generation of a glomerular endothelial Eps Homology Domain (Ehd3)-Cre driver line and its application in glycocalyx exostosin (EXT)1 knockdown

Dr Raina Ramnath, Miss Eve Miller, Mrs Sevil Erarslan Catak, Dr Laura Carey, Dr Robert Pope, Dr Ruth Rollason, Prof Gavin Welsh, Dr Becky Foster, Prof Simon Satchell

University of Bristol, Bristol

Introduction: The endothelial glycocalyx is a key determinant of vascular function and studies have pointed to glycosaminoglycan heparan sulphate (HS) as having a particularly important role in diabetic kidney disease. HS loss has been associated with kidney damage in human pilot studies. HS chains are assembled in the endoplasmic reticulum by the actions of enzymes and exostosin (EXT) 1 is an essential and rate-limiting enzyme in HS chain polymerisation. Eps Homology Domain (Ehd3) is highly and selectively expressed in glomerular endothelial cells in the kidney in comparison to cells, making Ehd3 a key tool in specifically targeting the glomerular endothelium.

Aims:

1. To generate a glomerular endothelial-specific Ehd3-Cre driver line
2. To determine its application in glycocalyx EXT1 knockdown and assess its effect in normal kidney physiology.

Methods: An inducible Ehd3 knock-in mouse model, expressing Cre-recombinase (Ehd3-eGFPCreERT2), under the Ehd3 promoter, was generated by GenOway, to excise floxed genes specifically in glomerular endothelial cells. The Ehd3Cre driver profiling was performed by MRC Harwell. Male inherited CRE (Ehd3-eGFPCreERT2) was bred with female LacZ expressing reporter (Gt(ROSA)26Sortm1Sor) mouse and vice versa to assess the expression of Lac Z (blue) in tissues and organs. The Ehd3Cre line was then crossed with EXT1 floxed mice to generate experimental (EXT1KD) and littermate control (LMC) mice. These mice were injected intraperitoneally with 75 mg tamoxifen/kg body weight for five consecutive days to induce Cre recombination. After two weeks, mice were culled, FACS, lectin and immunofluorescence staining, and glomerular albumin permeability were used to fully characterise the mouse model.

Results: High expression of lac Z was observed in the kidney, cartilage and muscle but not in other vascularised organs such as the liver and heart. When CRE is inherited maternally, there was a slightly stronger but more widespread expression of LacZ. Hence, CRE has been bred through the male germline to generate experimental mice. There was no difference in body weight between EXT1KD mice and LMC. EXT1 gene expression was reduced by 88% ($p=0.03$) in FACS-glomerular endothelial cells in EXT1KD mice. No significant change in EXT1 expression was observed in non-endothelial renal cells, pointing to the selective knockdown of EXT1 in glomerular endothelial cells. Lectin LEL staining, known to bind to N-acetylglucosamine ([GlcNAc]1-3) found on HS chains, showed reduced glomerular endothelial glycocalyx

depth ($p<0.001$) and coverage ($p<0.001$) but no change in other microvasculature, e.g. cardiac endothelial glycocalyx, assessed by our novel confocal peak-to-peak analysis, confirming specificity to glomerular endothelial glycocalyx. Importantly, EXT1 knockdown led to a 34% ($p=0.03$) increase in glomerular capillary albumin permeability, assessed by our sensitive ex vivo glomerular albumin permeability assay.

Conclusions: We have successfully established an in vivo animal model that allows glomerular endothelial cells to be specifically targeted in the kidney. Our study shows for the first time that genetic deletion of EXT1 selectively in glomerular endothelial cells reduced endothelial glycocalyx depth and coverage and increased albumin leakage in the glomerular capillaries. Strategies targeted at restoring glomerular endothelial HS could be of potential therapy in diabetic kidney disease.

Monday 5th June 16:00 – 17:00

Track H2 – Translational & Laboratory Science 2

Poster: 214
Submission: 390

A novel pipeline for the tissue transformation, 3D imaging & visualisation in virtual space of optically cleared human renal tissue.

Dr Alessandra Grillo, Dr Keith Siew, Mr Zhongwang Li, Dr Stephen Walsh, Dr Viola D'Ambrosio

Department of Renal Medicine, University College London, London

Kidney biopsies have been the gold standard for diagnosis of pathological kidney diseases for almost 70 years. However, due to the small volume of tissue obtained from a needle biopsy traditional histopathological examinations are limited by the number of sections that can be obtained, with no two sections capturing the exact same histological features, sometimes necessitating multiple biopsies to be taken to ensure there is enough material to work with & that an accurate representation of the kidney histology is obtained. Developing a non-destructive 3D histopathology would allow for 60+ stains to be colocalised within their intact anatomical context, therefore reducing the risk of missing pathologies & need to re-biopsy patients.

Hunan renal biopsies & transplant rejected tissue routinely donated for research at the Royal Free Hospital were used for this study. These samples were fixed in formaldehyde, before undergoing tissue transformation following the SHIELD protocol (Park et al,. 2018. doi:10.1038/nbt.4281). These were then delipidated & stained using the LifeCavas Technolgies platforms, & optically cleared by refractive index matching prior to rapid 3D fluorescent lightsheet microscopy. These data were then preprocessed using imageJ & Imaris, before being imported into Syglass for 3D virtual reality visualisation using Oculus Quest 2 headsets.

In less than 24h were able to take fresh tissue, rapidly transform, multiplex stain and image immune cell infiltration (CD3), antibodies (IgA, IgM, IgG), complement (C1q), endothelium (CD31), Interstitium (Collagen IV), Nuclei (Histone H3), cytosol (Eosin) or tubule segment markers (Tomato Lectin -DCT/TAL marker (green); see figure). We were able to visualise these data with a histopathologist in virtual 3D space, where it was possible to toggle between the different markers, reorientate and resection the sample with ease. See virtual reality head-set demo at presentation.

Monday 5th June 16:00 – 17:00

Track H2 – Translational & Laboratory Science 2

Poster: 215
Submission: 436

Tubule-on-a-Chip: Culture and Analysis of a Novel Immortalised Human Distal Convoluted Tubule Cell Line in an Organ-on-a-Chip System

Miss Chutong Zhong, Dr Alessandra Grillo, Dr Keith Siew, Dr Stephen Walsh

University College London, London

Introduction: The kidney maintains blood pressure and electrolyte balance through the entwined actions of the tubular nephron segments. Recent investigations into rare monogenic diseases, specifically Gordon and Gitelman syndromes, occurring in the distal convoluted tubule (DCT) segment of the kidney, underline the critical physiological role of this segment in regulating blood pressure. Despite its crucial significance, no well-characterized and independently validated human DCT cell lines have been identified, with only a limited number of murine DCT cell lines available for in vitro studies. To date, none have been incorporated into the Organ-on-a-Chip (OOaC) system. This study aims to employ a novel, immortalized human DCT cell line into a multi-channel OOaC culture system, with the ultimate goal of creating the first human DCT Tubule-on-a-chip (TOaC).

Method: Immortalised hDCT cells characterised in our lab (gifted from Dr Kusaba, Kyoto Prefectural University of Medicine, Japan) were cultured as previously described (Ikeda et al., 2020). Cells were applied in a three-lane, micro-plate-based microfluidic chip platform OrganoPlate (Mimetas, Leiden, Netherland) following manufacture's protocol with modifications on the constitution of the extracellular matrix gel. Tubules formed in the OrganoPlate channel on an average of 5-7 days of culture. TOaCs were fixed using 4% w/v formaldehyde-PBS for 15min at room temperature or lysed with TRI reagent for RNA isolation. Segment specific marker expression was confirmed by staining with fluorescently tagged antibodies/lectins and qPCR.

Result :Barrier integrity assay in the OrganoPlate using fluorescent probes confirmed tight junctions between cells. qPCR of the cell lysate showed these TOaCs expressed the DCT-specific marker NCC (SLC12A3). NCC antibody showed positive staining localised to the apical membrane.

Discussion: These preliminary data demonstrate that this novel hDCT cell line is able to form tubule-like structures in the OrganoPlate. Given this cell line were derived from primary human DCT cells, we propose this TOaC model will better reflect in vivo human DCT physiology compared to iPSC-based systems. Tubular function will be validated by ion transport assays and pharmacological responses. In the future, we aim to create patient-specific TOaC from urinederived cells and conduct therapeutic optimisation, thereby bringing true personalised medicine to nephrology.

Monday 5th June 16:00 – 17:00

Track H2 – Translational & Laboratory Science 2

Poster: 216
Submission: 445

The development of a Sn-RNAseq workflow from renal biopsy tissue

Dr Tanya Smith[1], Dr Yueh-An Lu[1,2], Dr Alexa Wonnacott[3], Dr David Thomas[4], Dr Chantal Colmont[3], Dr Timothy Bowen[1,3], Professor Donald Fraser[1,3]

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Background: The global burden of kidney disease is 9.1% totalling approximately 700 million cases. A new technique called single nuclear RNA sequencing (snRNAseq), can detect individual cell populations vital to disease recovery and kidney repair. This technology has helped us to understand the complexity of cell populations and propose new targets for CKD treatments. To date, however, studies have largely focussed on in vivo models, and studies from human kidney have been limited by the inherent challenges. Here, we describe the development of a human tissue bank of core kidney biopsies to investigate the transcriptomic profile in renal diseases at a cellular level. This will allow is to identify cellular subpopulations, the transcriptomic signatures of disease and new therapeutic targets for a diverse CKD patient group. Our first experimental aims were to optimise sample acquisition workflow and nuclear isolation protocol employing human kidney tissue.

Methods: We iteratively developed a protocol for sample collection to ensure tissue retrieval, processing and storage optimal to best obtain nuclei from kidney tissue snap frozen in liquid nitrogen. RNA quality and nuclear appearances (at high power microscopy and by flow cytometry) were evaluated. Techniques were tested using nephrectomy material, prior to proceeding with native biopsy tissue using the 10x genomics protocol. Two tissue preservation methods, RNA later and snap-frozen, were evaluated by comparing the isolated nuclei yielded and the nuclear RNA quality.

Results: Firstly, we optimised nephrectomy sample size with a 14G automated core biopsy gun and fine needle aspirate (FNA) using a 22G spinal needle. The core biopsy gun universally gave more consistent samples and was preferred by our clinical staff. Nuclear isolation from various frozen and fresh kidney samples of post nephrectomy human kidney samples were tested to optimise the in vivo nuclear isolation protocol. Sample preservation by snap-freezing was selected as the method of choice because of higher nuclei yield, RNA integrity number (RIN) scores and fewer multiplets compared to samples preserved using other methods. In addition, we used varying loose and tight homogenisation and lysis times. Although the nuclei yield of these samples were adequate and all samples had acceptable nuclear RNA quality, a high percentage of the unlysed cells were noted. Therefore, the lysis time was extended until the percentage of unlysed cells were < 5%.

Discussion: We present various nuclear isolation protocols and tissue storage methods to maximise yield and RNA quality while minimising processing time and transcriptomic profile alterations. From our

experience the optimum method of tissue collection is via a core biopsy and preservation by snap-freezing. Significant warm ischaemic time produced poor nuclei quality and should be avoided. Here we describe an optimised protocol for sample collection, storage and nuclei isolation.

Monday 5th June 16:00 – 17:00

Track H2 – Translational & Laboratory Science 2

Poster: 217
Submission: 452

Developing functionalised graphene-based dipstick biosensors for detection of urinary microRNA biomarkers of delayed graft function at the point-of-care

Dr Daniel Smith[1], Dr Kate Simpson[1], Dr Lucy Newbury[1], Mr Elliot Jones[2], Mr John-Mark Seymour[2], Professor Donald Fraser[1], Mr Usman Khalid[1], Dr James Redman[3], Dr Timothy Bowen[1]

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Introduction: MicroRNAs (miRNAs), short non-coding RNAs that regulate the expression of most human genes, have altered expression profiles in a variety of disorders including cancers, cardiovascular, infectious and kidney diseases. We have developed and optimised RT-qPCR-based methods for robust, precise urinary miRNA quantification and used them to identify biomarker panels that predict delayed graft function (DGF) following kidney transplantation, acute kidney injury and diabetic kidney disease. However, RT-qPCR is time-consuming and costly, requiring experienced laboratory staff and expensive equipment. We are therefore investigating the use of electrochemical detection to expedite quantification of urinary miRNAs.

Firstly, we established proof of principle using glassy carbon electrode-based biosensors, which detected urinary miRNAs with increased sensitivity compared to RT-qPCR. To simplify biosensor fabrication, we then developed disposable screen-printed carbon electrode-based miRNA biosensors more amenable to high-throughput and/or point-of-care analysis. We are now extending this aim to use Haydale's functionalised graphene technology and new aqueous-based chemistries to enable more rapid fabrication of screen-printed graphene electrode (SPGE)-based biosensors with improved reproducibility for miRNA biomarker quantification. The aim of this study was to develop cheap, reliable SPGE-based biosensors for rapid detection of urinary miRNA DGF biomarkers.

Methods: For miRNA detection with our glassy carbon electrode- and screen-printed carbon electrode-based biosensors we used chronocoulometric responses to quantify microRNAs, these data were then corroborated by subsequent RT-qPCR analysis. The aqueous-based chemistries that we have developed to fabricate SPGE-biosensors facilitate the use of fluorometry to quantify appropriately-labelled oligonucleotides and thereby optimise sensor construction and performance.

Results: Detection of miRNAs using our screen-printed carbon electrode-based biosensors compared favourably with RT-qPCR (limit of detection = 17 fM, n = 11). A comparison of urine samples from people with diabetic kidney disease and control subjects detected a disease-associated miR-192 decrease that we reported previously using RT-qPCR ($p<0.05$, n = 6). However, complexities in screen-printed carbon electrode-based sensor fabrication precluded their use at point-of-care.

Here we describe fabrication of prototype SPGE-based miRNA biosensors using graphene electrodes that were amine-functionalised by Haydale's bespoke plasma treatment. Subsequently, we used aqueous-based 1-ethyl-3-(3-dimethylaminopropyl)carbodiimide/*N*-hydroxysuccinimide coupling chemistries to carry out solution-based immobilisation of carboxylic-acid labelled DNA oligonucleotides of complementary sequence to target miRNAs at the SPGE surface.

Conclusion: We will present data from current investigations into the ability of these novel biosensors to detect urinary miRNAs that predict DGF. By these means we are developing novel, cost-effective, disposable electrochemical dipstick biosensors for rapid and routine detection of urinary miRNA DGF biomarkers at the point-of-care.

Monday 5th June 16:00 – 17:00

Track H2 – Translational & Laboratory Science 2

Poster: 218
Submission: 459

Proteomic and Functional Analysis of Acute Galactic Cosmic Radiation Exposure in the Kidney

Dr Keith Siew, Dr Vaksha Patel, Mr Zhongwang Li, Ms Chutong Zhong, Dr Elizabeth Wan, Dr Alessandra Grillo, Dr Stephen Walsh

University College London, London

Introduction: There is concern regarding the effect of galactic cosmic radiation (GCR) exposure on cancer risk, cardiovascular and neurological health posed by longer missions planned as part of the Deep Space Transport/Mars Missions.

However the kidney is the dose limiting organ in abdominal radiotherapy and total body irradiation. Chronic kidney dysfunction can occur with acute low linear energy transfer (LET; *e.g.* γ-radiation or X-rays) radiation doses as low as <0.5Gy. An astronaut on a Mars exploration mission has an estimated absorbed dose of 0.47Gy.

We hypothesise that GCR may cause acute renal failure within the timeframe and GCR dose expected for an exploratory mission to Mars, which may require renal replacement therapy and would thus be mission critical.

Methods: To investigate this, snap-frozen kidneys from mice either exposed to an acute 0.5Gy dose of simulated GCR or sham control (n=10 per group) at Brookhaven National Laboratory, underwent quantitative TMT mass spectrometry proteomic analysis formarkers of proximal tubule damage and pathways known to be involved in radiation nephropathy. Urine and plasma were also collected from these mice 24hrs after acute GCR exposure for biochemical and electrolyte analysis to look for early signs of renal tubular and glomerular filtration dysfunction.

Results: Network analysis of the proteome of whole homogenised kidney of GCR exposed animals showed a biologically significant (>-
10%) decrease in proteins associated with mitochondrial (e.g. CYC1, COX7C) or ribosomal function, intracellular transport and cell membrane transport (e.g. SLC12A1, SLC12A3) compared to sham exposed animals.

There was a >10% increase in apolipoproteins and HDL proteins (e.g. APOA4, APOA1) in GCR compared to sham exposed animals.

Conclusion: GCR exposed animals had proteomic and biomarker evidence of renal damage. This requires further investigation

Monday 5th June 16:00 – 17:00

Track H2 – Translational & Laboratory Science 2

Poster: 219
Submission: 472

The impact of microgravity on kidney function during spaceflight

Dr Keith Siew, Dr Vaksha Patel, Mr Zhongwang Li, Ms Chutong Zhong, Dr Elizabeth Wan, Dr Alessandra Grillo, Dr Stephen Walsh

University College London, London

Introduction: The impact of microgravity (MG) on deep space travellers has mainly focused on cardiovascular, musculoskeletal, neurological and occular health. However, MG exposed astronauts have an unusually high rate of kidney stone formation which poses a mission critical risk. In fact, over 30 incidents have been reported and previous missions have almost been aborted due renal stone formation

Methods: To investigate this, we studied kidneys and biofluids from mice aboard the Rodent Research-10 (RR-10) Mission that launched with SpaceX-21 to the International Space Station and spent ~30 days in MG. These were compared to ground controls (n=10 per all groups) and underwent spatial transcriptomics and miRNA analysis, quantitative proteomics/phosphoproteomics, urine/plasma electrolyte analysis and 3D imaging of immunostained optically cleared tissues for histomorphometry.

Results: Thus far, our network analysis of the data supports evidence of mitochondrial damage, extracellular matrix dysfunction and decreased glomerular filtration rate. Interestly, there are also marked dysregulation in gene products relating to lipid metabolism, SLC membrane transporter superfamily and phosphorylation status.

Conclusion: Our data suggest that there are detrimental changes in the abundance and activity of key transporters/channels that either directly or indirectly regulate calcium homeostasis, and that these may be primary changes in the kidney that drive renal stone formation on the backdrop of milleu of increased renal stone risk factors (e.g. bone resorption, dehydration, enhanced crystal formation in MG)

Monday 5th June 16:00 – 17:00

Track H2 – Translational & Laboratory Science 2

Poster: 220
Submission: 477

Assessment of creatinine and estimated GFR using point of care testing in a multi-ethnic South London population

Dr Ciaran Twomey Brenner[1], Mr Evangelos Kougiouris[1], Dr Katy Kuhrt[2], Mr Danilo Nebres[3], Ms Rachelle Villahermosa[3], Dr Kate Bramham[1,4,5], Dr Rouvick Gama[4]

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Introduction: The prevalence of chronic kidney disease (CKD) is increasing and disproportionately affects ethnic minority populations. National Institute for Health and Care Excellence (NICE) recommend therapies, such as angiotensin-converting enzyme inhibitors (ACEi) and sodium-glucose-cotransporter 2 inhibitors (SGLT2i) for cardiorenal protection. However, barriers to optimization of therapies include lack of rapid kidney function testing, result review and prescribing dosing alterations.

Point of care (POC) testing has been demonstrated to promote patient engagement and satisfaction, providing nearly instant results and timely management. However, further validation is required to assess the accuracy in multi-ethnic cohorts.

This study aims to assess the accuracy of point-of-care creatinine (POC-Cr) using finger-prick capillary sampling, compared to laboratory serum creatinine.

Methods: Patients, aged ≥ 18 years old, from a single tertiary renal centre, having venous blood sampling for kidney function testing also underwent capillary POC-Cr using the NovaMaxCreat (NovaBio) handheld device.

Demographics (age, ethnicity and sex), capillary POC-Cr (µmol/L) and estimated glomerular filtration rate (eGFR, mL/min/1.73m2; CKD-EPI 2009 equation) were recorded alongside venous serum creatinine (IDMS-traceable enzymatic assay) and laboratory eGFR results.

Agreement of testing methods was assessed using Passing-Bablok regression and the Pearson correlation co-efficient. Comparison between testing methods was assessed using a Bland-Altman plot. Limits of agreement were compared with CLIA criteria for acceptable performance for creatinine.

Results: Of the 72 patients included, mean age was 54.6 ± 15.8 years old and 51.4% were male (n=37). The majority of patients were of Black ethnicity (N=28; 38.9%) followed by White ethnicity (N=23; 32.0%) and South Asian (N=7; 9.7%).

Median POC-Cr 164 µmol/L, interquartile range (IQR) 108, 277 µmol/L versus venous creatinine 160, IQR 94, 269 µmol/L, giving an underestimation of kidney function, with median POC-eGFR of 33.5 mL/min/1.73m2, IQR 16, 67 mL/min/1.73m2 versus venous eGFR 41 mL/min/1.73m2, IQR 18, 70 mL/min/1.73m2.

The mean bias for creatinine was -21.9. Limits of agreement on Bland-Altman plot (Figure 1) were +166µmol/L and – 123µmol/L. Overall, there remained a strong positive correlation between POC-Cr and IDMS-traceable enzymatic creatinine assays (R = 0.86667; P<0.0001) (Figure 2).

The NovaMaxCreat test was easy to use with 71/73 (97.2%) patients having a successful result on the first attempt.

Discussion: There was a strong correlation between POC-Cr and laboratory analysis of venous creatinine although accuracy was lower than that reported in the product literature (R=0.87 vs 0.96). Limits of agreement were outside the CLIA criteria for acceptable performance (+/- 27µmol/L). These discrepancies likely due to the high proportion of people with high creatinine in our cohort, which has been shown to affect accuracy of POC-Cr tests but could also be related to human error or small sample size. The ease of testing suggest POC-Cr devices could have great utility in community settings, including for patient use, to overcome barriers to healthcare. However, larger clinical studies are required to assess accuracy in different ethnicities and to develop creatinine thresholds for use in home testing.

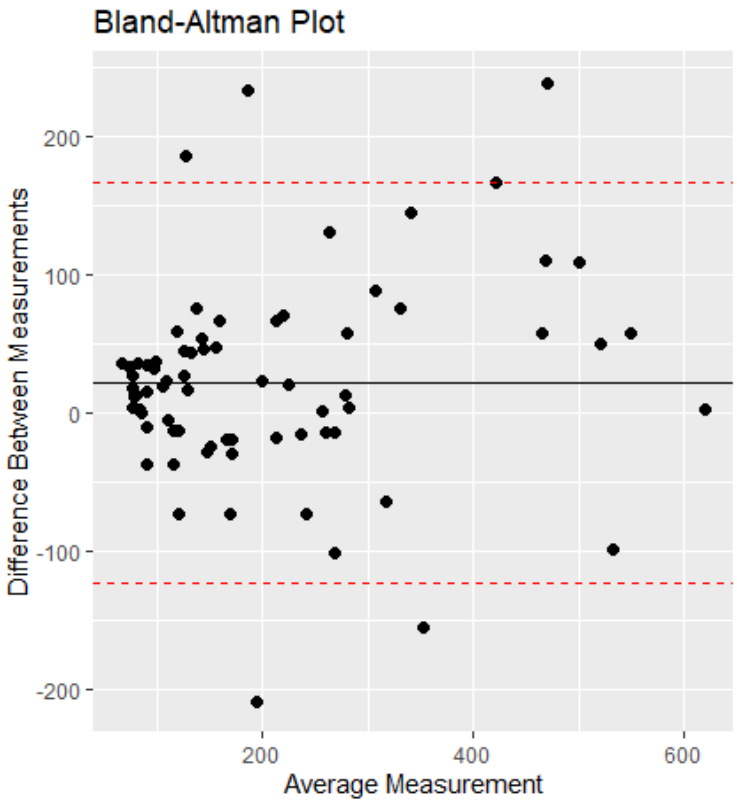

Figure 1

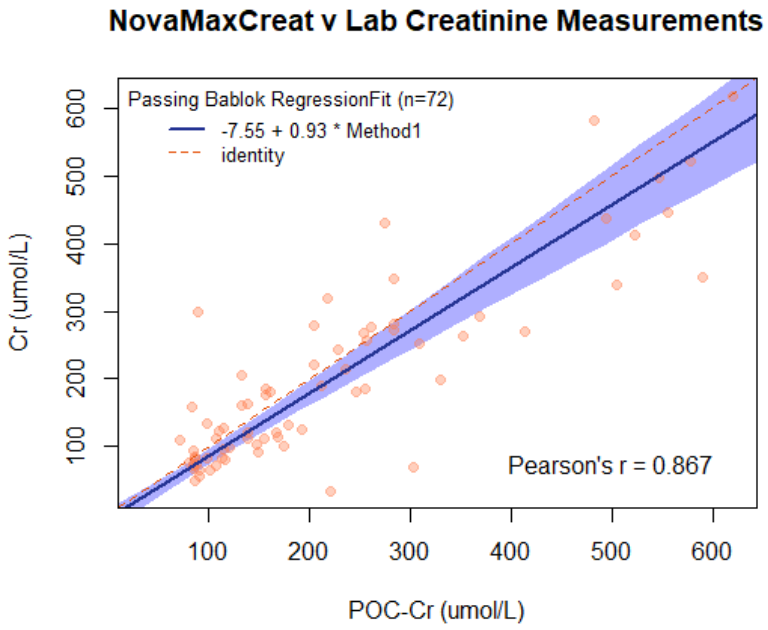
NovaMaxCreat v Lab Creatinine Measurements
Passing Bablok RegressionFit (n=72)
-7.55 + 0.93 * Method1
identity
Pearson's r = 0.867
Cr (umol/L)
POC-Cr (umol/L)
100
200
300
400
500
600

Figure 2

Monday 5th June 16:00 – 17:00

Track H2 – Translational & Laboratory Science 2

Poster: 221
Submission: 492

Focus Quality Evaluation of Microscope images with deep learning

Mr Zhongwang Li, Dr Keith Siew, Dr Stephen Walsh, Prof Simon Walker-Samuel

University College London, London

Introduction: Acquiring a significant quantity of high-quality image data is a foundational step for training any accurate image model. This often necessitates automated collection of imaging data (e.g. whole slide scanning microscopes) that may result in occasional out-of-focus images or regions being acquired. Including these in the final dataset may affect the final training outcomes. However, finding these data in numerous images would be considerably time-consuming and laborious, and the naked eye is incapable of precisely quantifying the degree to which an image is out of focus. Therefore, developing an image model that could measure the blurring of an image is desirable. This would allow researchers to rapidly and efficiently remove the confounding data from the dataset during the workflow, thus improving the quality of the dataset and the training results.

Due to the reasons stated above, we propose a model that uses CNN as the core framework, trained with scanned 8-bit RGB human kidney biopsies brightfield images, using the images as input and the output values as an evaluation of the degree of focus of the images.

Methods: Archived kidney needle core biopsies from UCLH and the Royal Free Hospital were used to create our dataset. The biopsies were scanned at a magnification of 20x using the AXIO Scan Z.1 automated batch scanning microscope. We acquired multi-slice focus stacks (1-micron Z-steps) of each slide. The sharpest z-slice (and therefore assumed to be the most in-focus image) was selected based on the largest standard deviation. From this z-slice, we selected areas clearly in focus and with no tile stitching misalignments as the original images to undergo ten levels of artificial blurring for the training model. The final image used for training is in 8-bit RGB PNG format. Two models have been tested: ResNet and two convolutional layers with two to three fully connected layers.

Results & Discussion: Our CNN with 2 Fully connected layers model uses 2406 images as the training set, learning rate 0.00001 and batch size set to 200 for 500 epochs, it ended up with a mean square error of 0.4637 on the training set and a mean square error of 3.574 on the 1144 validation set. When using ResNet, the error for the training set was 0.4996, and the validation set was 5.33. In future tests, we'll use a larger number of photos as the training set. We'll also expand the model's size to learn new characteristics.

Conclusion: We proposed a model that can infer the absolute focus fraction of an image to better assist researchers in determining whether there are unfocused, unclear or blurred images in the acquired dataset.

Monday 5th June 16:00 – 17:00

Track H2 – Translational & Laboratory Science 2

Poster: 222
Submission: 488

Automated Tool for Renal Biopsy Diagnosis

Mr Zhongwang Li, Dr Keith Siew, Dr Stephen Walsh, Prof Simon Walker-Samuel

University College London, London

Introduction: Histological examination of the glomeruli in renal biopsies is essential for diagnosing many kidney diseases. However, manual identification and characterisation of glomeruli in biopsies requires trained histopathologists and can be a tedious, time-consuming task. Therefore, the development of automatic tools (e.g. Artificial Intelligence) to help accelerate diagnostic workflows and improve detection accuracy is an unmet need. Such tools should have the ability to detect and count glomeruli of various sizes, shapes, and disease status across whole slide image (WSI) biopsies and annotate these in the image. Advanced functionality could then be developed to classify glomeruli based on disease features (e.g. fibrosis, mesangial expansion, segmental sclerosis) and generate AI-assisted preliminary biopsy reports for review by the histopathologist.

Methods: Routine renal biopsies collected at Royal Free Hospital with patients' consent for research were used for this study (n=300). 2-5um biopsy sections were acquired as 8-bit RGB WSI using an Axio Scan Z.1 (20x/0.8NA). To ensure the general applicability of the model, multiple common histochemical stains (H&E, PAS, Silver stain, VVG, DAB immunostains) were imaged and included in the training dataset. These digitised slides were then manually annotated by several histopathologists and nephrologists using QuPath (version 0.3.2) on Wacom Cintiq Pro 32 interfaces to capture the features described in the matching to biopsy reports.

"You only look once" (YOLO) is a state-of-the-art, real-time object detection system that has previously been used to identify glomeruli in the PASM-stained section. For our work, we decided to adopt this approach using the latest version of YOLO that can function under multiple conditions (e.g. different stains and magnifications), and a Convolutional Neural Network (CNN) model may then be used to classify various glomeruli diseases.

Results: Using the location information given by YOLO, the glomerular images could be cropped from the original image and tabularized alongside morphometric and histopathological readouts from our U-NET model (a type of CNN) that could segment the identified glomeruli from the background tissue and quantify features (e.g. % area of fibrosis).

Conclusion: This work shows that an automated image analysis pipeline can identify, quantify and characterize glomeruli in 2D slides in seconds, with obvious utility for pathologists and clinicians. Further work to expand the functionality of this model and to validate it further in larger datasets is warranted.

Tuesday 6th June 12:15 – 13:15

Track J1 – AKI 1

Poster: 223
Submission: 080

Significance of Acute Kidney Injury Stage 1 (AKI 1)

Dr Li Jin Ooi, Dr William Mckane, Dr Jyotin Singh, Miss Louise Wild, Miss Ella Patrickson

Sheffield Kidney Institute, Sheffield

Introduction: Patients who are admitted with AKI are at significantly higher risk of worse health outcomes, including a higher risk of AKI recurrence, progression of CKD and high mortality. It is a marker of illness severity that is associated with higher resource utilization such as prolonged length of stay. AKI 1 may be considered less significant by non-renal admitting specialities and primary care due to the common misconception that it is "mild".

Methods: A retrospective review of all patients admitted with or who developed AKI stage 1 in a one-week period in a large tertiary centre. Patients were identified from a routine laboratory AKI e-Alert extract. Our focus was on AKI 1, so we excluded patients with peak AKI e-Alerts higher than 1 during the index admission. The only other exclusions were pregnancy, and death during the index admission. We analysed data for 12 months post-discharge, including further AKI episodes, hospital readmissions, renal replacement therapy (RRT), mortality, the quality of discharge information and biochemical follow-up.

Results: 100 patients with a median age of 76 years (IQR 66-85) were identified and analysed (50 male, 50 female). Most patients were white British (86). 90 patients had a Charlson Comorbidity Index of 3 and above. 38 patients had further AKI episodes (28 had one further episode, and 10 had two or more). 59 patients were re-admitted to the hospital (27 once, 14 twice and 18 three or more times). 2 patients required renal replacement therapy on re-admission (1 remains dialysis-dependent and 1 had temporary dialysis). 46 patients died within 12 months. 39 discharge summaries highlighted the AKI episode and 25 made recommendations for follow-up or medicines management. 81 patients had eGFR follow-ups within 3 months and 13 had a measure of proteinuria within 12 months. Most of the biochemical follow-up was in secondary care (n=51).

	Alive at 12 months	Dead at 12 months

Charlson comorbidity index		
<1	3	0
1 to 2 (mild)	5	2
3 to 4 (moderate)	25	10
> 5 (severe)	21	34

p=0.00416 ($\chi 2$ test)

Discussion: AKI 1 should not be considered a mild or insignificant health condition. Patients with a peak AKI level of stage 1 have a relatively mild biochemical disturbance, but this is frequently a consequence of poor physiological reserve to cope with less severe hemodynamic or septic challenges, reflecting severe comorbidity. Although it is not always directly related to the cause of death or re-admission, AKI1 identifies patients at high risk of either event. The very high rate of re-admission might be improved by better communication with primary care and subsequent careful post-discharge management of biochemistry and medicines.

Tuesday 6th June 12:15 – 13:15

Track J1 – AKI 1

Poster: 224
Submission: 117

A proof of concept recurrent neural network model to predict the need for acute renal replacement therapy among in-patients with acute kidney injury.

Dr. Haresh Selvaskandan[1,2], Dr. Timothy Gaultney[3], Dr. Dan Heath[3], Dr. Scott Linfoot[4], Dr. Gang Xu[5]

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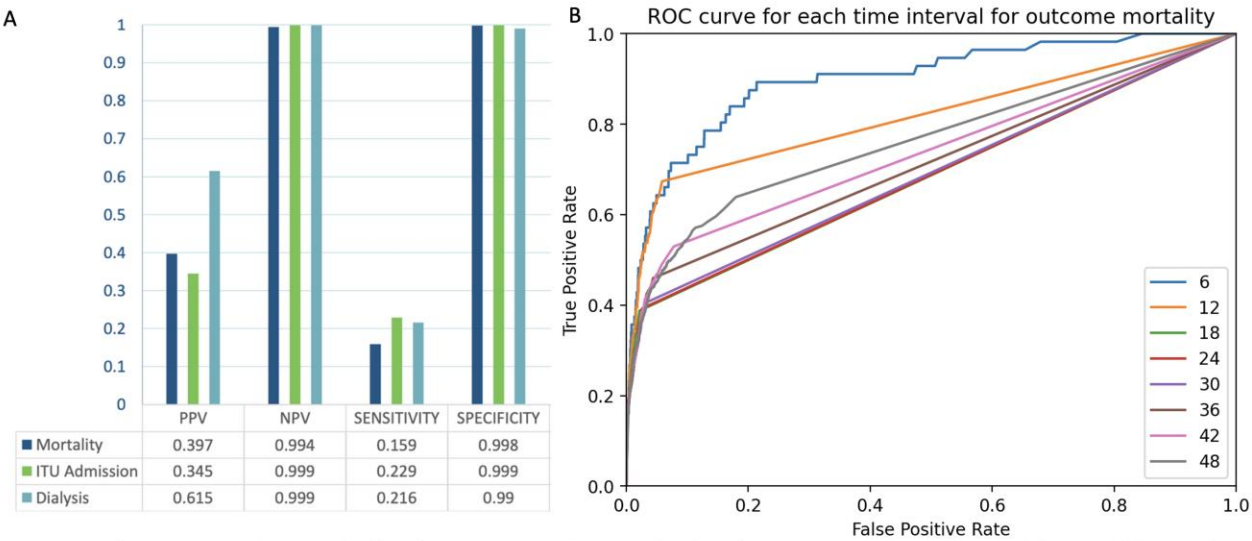
Introduction: Acute kidney injury (AKI) complicates 13-18% of hospital admissions[1]. While high profile initiatives have sought to predict AKI onset using machine learning methods[2], predicting which in-patient cases progress to require renal replacement therapy (RRT) remains an unaddressed challenge. Early, reliable prediction of RRT requirement among in-patients with AKI can avoid hasty assessments of suitability, rushed counselling, delays, sub-optimal bridging therapies, and added costs. This proof-of-concept (PoC) study assessed the value of a recurrent neural network (RNN) in predicting, up to 48 hours in advance, the risk of an in-patient with AKI requiring RRT, being admitted to an intensive treatment unit (ITU), or dying.

Methods: 21,225 sets of anonymised in-patient consecutive AKI episodes (stages 1-3) were identified. Associated anonymised electronic health records (EHR) of demographics, prescriptions, observations, and serum creatinine and electrolytes were extracted, generating over 25,000,000 data points. Data pipelining was constructed for compatibility with DeepMind's EHR prediction framework. Each entry was represented as a combination of six tensors (relating to feature categories, numerical feature values, and feature presence flags) covering indices and values of feature changes within that specific entry. Time values were binned into 6-hour blocks. The outcomes of interest (RRT, ITU admission, death) were labelled at the appropriate 6-hour block. Data were randomly split into a training and validation set. DeepMind's RNN for predicting AKI among veterans was adapted for the outcomes of this work, and trained. Occlusion analysis was performed to assess 'explainability', providing insights into which data points the model most relied on for predictions. The model was tested on the validation dataset.

Results: 15% of AKI cases culminated in death, 4% required ITU, and 1.5% received dialysis on a kidney unit. The model was assessed for positive predictive value (PPV), negative predictive value (NPV), sensitivity, specificity, and accuracy, for each outcome. NPV, specificity and accuracy exceeded 99% (Figure 1). PPV was highest for the outcome for dialysis (62%) and sensitivity highest for ITU admission (23%). The imbalance in these values is likely accounted for by the weighting of the dataset; most patients did not reach the predefined outcomes. Occlusion analysis (assessed using cross entropy differential values relative to un-occluded baseline) highlighted systolic and diastolic blood pressure, oxygen saturations and serum sodium as having the most influence on model predictions (Figure 2).



	PPV	NPV	SENSITIVITY	SPECIFICITY
Mortality	0.397	0.994	0.159	0.998
ITU Admission	0.345	0.999	0.229	0.999
Dialysis	0.615	0.999	0.216	0.99

FIGURE 1: A) Positive predictive value (PPV), Negative predictive value (NPV), Sensitivity and Specificity of the model for each defined outcome. B) ROC curve highlighting shorter time windows allowed better classification of events related to mortality.

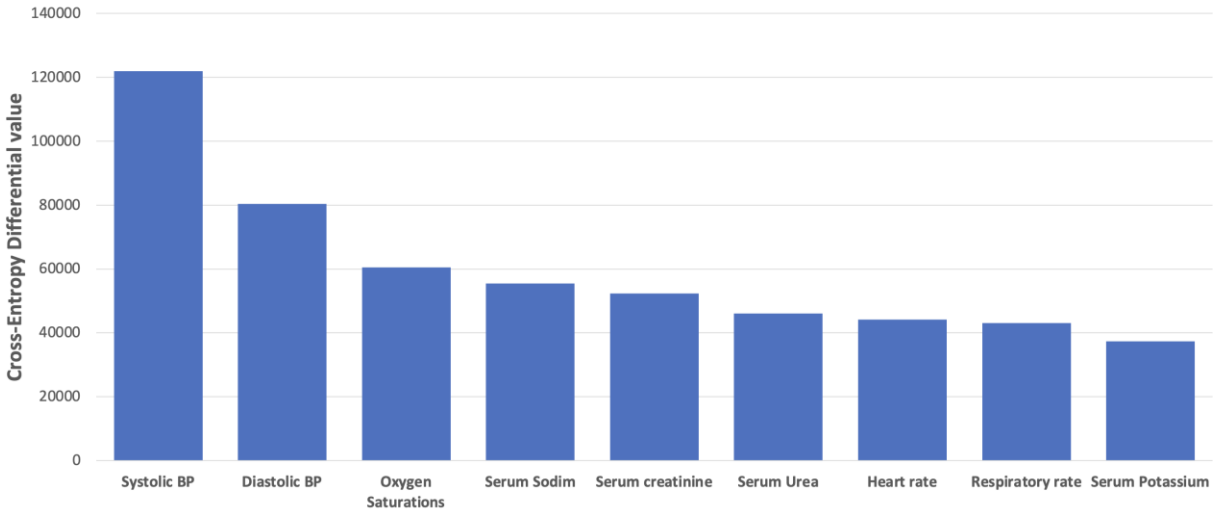


FIGURE 2: Physiological and biochemical parameters which most influenced the predictivity of the model.

Discussion: This PoC model highlights a value of RNN based models in predicting severe progression of AKI. The most powerful predictors for outcome reflect current understanding of AKI, hinting at disturbances in cardiovascular and fluid status playing being key influencers of subsequent deterioration. These findings indicate clinical relevance of the model even at this early stage PoC stage. This is promising, and further steps are being explored to improve the model, including increasing cases and variables used for training, improving outcome labelling, and adjusting model architecture. If validated, this model may improve patient care whilst streamlining the use of healthcare related resources.

References:

1. Rewa O et al. Nature Reviews Nephrology. 2014.

2. Tomašev N et al. Nature. 2019.

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Track J1 – AKI 1

Poster: 225
Submission: 144

An audit of patient transfers from non-renal centres to a renal hub in a large district general hospital for emergency renal intervention from September 2021-September 2022.

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Royal Wolverhampton NHS Trust, Wolverhampton

Acute Kidney Injury (AKI) is a common and major contributor to hospital length of stay (LOS), as well as morbidity and mortality rates. If severe enough, patients with AKI may require interhospital transfer for renal replacement therapy if not available at the initial hospital. This may lead to delays in therapy, resulting in poor patient outcomes. The Renal Service Transformation Programme recommend that all patients should be transferred within 24 hours of being accepted by the receiving consultant nephrologist, however, there is little data in the UK which details outcomes for patients requiring transfer for emergency renal intervention.

This audit has recorded all patients accepted for transfer from non-renal centres to the regional renal hub for emergency renal intervention over a period of twelve months. Currently in our renal network there is no set criteria for transfer and referrals are mostly made by telephone call to the receiving nephrologist.

During our audit period, 62 patients were accepted for transfer to the renal hub, although only 54 were transferred across. Of the eight patients not transferred, 87.5% deteriorated within the 24-hour window, and were either escalated to intensive care or palliated, which raises questions about the timeliness and suitability of referral. 57.4% of all transferred patients required emergency haemodialysis (HD), 35.2% needed specialist management from the nephrology team and 16.7% required renal biopsy for prompt diagnosis and subsequent management. Overall, 21 patients (38.9%) were delayed by more than 24 hours from time of referral, 13 of which were patients requiring urgent HD (42%). The average time from referral to transfer was 24.6 hours and time from referral to HD was 43.7 hours. This is in stark contrast to patients requiring urgent HD who are already in a renal hub, where HD normally occurs within twelve hours of it being indicated.

Unsurprisingly in our ever-pressed NHS, lack of bed capacity at the renal hub was the predominant cause of delay (81%). Consequences of delay meant that 22.6% of patients who needed HD required admission to critical care for either single or multiorgan support, with one death reported where delayed transfer was thought to be a contributing factor. Interestingly, delayed transfers had no influence over LOS suggesting that there are other variables which influence this measure. The 30-day emergency readmission rate for transferred patients was 23% which is largely in line with all AKI patients regardless of initial hospital location. Mortality at 90 days was 18% with no difference between those delayed and not delayed. Comparable with the general AKI population, average eGFR was 39 after 3

months, compared to 54 before the AKI episode, with 20.5% of transfers for HD remaining dialysis dependent at three months.

In order to minimise the consequences of delay, referral criteria may help identify and expedite timely transfers, however bed capacity issues remain the largest threat to transfer times and subsequent outcomes. Reassuringly, interhospital transfers do not appear to affect readmission or mortality rates for patients with AKI, nor long-term outcomes such as renal disease progression.

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Track J1 – AKI 1

Poster: 226
Submission: 155

Development of a patient home based AKI service

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East and North Herts NHS Trust, Stevenage

Introduction: The NHS is currently under an unprecedented amount of pressure particularly in the hospital environment. There is a lack of inpatient beds with waiting times in the emergency department around 15 hours on average (Hayward, 2022). These patients are sometimes required to spend this entire time in a chair. Thus, there has been a move to provide more care in the community. Not only does this reduce the burden on hospitals, but aims to give patients high quality treatment in their home environment. Therefore, we created a community based acute kidney injury (AKI) service to help achieve these aims.

Methods: With help of the transformation team at the trust and in association with the hospital at home team at Hertford Community Trust we developed an outpatient AKI service. There were two main pathways for the service. Some patients attended via the Same Day Emergency Care service with an AKI, who were relatively well, where initial blood and urine tests along with an ultrasound could be organised before caring for patients in their home environment. The second group of patients were those who were current inpatients. These patients were also well apart from their AKI. Once home, remote monitoring would be instigated including weight and urine output and patients would answer daily electronic questionnaires via an app regarding their health. If anything was flagged as abnormal, then a trained nurse or GP would attend the home of the patient for assessment with the ability to give fluid boluses as needed. There is a daily MDT between the AKI and hospital at home team to discuss any patient issues. Blood tests would be conducted every 48 hours. There are clear pathways for readmission and discharge.

Results: The pilot is due to start running in the next few weeks. We expect there to be a maximum of around five patients per week using this service. There will be data available to present in the very near future.

Discussion: There is a big move to provide more care in the community and this community based AKI service will provide high levels of patient care within their home. As more and more pressure is placed onto the NHS, services like this one will become more importance in ensuring the sustainability of the service as a whole. The next steps would be to extend the service to other types of renal patients, such as nephrotic patients who need careful diuresis.

Ref:

1. Hayward, E. (2022). NHS A&E patients wait 15 hours as hospitals feel the strain. The Times. https://www.thetimes.co.uk/article/nhs-a-amp-e-patients-wait-15-hours-as-hospitals-feel-the-strain-zhtk3t7wh

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Track J1 – AKI 1

Poster: 227
Submission: 171

Audit of the patients reviewed by a multidisciplinary Acute Kidney Injury (AKI) team.

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Introduction: The Trust multidisciplinary (MDT) AKI team triage all patients who trigger an AKI alert from Monday to Friday according to the national algorithm[1]. Patients with a stage 2 or 3 AKI are prioritised to be reviewed on an MDT ward round. Advice and education is offered to the clinical team looking after the patient, with the aim of improving patient care and reducing progression of AKI. Any stage 3 patients that have already been seen by the nephrology outlier team are excluded. Virtual reviews for patients with a stage 1 AKI are conducted using electronic patients notes. Patients are followed up in order to monitor if the AKI improves.

Currently patients are not reviewed by the team post discharge, thus relying on the discharge summary and the GP, utilising the Royal College of General Practice (RCGP) AKI post discharge toolkit[2].

Methods: In this retrospective audit, we reviewed all patients who were seen by the AKI team over an eight-week period. We aimed to look at renal recovery; who had follow up post discharge and how many were readmitted within 28 days. We defined renal recovery as creatinine returning to <20% of baseline. In the literature there is a lack of consistency around what defines recovery of renal function with other centres using within 10%, 20% or 50%.

Results: 60 patients were reviewed in the period 1.8.22 – 30.9.22. There were 38 male and 22 female patients. 47% were hospital acquired AKI, 53% were community acquired AKI. 45% were stage 1; 27% were stage 2; 28% were stage 3.

38% of patents had returned to baseline at the point of discharge, 45% had not, 17% died.

Only 15% of patients had had follow up bloods after discharge, 4 were readmitted within a week and 2 within 28 days.

Discussion: Our data supports the need for follow up as 54% of surviving AKI patients had not returned to baseline at discharge. There was very little follow up with only 18% of surviving patients having follow up bloods. This data can be utilised to build the case for the AKI team to provide a post discharge clinic follow up, either face to face or virtual. The Renal Services Transformation Program is shortly due to publish a toolkit and service specification that will advise on post AKI follow up. Our data will support from a local stance the need for follow up to improve patient care.

References:

1. NHS England » Acute Kidney Injury (AKI) Algorithm
2. AKI Post-discharge Timeline FINAL.pdf (rcgp.org.uk)

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Track J1 – AKI 1

Poster: 228
Submission: 175

Fluid balance standardisation and improvement – a quality improvement project

Miss Claire McGuire, Mrs Elita Phiri, Miss Leah Torr, Mrs Jane Owen, Dr Elizabeth Mullaney, Dr Catherine Fraser, Dr Nitin Kolhe

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Introduction: Improving the quality of AKI patient management is a clinical priority, of which fluid balance is a core component. A trust-wide audit across two hospitals highlighted sub-optimal standards of fluid balance documentation with inconsistencies in the quality and location of completed fluid balance documents. There were multiple different practices to record fluid balance across different areas within the same trust highlighting poor practice. The aim of this quality-improvement project is to introduce a standardised electronic platform for recording fluid balance across all inpatient areas and measure the effect on quality of AKI management.

Methods: After an initial baseline audit, a suitable electronic platform was identified. Our existing integrated electronic system (Patientrack) was decided as most appropriate, taking advantage of an established system which was already being utilised in all inpatient clinical areas to document patient observations. This removed the barrier and associated cost of integrating a new system.

A multidisciplinary working group was then established including two medical consultants. The team met regularly to collaboratively develop a suitable fluid balance document applicable to all adult inpatient specialities. A two-step process was identified, step one being a 24-hour fluid balance assessment. Every inpatient would receive an electronic assessment to determine what type of fluid balance monitoring they required. The assessment would result in requiring either no monitoring at all, a hydration chart only or a full fluid balance chart.

Step two was the initiation of the identified monitoring document. An electronic ‘red flag’ alert would automatically generate within Patientrack if no fluid input or output was entered within a 6-hour time period. This wiould act as a prompt for staff to complete the necessary document and aid the AKI team in identifying clinical areas that were regularly flagging for inadequate fluid balance.

Once the process for assessment and recording of fluid balance had been identified, four different speciality areas were selected to pilot the new electronic fluid documents in order to test phase the process and highlight any system or functional errors to the working group.

Results: The pilot phase is planned for early 2023. The AKI team will conduct pre and post pilot audits measuring completion and the role of a fluid balance document to support fluid status assessment. After completion of this phase, the fluid balance document will then be utilised by all adult inpatient areas in the trust. The AKI team and clinical educators will assist with training and education package which will support its initiation.

Discussion: In conclusion, fluid balance is often not performed well in clinical settings with poor or missing documentation. Addressing this has the potential to improve patient management, including AKI care. This project showcases how AKI nurses can develop extended roles at Trust level and contribute to quality improvement.

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Track J1 – AKI 1

Poster: 229
Submission: 184

The West of Scotland and Thrombotic Microangiopathy

Dr Ciaran Groome, Dr Neal Padmanabhan

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Introduction: Thrombotic microangiopathy (TMA) is a diagnosis made on tissue biopsy manifesting as acute organ dysfunction. It has a variety of causes broadly categorised as: primary hereditary/genetic, primary acquired, secondary, and infection-related1. On blood testing there is evidence of microangiopathic haemolytic anaemia (MAHA) –, thrombocytopenia, raised lactate dehydrogenase (LDH), reduced haptoglobin and fragments on blood film. Renal involvement is evidenced by an elevation in creatinine; together with MAHA this is haemolytic uraemic syndrome (HUS). We sought to examine the TMA/MAHA population as it presented to nephrology in the West of Scotland.

Methods: This is a retrospective case series of adult patients. We extracted data from the west of Scotland renal electronic patient records database Strathclyde Electronic Renal Patient Record ("SERPR") provided by VitalDataClient. We ran a query to identify patients in whom TMA and/or MAHA and/or HUS was inputted as a diagnosis. 363 patients were identified. Each was manually inspected and patient excluded who were not appropriate for inclusion.

Results: 134 patients were identified. The underlying diagnoses were: hypertension (n=34), the atypical HUS (aHUS, n=22), drug-induced (n=17), autoimmune (n=12,), thrombotic thrombocytopenic purpura (n=12), malignancy (n=10), inflammatory (n=10), peri-partum (n=9). Others included: transplant-related, unknown, Ecoli 0157, diarrhoea-related, IgA, AAV, MPGN, and essential thrombocythaemia. Note: many patients had multiple possible contributors to their diagnosis.

The average biochemical levels at presentation were: creatinine 591umol/L; haemoglobin 82; platelet count 98.7; LDH 1674.2; bilirubin 34.5.

Renal recovery was observed in n=27 (19%); CKD3 n=32 (24%); CKD4 n=10(7%); CKD5 n=7(5%); those who have progressed to ESRF (requiring renal replacement therapy) n=40(31%); persisting transplant function n=5(4%). 15 patients died (10%).

We categorised patients into 3 groups. 1 – presence of TMA on biopsy without MAHA (n=28). 2 – TMA on biopsy plus evidence of MAHA (n=41). And 3 – MAHA in those not biopsied (n=62). 3 patients with MAHA did not have TMA on biopsy. Those in group 1 had on average a lower serum creatinine at 331umol/L compared with group 2 (634umol/L) and group 3 (666umol/L). This result was significant $p < 0.05$. Hypertension was a leading cause in groups 1 and 2. aHUS was not present in group 1 - all patients presented with MAHA. All peri-partum patients were in group 3 i.e. not biopsied.

Discussion: It is evident from the dataset that hypertension is a major contributor to acute and chronic renal impairment. With aHUS contributing to a significant number of cases, given the advances in testing and therapeutics, early liaison with national services in complement disorders is paramount to protecting the kidneys. With 19% of patients regaining an eGFR >60ml/min prompt investigation is crucial to reducing the burden of disease. Long term renal follow-up should be offered. 21% of patients had no evidence of MAHA –we should be wary of excluding a TMA process in the absence of MAHA.

References:

1 Brocklebank V, Wood KM, Kavanagh D. Thrombotic Microangiopathy and the Kidney. Clin J Am Soc Nephrol. 2018 Feb 7;13(2):300-317. doi: 10.2215/CJN.00620117.

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Track J1 – AKI 1

Poster: 230
Submission: 208

Regional variation of acute kidney injury in COVID-19

Dr Nitin Kolhe[1], Dr Richard Fluck[1], Prof Maarten Taal[2,1]

[1]University Hospitals of Derby and Burton NHS Trust, Derby.
[2]University of Nottingham, Derby

Introduction: The recent worldwide COVID-19 pandemic has identified acute kidney injury (AKI) as a serious complication of COVID-19. Previous reports suggest that AKI associated with COVID-19 has higher morbidity and mortality compared to AKI due to other causes. Limited data has suggested that regional variation in COVID-19 incidence is related to population density. However, little is known about the effect of region, SARS CoV-2 strains, steroid treatment and other determinants on incidence and mortality in patients with COVID-19 complicated by AKI. The aim of this study was to determine the regional variation of COVID-19 AKI and predictors of mortality in these patients.

Methods: This retrospective cohort study used hospital episode statistics. Data were collected from all adult hospitalised patients with COVID-19 infection and AKI (diagnostic code U07.1 and N17 in any of the 20 diagnoses codes) between 1st March 2020 and 31st March 2021 until discharge. We also extracted all available secondary diagnoses and procedure codes. Patients with codes for chronic dialysis were excluded. We divided the observation period as per the dominant SARS CoV-2 variant and in relation to publication of the RECOVERY trial. SARS CoV-2 “Other” strain was prevalent between 1st March 2020 and 21st December 2020, “Alfa” between 22nd December 2020 to 17th May 2021. The end date of each phase was based on more than 50% decline in each variant.

Results: We extracted 749,844 unique admission spells in 337,029 patients with U071 code in any of the 20 diagnostic codes from 3,324,748 FCEs and admitted during the study period. We excluded patients not resident in England, multiple and duplicate FCEs within a spell. Out of 749,844 admissions, 63,147 patients had 227,268 admissions with AKI. Population incidence of AKI was highest in London at 6316 pmp and lowest in South West 2394 pmp. Mean length of stay was lowest in North East at 15.6 ± 15.9 days and highest in South West at 19.3 ± 18.3 days. London had highest proportion of patients with Asian (15.1%) and Black ethnicity (16.1%). Proportion of AKI patients dialysed varied from 2.5% in North West to 6.5% in London. Unadjusted mortality was highest in North West at 31.8% and lowest in London at 25.4%. In multivariable analysis, increasing age (OR 1.04, 95%CI 1.04, 1.04), Asian ethnicity (OR 1.13, 95%CI 1.08, 1.17), emergency admissions (OR 1.7, 95%CI 1.51, 1.9), and transfers (OR 1.18, 95%CI 1.03, 1.34), ITU admission (OR 5.16, 95%CI 4.98, 5.34) and acute dialysis (OR 2.74, 95%CI 2.6, 2.89) had higher odds of death. All regions had higher adjusted odds of death as compared to London. Post RECOVERY trial, the odds of death was lower with prevalent "Other" SARS CoV-2 (OR 0.78, 95%CI (0.76, 0.8) and "alfa” variant (OR 0.80, 95%CI 0.78, 0.82).

Discussion: In this large national study of COVID AKI, London had lowest adjusted odds of death despite a higher proportion of patients receiving dialysis. The odds of death were lower after the publication of RECOVERY trial which may have resulted in practice pattern change.

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Track J1 – AKI 1

Poster: 231
Submission: 210

Use of supratherapeutic gentamicin levels to trigger acute kidney injury risk in a medium sized district general hospital

Dr Stephanie Edmunds[1], Dr Helène Lindsay[2], Dr Sadie Thomas[2], Mr Stephen Trenchard[2]

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Introduction: Gentamicin is a commonly used aminoglycoside antibiotic with recognised nephrotoxicity and requirement for regular monitoring(1). Morbidity and mortality review of a patient admitted to the Critical Care Unit (CCU) with urinary sepsis and a stage three acute kidney injury (AKI) identified failings in routine monitoring of renal function and electrolytes (UEC) during their hospital admission after being administered gentamicin as per hospital guidelines. This was despite daily gentamicin trough levels being taken and recognised as supratherapeutic by the ward team.

Gentamicin levels and UEC are collected in the same BD Vacutainer® SST(TM) tube and an AKI risk is automatically generated with each UEC result. This study aimed to examine how often UEC were routinely requested alongside gentamicin levels and when not, whether a rule could be introduced to automatically generate UEC and AKI risk if a supratherapeutic gentamicin level was reported. The costs associated with this were also considered.

Methods: The number of gentamicin levels reported in a seven-day period was requested from the clinical chemistry laboratory and of these, the supratherapeutic levels (≥1.0 mg/L) were interrogated as to whether UEC were requested on the same day, or days prior to testing. Clinical chemistry were contacted and a rule was implemented to add on UEC and AKI risk to each supratherapeutic gentamicin level reported. Following introduction of this rule, the number of additional tests and the associated AKI risk was reviewed.

Results: Prior to the introduction of the new rule there were 210 requests for gentamicin levels over a seven-day period; 73(35%) of these levels were high. Only 34/73(47%) results had a UEC requested on the same day, therefore on introduction of the rule this could expect to generate 59 additional UEC per week.

When the UEC and AKI risk add on rule was applied 333 additional UEC were generated from 333 gentamicin levels of ≥1.0 mg/L out of 1076 reported over the following month. 45(14%) of these results returned a high AKI risk. This was associated with an additional clinical chemistry cost of £299.70.

Discussion: 45 AKIs were recognised in the month following implementation of a UEC and AKI risk add on rule. AKI is a commonly recognised issue contributing towards inpatient morbidity and mortality with one third of inpatients with AKI developing this during their hospital admission(2). By triggering a review of UEC and AKI risk associated with supratherapeutic gentamicin levels we have prompted earlier

recognition and review of deteriorating renal function. This will encourage a medical assessment, medication review and may prevent patient harm.

In addition, at 90 pence per UEC, the cost of multiple additional tests will be offset by avoiding just one prolonged inpatient hospital stay. If this had been implemented in the case of the CCU patient, they might have avoided a critical care admission and renal replacement therapy (RRT). AKI in patients undergoing RRT presents an excess risk of hospital death, which cannot be explained solely by a more pronounced severity of illness(3).

References:

1. Selby NM, Shaw S, Woodier N, et al. Gentamicin-associated acute kidney injury, *QJM*. 2009;102(12):873–880
2. Argyropoulos, A., Townley, S., Upton, P.M. *et al.* Identifying on admission patients likely to develop acute kidney injury in hospital. *BMC Nephrol.* 2019;20:56.
3. Metnitz PG, Krenn CG, Steltzer H et al. Effect of acute renal failure requiring renal replacement therapy on outcome in critically ill patients. *Crit Care Med.* 2002;30(9):2051-8.

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Track J1 – AKI 1

Poster: 232
Submission: 215

Parkinson's disease is overrepresented in people with acute kidney injury – A UKRR cross-sectional study

Dr Anna Casula[1], Professor Camille Carroll[2], Associate Professor Victoria Haunton[2], Professor Dorothea Nitsch[1,3]

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Introduction: Patients with Parkinson's Disease (PD) have low muscle mass, are frail and suffer from multiple health complications including stroke. The low muscle mass may mean that estimated kidney function using creatinine-based eGFR is underestimating the extent of kidney damage in PD. Acute kidney injury (AKI) can be detected by changes in serum creatinine, and these changes are less susceptible to the bias from low muscle mass. We set out to explore the prevalence of PD coded in hospital records for patients admitted with AKI relative to the prevalence of PD in the general population.

Methods: The UK Renal Registry (UKRR) collates all the AKI alerts reported by English Laboratories in the Master patient Index (MPI). After excluding people aged<18 years, the AKI-MPI for 2019 was linked to Hospital Episode Statistics data(HES) for England. People with PD were identified using HES admission data (1997-2020) using the ICD N20 code. We calculated the prevalence of PD in age strata, and derived prevalence ratios of PD relative to the general population. We report on ICD-10-coding of AKI and 30-day post-AKI mortality comparing those with PD to those without.

Results: There were 407,107 adults reported in England with an AKI episode, and of these 2.2% (n=8,868) had diagnoses of PD. Compared to CPRD, people with PD were over-represented in each age-stratum, with an inverse relationship with age (Table 1). There were 2,205 (24.9%) people with PD who died within 30 days after AKI compared to 68,535 people without PD and AKI (17.2%), but this crude difference was largely explained by confounding by age, with a broadly comparable distribution of deaths within age-strata. Of the people with PD and AKI-alerts who survived to discharge (n=7,502), there were 4,447 (59.3%) coded with N17 for AKI compared to 55.5% of people with AKI alerts without PD.

Conclusion: Younger people with PD are overrepresented in the AKI population. More studies are needed to evaluate kidney function in people with PD to understand the pathophysiology, and long-term implications of AKI on health outcomes in PD, including further kidney function loss and delirium.

Table 1. Number and percentage of people with HES ICD N20 diagnoses of Parkinson's Disease (PD) amongst people with AKI alerts in 2019 stratified by age-groups, corresponding numbers and

percentages reported in CPRD (1), and resulting prevalence ratios of PD comparing people with AKI to the general population.

	n, % with PD amongst people with AKI			n, % reported in CPRD	Prevalence ratio
Age group (years)	Men	Women	Total		
18-49	27	25	52	93	
	0.13	0.06	0.08	0.007	11.43
50-59	111	74	185	432	
	0.52	0.38	0.45	0.09	5
60-69	496	236	732	1376	
	1.45	0.85	1.18	0.37	3.19
70-79	1849	1034	2883	2685	
	3.56	2.24	2.94	1.05	2.8
80-89	2549	1594	4143	2318	
	5.15	2.84	3.92	1.67	2.35
90+	472	401	873	405	
	3.31	1.63	2.24	1.23	1.82
Total	5504	3364	8868	7216	

Reference (1) Parkinson's UK report 2018: The Incidence and Prevalence of Parkinson's in the UK. (parkinsons.org.uk)

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Track J2 – AKI 2

Poster: 233
Submission: 284

Post Acute Kidney Injury (AKI) enhanced follow up care – assessment of feasibility at secondary care level and impact on short term patient outcomes.

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The Royal Wolverhampton NHS Trust, Wolverhampton

Introduction: Post AKI episode, patients experience adverse outcomes of cardiovascular deaths and risk of progression to chronic kidney disease (CKD). To mitigate this risk, key aspects of post AKI care should include optimisation of medicines and co-ordination of kidney function monitoring, particularly for patients with unresolved AKI, in order to identify risk of progression to CKD. Our aim was to assess whether it was feasible to provide safe and enhanced post AKI follow up care considering the resource implications in primary care.

Methods: Retrospective data collection of all unresolved AKI stage 2 and 3 from July 2022 to September 2022 which assessed key aspects of enhanced post AKI care. We looked at whether patients were reviewed in a timely manner as per recommendations by the Royal College for General Practice (RCGP) post-AKI care toolkit. Further Patient outcome measures of recurrent AKI episodes, identification of new CKD, rehospitalisation within 30 days were analysed.

Results: 496 patients with AKI stage 2 and 3 were reviewed by our AKI team during July 2022-Sept 2022. The majority of patients (75.5%) recovered from AKI before hospital discharge, but we identified 122 (24.5%) patients with unresolved AKI at time of hospital discharge. The AKI team followed up these patients for a period of 3 months, finding only 38 patients (31%) had made a full recovery from AKI. Of the remaining cohort of patients with unresolved AKI, 46 (37.7%) patients required follow up in renal clinic for further decline in renal function or due to pre-existing CKD. The average eGFR of these cohort of patients was 29 mls/min. 9 patients continue to remain dialysis dependent at 3 months. 20 patients who had unresolved AKI at 3 months were discharged with a clear communication plan to primary care. As our follow up care was individualised according to patients care needs, we were able to review only 28 patients (23.3%) in a timely manner as per RCGP post AKI care toolkit guidance, particularly for patients with poor renal recovery.

With our enhanced AKI follow up care, only 9 patients (7.3 %) with unresolved AKI had to be re-admitted within 30 days after discharge. 23 (4.6%) had further episodes of AKI after 30 days of first AKI alert during the 3 months follow up period.

28 patients required medication optimisation post AKI episode through involvement of patients, primary care and community heart failure teams.

Discussion: Our study shows by embedding enhanced post AKI follow up care we were able to identify significant proportion of patients (37.7%) needing follow up in renal clinics and reduced hospital readmissions due to closer monitoring. Through our multidisciplinary approach we co-ordinated medicine optimisation for high-risk patients with AKI. Timely review of patients with poor renal recovery as per RCGP AKI follow up toolkit was not feasible due to the stringent follow up criteria and not individualised according to patient needs.

Tuesday 6th June 12:15 – 13:15

Track J2 – AKI 2

Poster: 234
Submission: 295

Multi-centre assessment of acute kidney injury recognition and management

Dr Faezeh Sakhinia[1,2], Dr Megan Athersmith[1,2], Prof Rachel Lennon[1,3]

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Background: Acute kidney injury (AKI) is associated with increased morbidity and mortality within the neonatal and paediatric populations (1). Early identification along with diligent AKI management is crucial. Here we report the findings of a retrospective multi-centre study analysing AKI management across the Greater Manchester region.

Methods: We conducted a retrospective review of patients that acquired an AKI between the ages of 3 days to 18 years . We included seven hospitals within the North West of England over a period of two weeks to two months. These were comprised of secondary and tertiary neonatal and paediatric units. Infants under 72 hours of age were excluded due to the effect of maternal serum creatinine. Patients were identified using electronic AKI alert systems available or by review of individual blood results. AKI was staged according to the KDIGO scoring criteria and the 'Think Kidneys' baseline serum creatinine values (2,3). AKI stage 1 was defined as a serum creatinine rise above baseline of 1.5-≤2 with AKI stage 2 being a rise of 2-≤3 and an AKI stage 3 being as a rise of ≥3. Patients with an AKI score of ≥2 required tertiary nephrology clinic follow-up. Data was recorded on AKI recognition, causality and acute and chronic management. Standardised formal teaching was then delivered at each centre to improve AKI awareness.

Results: A total of 38 patients were identified (11 female, 27 male) with a mean age of 4.9 years. The total AKI incidence per month was 34.5 patients. There were 9 (26%) neonatal patients with 2 being term and 7 being pre-term. There were 13 (34%) AKI stage 1, 17 (45%) AKI stage 2 and 8 (21%) AKI stage 3 patients. The majority were identified as being due to a hypovolaemia cause (18 cases, 47%) with 6 (16%) having a primary kidney aetiology, 11 (29%) being combined and 3 (8%) having no identifiable trigger.Medications with nephrotoxic potential were used in 15 (39%) cases with doses being adjusted in only 3. There were no recordings of strict daily fluid balances or weights in any of the participants. Only 5 (13%) patients underwent a kidney ultrasound. Of the 21 (55%) patients identified as requiring follow up in a tertiary nephrology clinic, only one patient was referred. Six cases (16%) were discussed with the tertiary paediatric nephrology centre. No patients required dialysis.

Conclusion**:** Despite a monthly incidence of 34.5 patients, neonatal and paediatric AKI is still poorly recognised and managed. With the known risk of progression to chronic kidney disease, children with a history of a significant AKI require formal nephrology follow-up. Through standardised multi-centre teaching and expansion of the role of an AKI nurse, we aim to improve the management of neonatal and paediatric AKI and will review the impact of this intervention within our region.

Tuesday 6th June 12:15 – 13:15

Track J2 – AKI 2

Poster: 235
Submission: 301

An audit of practice: Acuity, outcomes and mortality of transfers to a tertiary renal centre

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Introduction: The Getting It Right First Time (GIRFT) report identified significant differences between renal centres when transferring patients with acute kidney injury (AKI)[1]. 73% of centres reported delays of ≥24 hours. These delays lead to a deterioration in the patients condition and strained critical care services. GIRFT recommend that patients with AKI should be transferred within 24 hours of acceptance by a consultant nephrologist.

We reviewed our centre's performance, as well as identifying those with high national early warning scores (NEWS) and those who required out-of-hours dialysis as these patients may consequently require input from critical care. We anticipated that the COVID-19 pandemic would affect our transfer targets and acuity of patients.

Methods: We included patients transferred with AKI Stage 1-3 (by KDIGO classification) during two different time points (50 patients: 02/08/2019/-30/12/2019, 50 patients: 15/06/2021- 30/09/2021) from our referral portal (referapatient). Data was collected using electronic records and VitalPAC. Patients established on haemodialysis and peritoneal dialysis were excluded.

Results: At both timepoints 46% were new referrals, 54% were known to renal services. In 2019 16% received renal replacement therapy on ICU prior to transfer, versus 12% in 2021. The average time from referral to transfer in 2019 was 5 days, versus 7 days in 2021. The average time from consultant acceptance to transfer was 24 hours in 2019, in comparison to 72 hours in 2021.

From the 2019 cohort; 34% were transferred out-of-hours (after 17:00), 26% received haemodialysis within the first 24 hours and 32% received their first haemodialysis out-of-hours. From the 2021 cohort; 54% were transferred out-of-hours, 26% received dialysis within the first 24 hours and 54% received their first haemodialysis out-of-hours.

The highest aggregated NEWS within the first 24 hours of arrival was calculated. In 2019 the average NEWS was 3, 10% had a score of 5-6 and 6% had a score of ≥7. In 2021 the average NEWS was 4.76, 28% had a score of 5-6 and 18% had a score of ≥7.

Outcomes were reviewed at 30 days and are shown in table 1.

Outcome (30 days)	**2019 (%)**	**2021 (%)**

Death	4	2
Recovery	8	2
Renal follow-up	46	36
Advanced kidney care	4	0
Haemodialysis	32	42
Peritoneal dialysis	0	4
Transferred/Unknown	8	0

Discussion: Our findings corroborate the GIRFT report; patients with a delayed transfer had a higher mortality and higher NEWS on arrival. Our time periods encompassed the COVID-19 pandemic and our admissions policy during this time affected transfers as well as reducing the number of in-person nephrology reviews at referring centres. A small proportion required treatment on ICU prior to transfer and those arriving out of hours and with a higher NEWS on may contribute to the critical care outreach workload. This could potentially be avoided with earlier transfer. Further training, teaching and outreach within referring hospitals may identify those who need transfer early, as well as developing an inter-hospital transfer protocol to standardise transfer criteria.

References:

1. GIRFT Programme National Speciality Report – Renal Medicine, 20219

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Track J2 – AKI 2

Poster: 236
Submission: 317

Episodes of AKI following hospitalisation and association with adverse outcomes: analysis from a prospective cohort study

Dr Kerry Horne[1,2], Dr Daniela Viramontes-Horner[1], Mrs Rebecca Packington[2], Dr John Monaghan[2], Mr Timothy Reilly[2], Dr Sue Shaw[2], Ms Aleli Akani[2], Professor Nick Selby[1,2]

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Introduction: AKI is associated with adverse long-term outcomes, including mortality, cardiovascular events and CKD development and progression. Individuals who have sustained AKI are at increased risk of developing future AKI. This analysis presents the association of long-term risk related to recent and future episodes of AKI in a prospective cohort of recently hospitalised individuals.

Methods: Two matched cohorts of hospitalised individuals who had survived to at least 90 days after hospital discharge were recruited. The cohorts consisted of people who had sustained AKI during hospital admission (exposed group), and those who had not (non-exposed group), and were matched 1:1 for age, baseline eGFR stage and diabetes. Renal function and albuminuria were measured at 3 months, one, three and five years after index hospitalisation. Mortality, further AKI episodes and episodes of heart failure were recorded. Multivariable analysis was performed with binary logistic regression.

Results: 866 exposed and non-exposed participants were recruited and successfully matched. Over the 5-year follow-up period, 138 (34%) participants in the exposed group had ≥1 further AKI compared with 67 (16%) in the non-exposed group (OR 2.71 [95% CI 1.94 to 3.77]; p<0.001). Independent associations with developing AKI during the follow-up period were AKI during index admission, baseline eGFR, albuminuria at 3 months and smoking status.

Binary logistic regression, including all matched participants, showed that AKI during follow-up was independently associated with 5-year kidney disease progression (adjusted OR 2.49, 95% CI 1.42-4.37, p=0.002), mortality (adjusted OR 3.076 95% CI 2.039-4.639, p<0.001) and episodes of heart failure (adjusted OR 5.234 95% CI 3.355-8.164, p<0.001).

There was an additive effect, with frequency of adverse outcomes increasing as number of AKI exposures increased (Table 1). Exposure to AKI during index admission or follow-up episodes conferred similar risk of kidney disease progression. AKI during the follow-up period had a stronger effect on mortality and developing an episode of heart failure than index admission AKI in this survivor cohort.

Conclusions: Previous AKI episodes are associated with increased frequency of future AKI episodes. AKI episodes during follow up period were independently associated with adverse outcomes regardless of

AKI exposure during index hospitalisation. Increasing number of exposures to AKI had an additive effect on the proportion of individuals showing kidney disease progression, mortality and heart failure episodes. In this cohort of AKI survivors, AKI during the follow-up period had a stronger association with these outcomes than exposure to AKI during the index admission. A strategy for improving long-term outcomes in AKI survivors may be improving the identification of those at greatest risk of future AKI and strategies to prevent or optimise early detection and management.

Table 1: Incidence of kidney disease progression by 5-years according to number of time points during index admission and follow-up in which AKI episodes occurred.

Number of AKI episodes	0 n=349	1 n=347	2 n=115	>=3 n=26	Sig
Kidney disease progression n (%)	19 (5.4)	92 (26.5)	45 (39.1)	17 (65.4)	p<0.001
Mortality n (%)	57 (15.6)	87 (24.2)	41 (35.7)	9 (34.6)	p<0.001
At least 1 episode of heart failure	37 (10.1)	66 (18.4)	41 (35.7)	13 (50)	p<0.001

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Track J2 – AKI 2

Poster: 237
Submission: 325

Using the Renal Network to collaborate, improve and standardise AKI nurse led services.

Miss Leah Torr[1], Miss Claire Mcguire[1], Mrs Elita Phiri[1], Ms Rachael Lee[2], Ms Suzanne Morgan[2], Ms Kelly Wright[3], Ms Charlotte Hoodless[3], Ms Lauren Still[3], Ms Kathryn Northcott[4], Ms Tracey Lynch[5], Ms Lisa Mason[6], Ms Christine Armitage[6], Mr Robert Browne[7], Ms Claire Mace[7], Mrs Shelagh Bickerton[8], Ms Emilia Sobczyk[8], Ms Maribel Prudon[8], Ms Katie Harris[8], Ms Chantal Owens[9], Ms Gemma Highway[9], Ms Ann Grace[9], Ms Jeanie Kessell[10], Ms Joanna Martin[11], Mrs Marie Atkins[2], Mr Alastair Tallis[2], Dr Nitin Kolhe[1], Professor Nick Selby[1]

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[7]Nottingham University Hospitals, Nottingham.
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[9]Wallsall Healthcare NHS Trust, Walsall.
[10]Kettering General Hospital, Kettering.
[11]University Hospital Birmingham, Birmingham

Introduction: AKI is a national healthcare priority, with a need for hospital-wide improvement strategies. Reports have demonstrated potential value of a dedicated AKI specialist nurse team, which are increasingly being rolled out across UK hospitals. Discrepancies in service specifications exist which may lead to inequalities in care provided. Within the Midlands Renal network, we aimed to explore regional variations in AKI nurse services, utilising an AKI nursing forum that was originally formed to provide peer support, share information and expertise across the network. Our aim is to increase standardisation across systems and processes to maximise the opportunities that arise from successful integration of an AKI nurse services in secondary care.

Methods: Baseline information was gathered from 6 out of 11 units within the network, all of which are covered by AKI specialist service. Information was not collected from 5 trusts, 2 were paediatric and the remaining 3 did not have a specialist AKI Team. Detail regarding workforce allocation, job role and service specifications were collected, as well as the annual number of AKI alerts from each centre as a surrogate measure of caseload. The AKI nurse team were then invited to a monthly online nursing group forum to discuss the baseline data collected. A diverse array of monthly dates was established to be inclusive of all working patterns.

Results: There was significant variation in delivery of AKI nursing services offered by each trust across three main themes. Firstly, variation in role identity, including variation from sole duties in AKI versus a

dual responsibility of AKI and an additional specialism such as Critical Care outreach and/or sepsis. There were also differences in staffing levels, this offered much diversity across the region. In particular the lowest ratios of Whole Time equivalent (WTE) was 1 to 10,722 Annual AKI alerts, as compared to 3 WTE for 8050. This was significant as reduced WTE to AKI ratio is likely to reduce service capacity, effectiveness and restrict development of the team members'.

. The second theme was academic credentials that differed along a spectrum of qualifications from band 8 advanced nurse practitioner through to clinical nurse specialist at band 6 with no prior extended role training. Discussion also highlighted the difficulty of role transition, with different educational needs depending on clinical experience and background (e.g. Intensive Care Unit (ICU) versus renal background). The third theme was longevity of the AKI CNS services, which ranged from <6months toa maximum of 9 years.

However, similarities exist between AKI nursing services in overall objectives. These encompassed inpatient clinical review, development of a post-discharge AKI clinic, multi-disciplinary education and engagement in quality improvement work.

Discussion: We have described the variation in AKI nursing provision across the Midlands Renal Network. We have formed an AKI nursing forum for the network that aims to reduce this variation via sharing of knowledge, competency packages and education tools, and via engagement in regional quality improvement and data collection. This is particularly important given a lack of national standards for AKI nursing services.

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Track J2 – AKI 2

Poster: 238
Submission: 326

Experience of recruiting hospital inpatients with acute kidney injury to a prospective observational cohort study

Dr Rebecca Noble[1,2,3], Miss Leah Torr[3], Mrs Elita Phiri[3], Miss Claire Mcguire[3], Mrs Karen Jones[1,3], Prof Nicholas Selby[1,2,3]

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[2]The University of Nottingham, Nottingham.
[3]University Hospitals of Derby and Burton, Derby

Introduction: Acute kidney injury (AKI) is a sudden, usually reversible loss of renal function occurring in up to 20% of hospitalised inpatients. Rather than being a single entity, AKI is a heterogeneous syndrome with variety of causes affecting a wide range of people. AKI carries an increased risk of mortality in the first 90 days, and those who survive are at an increased risk of long-term health consequences, particularly chronic kidney disease (CKD). At present there are no interventions proven to reduce the development of CKD after an episode of AKI. This is in part due to a lack of understanding about the initial 'recovery' phase after AKI. This prospective observational cohort study aims to understand which patients are more at risk of non-recovering after AKI. Here we present the challenges of recruitment and strategies for retention of participants in an ongoing study.

Methods: Since December 2021 'Non-recovery of kidney function after AKI: identifying high risk groups' (RECOVER-AKI) has been open. Using the eligibility criteria in table 1, participants with AKI 1-3 have been recruited from an acute hospital inpatient setting. Detailed screening data has been collected alongside data collected for the participants. Recruited participants are seen in hospital and at day 30, 60 and 90 with plasma, serum and urine samples taken at each time point for biochemistry as well as storage. A cohort of 10 participants will also have multiparametric MRI scans at day 30 and 90. Potential participants are screened using a daily list generated from hospital eAlerts. Of the first participants recruited, 50 have currently reached day 90 of their follow up and their outcomes have been reported as recovered/non-recovered based on the reversal of KDIGO 2012 AKI criteria.

Results: From the first 1000 potential participants screened, 136 met eligibility criteria from whom led 63 participants were recruited (fig 1.). Reasons for ineligibility are also listed in fig 1. The consort diagram (fig 2.) describes participants progression through the study.

Discussion: There are challenges in recruiting patients from an in-patient setting at time of AKI when participants are required to return for post-discharge follow-up visits. In order to improve recruitment and retention, we have made a number of adaptations. Screening has been streamlined by involving our AKI Specialist Nurses who see all patients with AKI 2/3 patients in person leading to recruitment of patients who may have been deemed ineligible on remote screening. Patients are offered appointments at time convenient to themselves rather than in a specified clinic, and where possible they are seen around other appointments they have. This collaborative approach has improved retention throughout

the study. We have also introduced a two stage consent process for the imaging substudy, whereby suitable participants are approached at the day 30 visit, i.e. after discharge. We have found that the withdrawal rate since this change as significantly improved (no withdrawals since this change). The study is still open and aims to recruit 150 participants in total.

Inclusion	Exclusion
≥18yrs	Unable to give consent or understand written information
Acute kidney injury stage 1-3 by KDIGO criteria	Obstructive uropathy
At least one previous serum creatinine result available for determining baseline renal function	Renal transplant
Able to give informed consent	Patient receiving palliative care
	Patient with AKI due to recent nephrectomy
	Multiple myeloma
	Patients with known or suspected acute vasculitis or glomerulonephritis requiring immunosuppression
	End-stage kidney disease (CKD stage G5 or already on RRT)
	Serum creatinine changes that do not meet the KDIGO definition of AKI

Table 1. Eligibility criteria

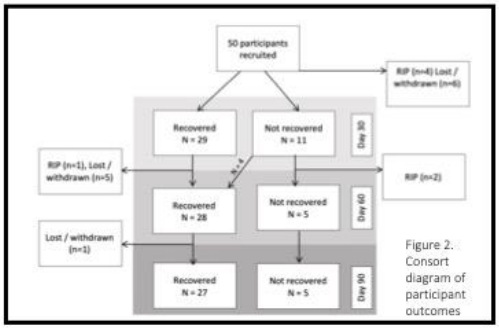

Figure 2. Consort diagram of participant outcomes

b)

Unable to give consent or understand written information	**172**
Obstructive uropathy	**69**
Renal transplant	**21**
Patient receiving palliative care	**162**
Patient with AKI due to recent nephrectomy	**4**
Patients with known or suspected acute vasculitis or glomerulonephritis requiring immunosuppression	**4**
End-stage kidney disease (CKD stage G5 or already on RRT)	**51**
Serum creatinine changes that do not meet the KDIGO definition of AKI	**379**
Myeloma	**2**

Figure 1. Summary of screening data a) eligibility subsequent recruitment b) reasons for ineligibility

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Track J2 – AKI 2

Poster: 239
Submission: 353

Evaluation of a nurse led acute kidney injury teaching programme on the management and outcomes for patients on an orthopaedic ward.

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Royal Devon and Exeter Hospital, Exeter

Introduction: Acute kidney injury (AKI) is common in patients admitted to hospital and carries a poor prognosis with significant associated morbidity and mortality (reported in hospital mortality rates of 31%[1]). We aimed to review the impact of a teaching package delivered to nursing staff working on an orthopaedic ward on the management and outcomes of patients with AKI.

Methods: A specialist renal nurse delivered informal teaching on AKI to nursing staff for 15 minutes each weekday for a month. Topics covered included the definition and causes of AKI, identifying patients at risk of AKI and nursing management. We reviewed the electronic medical records of patients managed on the orthopaedic ward, who developed AKI, in a 3-month period before and after the month of AKI teaching. Patients were identified by performing a search of medical records to identify AKI flags. We reviewed general demographics of the patients, reasons for hospital admission and in-hospital mortality. We reviewed whether a number of basic measures for managing AKI were performed within a 48-hour period of the initial flag in these patients, including a documented medication review, urine dipstick testing, mid-stream urine samples being obtained and documentation of fluid balance.

Results: In total, 14 registered nurses (60.8% of total registered nurses), 9 un-registered nurses (45% of total un-registered) and 2 student nurses attended the teaching. Over the 3 month periods, there were 24 patients who flagged for an AKI in the pre-teaching group and 17 in the post-teaching group. The average ages were 77.7 years and 81.5 years retrospectively. 58.3% and 58.8% of patients respectively were of male gender. The majority of patients in both groups were admitted because of a fractured neck of femur. A medication review relevant to AKI had occurred within 48hrs of the initial AKI flag in 15 of 24 (62.5%) and 14 of 17 (82.4%) patients in the pre and post teaching groups respectively. Urine dipsticks were performed in 9 of 24 (37.5%) and 13 of 17 (76.5%) patients. A mid-stream urine was sent in 9 of 24 (37%) and 12 of 17 (70.6%) patients. Basic fluid balance was documented in 19 of 24 (79.2%) and 13 of 17 (76.5%) patients. Whilst not part of nursing management it was also noted that 8 of 24 (33%) patients had renal imaging pre-teaching and 5 of 17 (29.4%) patients post-teaching. There were more AKI stage 3's in the pre-teaching group (4 of 24) vs the post-teaching group (1 of 17). Mortality was high in these patients with 11 of 24 (37.5%) and 9 of 17 (35.3%) patients dying in hospital respectively.

Discussion: Improved knowledge of AKI at nursing level following a nurse led teaching package improved the basic management of patients who developed AKI on an orthopaedic ward. Fewer AKI stage 3's were observed following the teaching intervention. Our data emphasises the poor prognosis associated with in hospital AKI with a high mortality rate observed both before and after teaching.

References:

1). Nephwork acute kidney audit, Renal association, 2019

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Track J2 – AKI 2

Poster: 240
Submission: 356

Regional reconfiguration of Nephrology Services to reduce delays in care, ITU bed utilisation and reduce length of stay

Dr Syazril Samani[1], Dr Sophie Miller[1], Dr Harsha Wodeyar[1], Miss Kate Brizell[1], Dr Mrityunjay Hiremath[1], Dr Neil Bailey[2], Dr Asheesh Sharma[1]

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Acute kidney injury (AKI) affects up to 20% of emergency admissions to acute hospitals. There is variation in incidence, mortality and the way in which care is organised. 73% of centres reported delays exceeding 24h in transferring patients from referring hospitals to renal centres; all experienced an adverse outcome due to these delays (GIRFT Renal Medicine report, 2021). Baseline data in 2018 demonstrate delays in the transfer of patients to our hub renal unit; these patients were frequently transferred to the referring centre ITU despite only having single organ failure, while waiting for a hub renal bed. There are varying models of service delivery between renal centres (hubs) and their referring acute hospitals (spokes). The hub renal centre had inpatient beds split between 2 sites in the city and provided a hybrid of telephone and weekday inpatient consultation service to its 3 main spoke hospitals, serving a population of 1.06 million. Between 2019-2022 the service was re-organised. 6 hybrid consultants were appointed in the spoke hospitals; they deliver local AKI care and act as 'gatekeepers' to the hub unit. The two hub inpatient sites were combined in a hospital: 8 Renal HDU beds, 34 Nephrology beds, all single rooms with the Nephrology department given autonomy to manage patient transfers in/out. The merger has improved the resilience of the medical workforce, and facilitated more frequent senior medical input. We report the impact of these changes on the delivery of acute renal care in Liverpool.

Baseline audit data from a spoke hospital was collected in 2018. The number of patients transferred to the hub unit, their utilisation of ITU beds prior to transfer, and the time interval between decision to transfer and transfer were recorded. These measures were repeated following service reconfiguration in 2020. The potential impact was estimated if these gains were also realised at all referring spoke sites. The median length of stay in the hub unit bed base for all inpatients is also reported both before and after reconfiguration.

The key findings are reported in Table 1. The number of patients requiring transfer to the hub unit was reduced by 35.3% and the mean delay in transfer was significantly reduced from 4.9 to 0.8 days. This was associated with a predicted reduction in the use of spoke hospital ITU beds of 114 bed days per annum in total. At the hub unit, median length of stay has fallen by 2 days.

Table 1: Improvement in service provision following reconfiguration

	Baseline	Following service reconfiguration
Annual emergency inpatient renal transfers from spoke to Hub Unit (predicted numbers assuming gains extrapolated to all 3 main spoke sites)	34 (102)	22 (66)
Mean time between decision to transfer, and transfer (days)	4.9	0.8
Annual ITU bed days at spoke unit pre-transfer (predicted numbers assuming gains extrapolated to all 3 main spoke sites)	46 (138)	8 (24)
Median hub unit length of stay (days)	7	5

This service reorganisation has enabled more patients to be managed closer to home, reduced the utilisation of ITU beds to manage patients with single organ failure, reduced delays (and the risk of adverse outcomes) for patients needing transfer to the hub unit, and has reduced the length of stay in the hub unit bed base. These favourable trends parallel the introduction of hybrid consultants in spoke centres, and the creation of a single city hub unit with the Nephrology team working closely with operational colleagues to control patient flow.

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Track J2 – AKI 2

Poster: 241
Submission: 368

Validation of the Welsh electronic acute kidney injury alerts

Dr Tim Scale[1,2], Mr Gareth Davies[2], Professor Ronan Lyons[2], Dr James Chess[1,2]

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Backgrounds: Electronic alerts (eAlerts) for acute kidney injury (AKI) were introduced across Wales between 2013-2015 with the intention of aiding diagnosis of AKI and expecting to improving outcomes. These eAlerts have been used to help understand the frequency of AKI but how they perform in practice is not well known. From the publically available information and research publications, it seemed that the NHS England algorithm was applied in Wales. The application of these eAlerts is understood to be standardised, using the all Wales laboratory information management system. We looked at how these alerts compare to a recreation of the NHS England electronic alert algorithm with dialysis patients removed using the Welsh renal dataset.

Method: The research was carried out in the secure anonymised information linkage (SAIL) databank within Swansea university. This contains pseudoanonymised information of Welsh patients including biochemistry data, AKI alerts and the Welsh renal dataset. We recreated the NHS England AKI algorithm within SAIL, suppressing the detection of AKI in patients undergoing haemodialysis at that time and compared this to the eAlerts sent to clinicians in Wales.

Results: The sensitivity of the Welsh AKI eAlerts was 61.6% when compared to the NHS England eAlert algorithm with dialysis patients excluded. The specificity is better (99.7%), however 1 in 12 eAlerts are sent in patients currently undergoing haemodialysis. This varies in the different Welsh health boards. The number of false negatives was low, but again varies between health boards.

If we looked at the first AKI alert issued to the patient, the sensitivity improved, but again this varied by health boards which have been anonymised in the table below;

Health Board	All alerts sensitivity	1st AKI alerts for patient sensitivity
1	62.2%	94.5%
2	62.2%	93%
3	61.7%	92%
4	63.3%	92.9%
5	58.5%	91.7%
6	62.1%	92.9%

Table 1 - A comparison of the clinical AKI alerts to the NHS England AKI algorithm with dialysis excluded

The reason for this low sensitivity was not immediately clear, but upon investigation, it became apparent that the Welsh algorithm had an additional rule applied to it.

Discussion: The Welsh AKI eAlerts are not directly comparable to those sent out in England and Scotland, however this did improve with the first eAlerts for a patient.

It was understood that the Welsh eAlerts were based on the same alerts sent in England and Scotland. However, the Welsh system had the addition of an undocumented rule that suppressed AKI alerts in those whose creatinine values increased by less than 6% from the previous one. This led to a reduced number of eAlerts.

Conclusion: In order to understand the impact of these AKI eAlerts, it is crucial to understand how they have been implemented. This validation study found that the Welsh eAlerts identified a third fewer alerts than a version of the NHS England AKI algorithm due to an additional rule. As a result of the recognition of the deviation, we are proposing options to implementing a standardised approach in Wales, which includes removing this extra rule.

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Track J2 – AKI 2

Poster: 242
Submission: 393

Practical consequences and patient safety implications of using hard cut-offs in treatment algorithms, which are further exacerbated by method bias differences

Dr Rachel Marrington, Mr Martin Roch, Mr Finlay MacKenzie

Birmingham Quality (UK NEQAS), Birmingham

Background: Laboratory results are routinely reviewed in conjunction with Reference Ranges which are often method specific. National and International Guidelines are widely used which often have specific concentration cut-offs and are usually method independent. These hard cut-offs aid in decision making for patient treatment, but misclassification can be very costly both financially and to patient outcomes.

The example of creatinine where the clinical utility has expanded since it was first introduced and it is now routinely used in many algorithmic tests/pathways, including eGFR and AKI. EQA data consistently shows that there are manufacturer differences in bias, neither these, nor the impact of interferents are taken into consideration in clinical pathways.

Methods: The AKI element of the UK NEQAS for Acute and Chronic Kidney Disease Scheme has over 350 participants. In 2022, two specific scenarios were probed 1) can methods identify a 26 umol/L difference in creatinine between specimens? and 2) what is the spread of creatinine results at 354 umol/L? Serum specimens were designed to investigate these areas and distributed to all participants within the Scheme.

Results: Both the KDIGO AKI Guidelines and the NHS England AKI Algorithm require laboratories to be able to differentiate a creatinine difference of 26 umol/L. To allow for the tolerances in measurement, we factored-in a bias of 7.5% — our regular allowable error — onto what we added as a 'spike', so we added 28 umol/L creatinine into our base specimen. Of 363 laboratories, including all Abbott Architect and all Abbott Alinity Jaffe users, 18% measured the difference between the two specimens to be less than 26 umol/L.

Another 'hard' cut-off in the algorithm is a creatinine concentration of 354 umol/L, which classifies a patient as AKI Stage 3. A specimen was designed to have a concentration of 354 umol/L (confirmed by reference method analysis as 354.92 umol/L). 46% of 359 laboratories measured a creatinine >354 umol/L with a range of results from 320 – 390 umol/L.

Conclusion: As laboratory medicine improves and the clinical utility of existing assays is extended, verification is required to ensure that the performance of assays are fit for purpose across all manufacturers for their extended roles.

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Track J3 – AKI 3

Poster: 243
Submission: 410

Do electronic acute kidney injury alerts improve mortality in Wales?

Dr Tim Scale[1,2], Mr Gareth Davies[2], Professor Ronan Lyons[2], Dr James Chess[1,2]

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[2]Swansea university, Swansea

Background: The recognition and care of patients with AKI has been suboptimal. Electronic alerts have been introduced in a staggered way across Wales between 2014 and 2015 to try and improve this. We set out to understand if these alerts improved outcomes of AKI in Wales.

Method: The research was carried out in the secure anonymised information linkage (SAIL) databank within Swansea university. This contains pseudoanonymised information of Welsh patients including biochemistry data, AKI alerts and the Welsh renal dataset. We recreated the NHS England AKI algorithm within SAIL, suppressing the detection of AKI in patients undergoing haemodialysis at that time. We compared adult patients that would have had an AKI alert before it was implemented to those that had an alert in clinical practice. 3 of the 7 Welsh health boards did not have data prior to the alerts, and were therefore excluded. It became apparent that the Welsh alerts (called WRRS alerts in this study) had an additional rule applied to it, meaning it was not directly comparable to the NHS England code. Therefore, for comparison we have created 3 groups, the NHS England code before and after the introduction of the alerts, and the alerts seen by the clinicians, the WRRS alerts after.

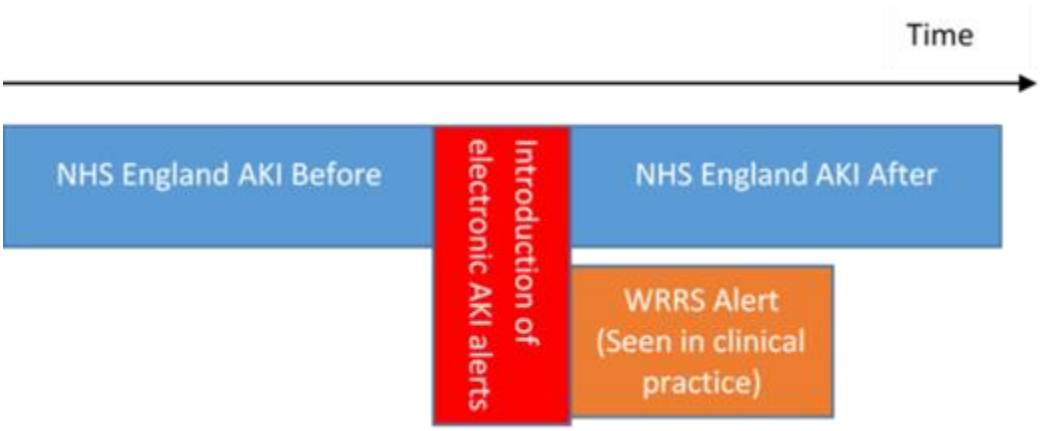

Figure 1 – Identification of AKI using recreated NHS England AKI alerts before and after the introduction of the Welsh alerts (WRRS) which were available for clinicians

Results: In the four health boards there were 2,014,501 creatinine tests (693,228 individuals) in the year before the alert introduction and the 2,081,269 test after (709,951 individuals). Of these tests 3.8% of the tests before (75,889) and 3.6% after (75,958) the introductions of alerts triggered AKI by the NHS England algorithm.

Outcomes	NHS England AKI Before alerts	NHS England AKI After alerts	P value (Before vs After)	WRRS alerts after	P value (Before vs WRRS)
30 Day Mortality	18.6%	19.3%	0.08	19.7%	0.01
1 Year Mortality	36.8%	37.9%	0.01	37.5%	0.12
Recovery	72.8%	74.2%	<0.01	75%	<0.01
Recovery and 30 day survival	65.2%	66.2%	0.01	67.1%	<0.01
Future Dialysis Treatment	2.3%	2.9%	<0.01	2.3%	0.65
Length of Level 3 care days Mean (Median)	5.8 (4)	6 (4)	0.62	5.5 (4)	0.69
Admitted to hospital same day	23.5%	22.8%	0.07	23.2%	0.46
Progression of AKI to Stage 3	14.0%	14.5%	0.1	14.6%	0.06

Table 1 - Univariate regression analysis of the outcomes following the first AKI alert of the period

Discussion: As a whole, we did not see an improvement in the 30 day mortality following the introduction of AKI alerts. We did see an improvement in the recovery from AKI but this failed to result in a reduction in the need for future dialysis or AKI progression. There were some health boards with different positive outcomes, including one health board with an improved mortality, which possibly suggest local variation in the implementation of these alerts. Future efforts should focus on modifying these alerts and adapting interventions from areas of local success.

Tuesday 6th June 12:15 – 13:15

Track J3 – AKI 3

Poster: 244
Submission: 419

Identifying the risk of acute kidney injury: Predictive scoring system for the development of acute kidney injury

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Acute kidney injury is known to have a substantial implication in terms of length of stay, mortality and morbidity and the associated costs. We aimed to assess whether a scoring system could be devised to identify individual patient at increased risk of acute kidney injury.

We had 116 patients admitted to the renal ward in Dorset County Hospital during 2021 who were diagnosed with a stage 3 Acute Kidney Injury. We used different parameters such as Age, Chronic Kidney disease stage 4 and stage 5, presence of hepatorenal syndrome, left ventricular ejection fraction less than 40%, use of intravenous contrast, use of gentamicin and diabetes (insulin and non-insulin dependent). This parameters was used to assess the mortality within 90 days as the primary end point. We used renal replacement therapy, partial recovery and full recovery as the secondary end point.

Results showed that the different parameters individually had an association with mortality, requirement of renal replacement therapy, partial recovery and full recovery. It was seen that use of insulin prior to admission, EF < 40%, hepatorenal syndrome were associated with increased mortality and reduced renal recovery.

Using these variables, we derived a scoring system to identify acute medical patients with acute kidney injury stage 3 which predicts mortality and need of replacement therapy and renal recovery.

Parameters scoring

Age > 75	1
Chronic kidney disease stage 4 prior to admission	2
Chronic kidney disease stage 5 prior to admission	4
Hepatorenal syndrome	2
Ejection fraction < 40%	2
Use of IV contrast	1
Use of IV gentamicin	1
BMI 30 – 34	1
BMI > 35	2
Insulin dependent diabetes	2

Non-insulin dependent diabetes	1

Using the scoring system, scores of 5 and above had a 1 year mortality rate of 53.6% in comparison to patients with a score below 5 whom had a 1 year mortality rate of 26.1%. Renal recovery (partial + full) was noted in 79.5% of patients with score less than 5 in comparison to 71.4% of patients with score of 5 and above. Renal replacement therapy was needed in 35.7% with score of 5 and above in comparison to 28.4% in score below 4

In conclusion, this scoring system can aid in predicting mortality and the rate of renal recovery with patients presenting to hospital with acute kidney injury.

Tuesday 6th June 12:15 – 13:15

Track J3 – AKI 3

Poster: 245
Submission: 437

Intraoperative shedding of endothelial glycocalyx in cardiac surgery-associated acute kidney injury: a prospective longitudinal cohort

Dr Jennifer Joslin[1,2], Mr Ranjit Deshpande[3], Dr Sam Hutchings[4], Professor Simon Satchell[5], Professor Claire Sharpe[1,2], Dr Kate Bramham[1,2]

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Cardiac surgery-associated acute kidney injury (CSA-AKI) is common and has serious immediate and long-term sequalae. Enhanced early prediction of those at highest risk and greater understanding of underlying pathological processes are needed to prevent or minimise damage. CSA-AKI pathogenesis is multifactorial, and the recognised major associated insults are ischemia-reperfusion, inflammation, and oxidative stress. These insults are thought to each independently disrupt the microvasculature as a key pathogenic step in AKI development but direct consideration of microvascular disruption in CSA-AKI has not previously been explored. The endothelial glycocalyx lines endothelial cells throughout the vasculature and has multiple physiological roles including regulation of microvascular perfusion. Endothelial glycocalyx undergoes continual shedding and biosynthesis, and circulating concentrations of glycocalyx constituents correspond to the rate of shedding. We aimed to investigate dynamic glycocalyx changes and temporal association with CSA-AKI.

We conducted a prospective observational cohort study of patients undergoing non-emergency coronary artery bypass graft surgery. Serial blood and urine sampling was undertaken at seven set surgical time-points in the pre, intra and post-operative period (Figure 1). Plasma syndecan-1 (SDC1), a major endothelial glycocalyx structural component, was quantified by enzyme-linked immunosorbent assay. For each result, a ratio against simultaneous plasma albumin was calculated to take account of intraoperative haemodilution fluctuations. AKI within 48 hours was assessed using Kidney Disease Improving Global Outcomes (KDIGO) criteria.

75 were recruited and 61 participants completed sampling, including 13 (21.3%) who developed CSA-AKI.

Participant characteristics are outlined in Table 1.

Median baseline SDC1 concentration was 35.34ng/ml [IQR 25.12,48.56ng/ml]; median peak intraoperative SDC1 concentration was 241.75ng/ml [IQR 189.98,495.09ng/ml].

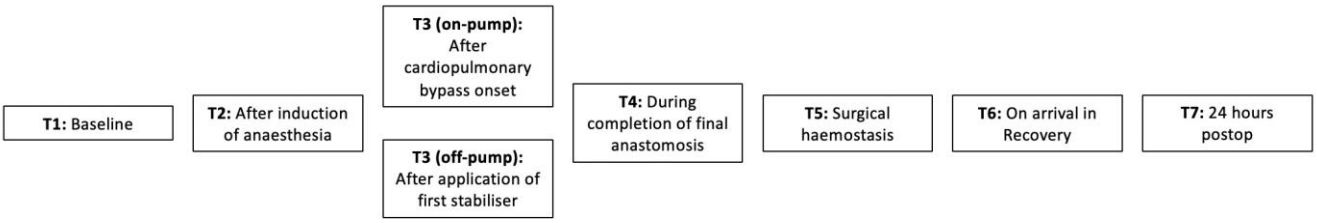
Peak intraoperative SDC1:albumin was significantly higher in participants who subsequently developed CSA-AKI compared to those who did not (p=0.0183). (Figure 2a)

The difference between peak and baseline SDC1:albumin was also significantly higher in participants who developed CSA-AKI than in those who did not (p=0.0226). (Figure 2b)

Analysis of confounding factors including medical history and surgical parameters will be undertaken.

This is the first study to undertake serial quantification of SDC1 in coronary artery bypass graft surgery patients with consideration of CSA-AKI, and the first demonstration of increased intraoperative shedding of SDC1, a core endothelial glycocalyx constituent, in those who subsequently developed CSA-AKI. These findings suggest endothelial glycocalyx disruption and microvascular dysfunction in CSA-AKI may provide a target for early therapeutic intervention and / or facilitate earlier identification of patients at greatest risk.

Figure 1: Plasma sampling timepoints



'on-pump': surgery with the use of cardiopulmonary bypass; 'off-pump': surgery without the use of cardiopulmonary bypass

Table 1: Study participant characteristics

Participant characteristic		All
Age, years		65.0 (±9.5)
Baseline creatinine, µmol/L		96.2 (±38.5)
Sex		
	Male	50 (82.0%)
	Female	11 (18.0%)
Ethnicity		
	White	45 (73.8%)
	Asian / Asian British	8 (13.1%)
	Black / African / Caribbean / Black British	4 (6.5%)
	Mixed / Multiple	3 (4.9%)
	Other	1 (1.6%)
Surgery type		
	With cardiopulmonary bypass	54 (88.5%)
	Without cardiopulmonary bypass	7 (11.5%)

Summary data are presented as mean and standard deviation in parentheses; categorical data are presented as n (%).

Figure 2a: Peak intraoperative SDC1:albumin in patients who did and did not develop post-operative AKI

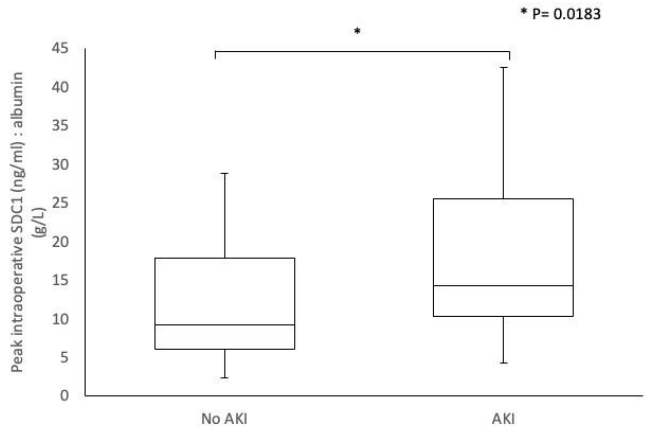
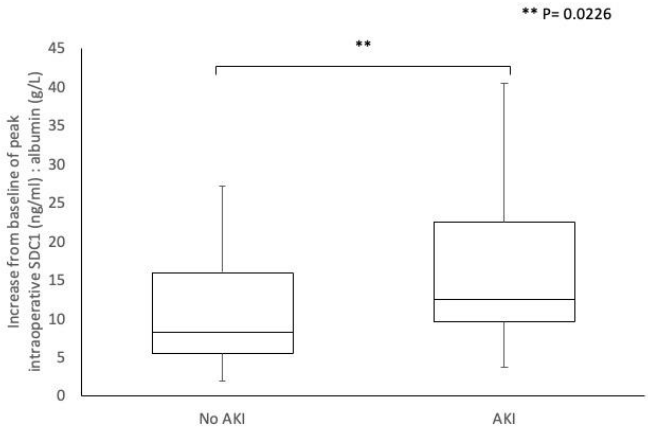


Figure 2b: Increase from baseline of peak intraoperative SDC1:albumin in patients who did and did not develop post-operative AKI



SDC1: Syndecan-1; AKI: acute kidney injury

Tuesday 6th June 12:15 – 13:15

Track J3 – AKI 3

Poster: 246
Submission: 451

Improved in vitro models for proximal tubular cells using growth on matrix and induced pluripotent stem cell (iPSC) approaches

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[1]Wales Kidney Research Unit, Cardiff University, Cardiff.
[2]School of Pharmacy, Cardiff University, Cardiff

Introduction: Disorders of kidney function can be divided into Chronic Kidney Disease (CKD) and Acute Kidney Injury (AKI). CKD is classified as kidney abnormalities that last for more than three months and is usually driven by an increase in kidney tissue scarring (called fibrosis). To uncover these diseases, there is an urgent need for the development of a robust *in vitro* model system to unravel the disease development. In the human kidney, proximal tubule cells (PTCs) are an abundant cell type, making up >50% of the cortical mass, central to kidney function, and responses to injury. Recent data demonstrates that existing *in vitro* models are poorly representative of their in vivo transcriptomic profiles and behaviour. Here, we present work targeted at developing improved *in vitro* models of PTC phenotype and responses.

Methods: HK-2 cells are a clonal E6/E7-transformed human PTC line and are commonly used for *in vitro* PTC studies. HK-2 cells on tissue culture plastic were compared to those grown on matrix and to induced pluripotent stem cell (iPSC) -derived PTC. Time courses extending to 14-day differentiation protocols were evaluated, as were responses to injurious stimuli including 10ng/ml TGF beta, 1µM H_2O_2, and 5-10 ug/ml Aristolochic Acid. Responses were evaluated by bulk RNA sequencing, qRT-PCR, immunocytochemistry, and immunoblotting.

Results: HK-2 cells expressed canonical PTC markers including *E Cadherin, Aquaporin-1, Arginosuccinate synthase 1, Cubulin, Megalin*, and *sodium/glucose cotransporter 2*, and these were downregulated in response to injury stimuli. HK-2 cells grown on defined matrix preparations, and iPSC-PTC preparations, exhibited enhanced “PTC-like” transcriptomic profiles. Microscopy and functional evaluation are ongoing.

Discussion: In this study we have iteratively developed improved *in vitro* PTC experimental models, utilising growth on matrix components and the use of iPSC-PTC. These approaches will enable injury and drug testing *in vitro*, and in the case of iPSC, open the possibility of experimental work using cells matched to susceptible patient genotypes.

Tuesday 6th June 12:15 – 13:15

Track J3 – AKI 3

Poster: 247
Submission: 453

Prescriptions and reviews in primary care following AKI

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[2]Swansea University, Swansea

Background: There is a growing depth of knowledge around the management and outcomes of inpatient acute kidney injury, however what happens to these patients upon discharge from hospital is less clear. We know there is an increased risk of readmission following discharge, particularly with fluid overload. We have set out to look at what happens with primary care prescriptions and reviews.

Method: The research was carried out in the secure anonymised information linkage (SAIL) databank within Swansea university. This contains pseudoanonymised information of Welsh patients including biochemistry data, AKI alerts, the Welsh renal dataset and primary care data for 70% of the Welsh population. We recreated the NHS England AKI algorithm within SAIL, suppressing the detection of AKI in patients undergoing haemodialysis at that time. We then looked at the read codes from primary care in the 90 days before and after the first AKI alert for the patients. If there were a read code for a medication during that period, it was assumed that they were on that medication.

Results: There were 52,249 patients with one or more episodes of AKI in the time period of 1 year before and after the introduction of electronic AKI alerts. In the 90 days before 42,947 (82.2%) patients had a primary care read code entry and 34,876 (81.2%) had a read code entry in the 90 days after their AKI (censoring those that died within 30 days). The table below shows the changes in medication prescriptions;

Percentage of patients with a prescription	90 days before AKI %	90 days after AKI and alive 30 days %	P Value (Chi Square)
Proton Pump Inhibitor (PPI)	44.5	44.3	0.57
Angiotensin Converting enzyme inhibitor or Angiotensin receptor blocker (ACEi/ARB)	41.7	36	<0.01
Statin	41.5	38.2	<0.01
Loop Diuretic	30	29.6	0.22
Beta Blocker (B Blocker)	29.8	31	<0.01
Paracetamol	26.6	29.3	<0.01
Aspirin	25.9	23.4	<0.01
Calcium Channel Antagonist	21.9	18.9	<0.01
Metformin	12.4	10.7	<0.01

Thiazide	9.8	6.9	<0.01
Potassium sparing diuretic	8.5	10.2	<0.01
Non-steroidal anti-inflammatory (NSAID)	7.7	5.8	<0.01
Sulphonylurea	6.6	5.9	<0.01
Histamine receptor 2 Antagonist (H2 Antagonist)	4.4	6	<0.01
Insulin	4.3	4.7	0.01

Table 1 – Percentage of the AKI population receiving a prescription for these classes of medication in the 90 days before and after their AKI – the after group is censored for only those alive at 30 days.

Discussion: Following inpatient AKI we see a reduction in the proportion of patients on some medications such as ACEi/ARB, calcium channel blockers and NSAIDS. We see a decrease in blood pressure reviews and no change in both medication reviews and primary care requested serum creatinine tests. The finding suggests that there are medication changes after AKI, but it is unclear from this study who instigates them, nevertheless we know from previous analysis, that communication of secondary care changes and advice to primary care is poor. Intervening in this area may improve rates of readmission and outcomes following AKI.

Tuesday 6th June 12:15 – 13:15

Track J3 – AKI 3

Poster: 248
Submission: 470

The incidence of Secondary Acute Kidney Injury is rapidly increasing: Clinical Trends 2006-2020

Dr Aaron Lake[1,2], Professor Peter Maxwell[1], Professor Ciaran O'Neill[1]

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[2]Belfast Heath and Social Care Trust, Belfast

Introduction: The incidence of Acute Kidney Injury (AKI) is increasing worldwide. Whilst both primary and secondary cases of AKI are rising, the incidence of secondary AKI is increasing more rapidly. Multiple risk factors for AKI are recognised with an improved understanding that concurrent chronic diseases play an important role in susceptibility to AKI. High-risk interventional procedures in hospitalised patients are also associated with AKI. It is important to assess the changing trends in clinical risk factors over time that are associated with AKI.

Methods: The Healthcare Cost and Utilization Project National Inpatient Sample (HCUP-NIS) database was used to identify all inpatient admissions in US acute hospitals between 2006 and 2020. Data were weighted using supplied weights to enable national estimates to be made. All adult admissions with a secondary diagnosis of AKI were included. Descriptive statistics were performed, followed by multivariate logistic regression analysis for mortality. Further analysis was performed on the most common 25 primary diagnoses associated with AKI each year, as determined by initial weighted descriptive statistics.

Results: The incidence of secondary AKI increased significantly between 2006 and 2020 with an average annual growth rate of 11.6% throughout this time period. In 2020, 14.52% of all nationally estimated discharges had a recorded secondary diagnosis of AKI. Length of stay in those with AKI is higher than those without AKI, although some convergence in the duration of hospital admissions was seen during the years analysed. Length of stay for those with AKI decreased from 10.62 days (95% CI 10.4-10.84) to 8.03 days (95% CI 7.94-8.12) from 2006 to 2020. Amongst patients with no secondary AKI, length of stay remained largely unchanged, from 4.36 days (95% CI 4.3-4.41) in 2006 to 4.42 days (95% CI 4.38-4.51) in 2020. The mortality ratio for admissions with secondary AKI [PM1] decreased from 0.16 (95% CI 0.16-0.17) in 2006 to 0.1 (95% CI 0.1-0.1) in 2020. Nevertheless, the mortality associated with secondary AKI remains significantly higher than for those inpatients without AKI. There was minimal change in the mortality ratio for admissions without AKI; 0.016 (95% CI 0.015-0.016) in 2006 and 0.015 (95% CI 0.015-0.015) in 2020. Odds ratio of mortality from those with secondary AKI reduced from 2006 (OR 4.99, 95% CI 4.8-5.19, p-value <0.001) to 2020 (OR 3.41, 95% CI 3.36-3.49, p-value <0.001). Patients with secondary AKI are more likely to be older, have a higher number of diagnoses and be of black ethnicity. Black, Asian-American and Native American patients all had a higher odds of mortality when diagnosed with secondary AKI compared to Caucasians.

Conclusion: Secondary AKI is a major clinical problem with a growing incidence. Encouragingly mortality is decreasing amongst these patients, as is length of stay, however further efforts are needed to reduce the burden of morbidity and premature mortality associated with secondary AKI. Differences exist among ethnicities, with a disparity in likelihood of diagnosis, and subsequent mortality noted. Older patients have the highest proportion of secondary AKI and higher mortality, likely reflecting their multimorbid state.

Tuesday 6th June 12:15 – 13:15

Track J3 – AKI 3

Poster: 249
Submission: 471

Trends in AKI and AKI with comorbid substance among US inpatients 2006-2018

Dr Aaron Lake[1,2], Professor Peter Maxwell[1], Professor Ciaran O'Neill[1]

[1]Queen's University, Belfast.
[2]Belfast Health and Social Care Trust, Belfast

Introduction: The global incidence of Acute kidney injury (AKI) is rising associated with an increased risk of morbidity and premature mortality. In parallel, the burden of substance abuse has risen rapidly, with a major contribution from the ongoing opioid epidemic. This study aimed to assess the changing epidemiology of AKI with a concurrent diagnosis of substance abuse and patterns in this related to ethnicity between 2006 and 2018.

Methods: Data were taken from the US Healthcare Cost and Utilization Project (HCUP) the largest publicly available all-payer inpatient healthcare database for the US. Episodes where there were diagnoses of primary AKI and secondary substance abuse (cannabis, cocaine, stimulants, opioids, and alcohol) were identified using ICD codes. Data were weighted to allow for national estimates. Logistic regression analysis was performed to determine the odds ratio of mortality. Length of stay and cost (after adjustment for cost to charge ratio and inflation) for each admission were also examined.

Results: Within US hospitals incidence of AKI and AKI with comorbid substance abuse increased between 2006 and 2018. Mean length of stay per admission of either type (in 2006; 6.63 days, 95% CI 6.63-6.93 compared to 2018; 4.5 days, 95% CI 4.41-4.62) as did the adjusted odds ratio of mortality from 1.07 (95% CI 0.87-1.32, p-value 0.495) to 0.49 (95% CI 0.41-0.59, p-value <0.001). Compared to Caucasians, Native Americans and Asian Americans had a higher odds ratio of mortality (1.16, 95% CI 1.05-1.29, p-value 0.003; versus 1.31, 95% CI 1.24-1.38, p-value <0.001) for admissions with a primary diagnosis of AKI and secondary substance abuse. Medicaid and self-pay patients made up a higher proportion of those admissions with AKI and substance abuse, compared to those with AKI and no diagnosis of substance abuse. Inflation-adjusted costs of primary AKI remained similar throughout the 2006-2018 period, but due to the decreased length of stay the mean cost per day of treating these conditions increased.

Conclusion: The incidence of AKI with substance abuse has increased in parallel with AKI, but the mortality of primary AKI with and without substance abuse has decreased over the 13-year period. This could represent better management of AKI or increased recognition of less severe cases. The decreasing mean length of stay associated with AKI is consistent with identification of less severe cases. Despite improvement in AKI outcomes, differences exist in mortality amongst different ethnicities and payer statuses, with ethnic minority groups and those self-paying for their care experiencing poorer outcomes.

Tuesday 6th June 12:15 – 13:15

Track J3 – AKI 3

Poster: 250
Submission: 479

An investigation into use of the SDEC pathway for management of AKIs in a London-based district general hospital

Dr Alfred Beard[1], Dr Gabriela Barzyk[1], Dr Seema Jain[1,2]

[1]Epsom and St Helier University Hospitals NHS Trust, London.
[2]South West Thames Renal and Transplantation Unit, London

Introduction: Approximately 65% of AKI starts in the community (Selby et al 2012). Although this is usually associated with concurrent acute illness, it may be possible to prevent inpatient admission by prompt management of these patients.

The NHS promotes Same Day Emergency Care services (SDEC) which enables patients to be assessed, diagnosed, and treated on the same day, avoiding hospital admission and the risks and cost associated with this. Community acquired AKI (CA-AKI) is one of the conditions in which a pathway has been created to guide care for patients in this setting.

We conducted a retrospective analysis of patients presenting with CA-AKI to a London based DGH, comparing outcomes of patients admitted as inpatients or managed in SDEC.

Methods: We reviewed the case notes of patients coded with a primary diagnosis of AKI on discharge from January 2022 to June 2022. Suitable patients for the SDEC pathway were defined as patients with a NEWS2 score of less than 5, those without life threatening features of AKI (pulmonary oedema, potassium > 6.5 and bicarbonate < 15), and patients who were not unwell, requiring admission for another reason. Patient outcomes were assessed at 3-months following the episode of AKI.

Results: Of the 219 patients with AKI as primary diagnosis, 26 (12%) were identified as being suitable for management via SDEC with a mean AKI stage of 2. Most were not suitable because they were acutely unwell and needed admission to hospital for other reasons and not the AKI.

The average length of stay for the patients who could have been managed via SDEC was 3.2 days (range 0-7). Of these patients, 50% recovered from their AKI after 3-months, 6 were lost to follow up and only 30% of patients that did not recover were referred to nephrology as per the guidance.

During this time frame, 20 patients were seen in SDEC as a direct referral with a mean AKI stage of 1.35. Of these patients, 80% recovered, none were lost to follow up and of those that did not resolve, 75% were referred to nephrology.

Conclusion: A small but not insignificant number of admitted patients appear to have been suitable for outpatient management of CA-AKI as per the SDEC AKI pathway, accounting for 84 bed days in this 6-

month study. Half of these patients recovered renal function but of those that did not, only 30% were referred on to nephrology and a significant proportion (23%) were lost to follow-up.

Better outcomes were seen in those that were managed via SDEC including ensuring appropriate nephrology follow up, although there is clearly selection bias towards these patients as illustrated by a lower mean stage of AKI.

Although this is study limited by retrospective analysis of case notes and small numbers, it highlights that outpatient management of patients with AKI via the SDEC service is a safe alternative to inpatient admission in certain patients.

This avoidance of hospital admission is notably advantageous to patients as well as a clear benefit to the NHS.

Tuesday 6th June 12:15 – 13:15

Track K – Children & Young People

Poster: 251
Submission: 150

The experience of Young Adults attending the Transition Clinic during the COVID-19 pandemic and its impact on their healthcare.

Ms Lara Weiland, Ms Shoshana Gelber, Dr Ruth Pepper, Dr Richard Trompeter, Dr Sarah Afuwape

Royal Free Hospital NHS Foundation Trust, London

As a result of the COVID-19 pandemic, healthcare has had to operate in different ways to protect patients from the virus. This includes many appointments becoming remote and reduced in-person access to health professionals. For patients, they have also had to make decisions about getting vaccinated and shielding from the virus in order to stay safe. This audit explored the experiences of our young adult (YA) cohort who attend the transition clinic, and their healthcare decision-making during the COVID-19 pandemic.

A link to a 37-item mixed closed and open-ended Microsoft Forms questionnaire exploring YA nephrotic patients' experiences during the COVID-19 pandemic was distributed between 11/3/22 and 26/7/22 via email to those YAs under the care of the Royal Free Hospital for whom email addresses were available. Participation was voluntary and there was no incentive for taking part. Data were analysed in SPSS using descriptive and correlational statistics to better understand patients' experience of outpatient appointments during the COVID-19 pandemic and the mental and physical health impact on the YA patient population.

Of the 120 YAs who attend the clinic between 11/3/22 and 26/7/22, 22 responded (M=14, F = 8), of whom the majority (81%) were aged 18-23 years. Over 90% of patients attended at least 2 appointments with their consultants over the previous year, and of these appointments, 41% were in person, 13% remote, and 41% a combination of the two. Under a third of participants (27%) thought remote appointments were a little or a lot worse than face to face, and no participant advocated for future appointments to remain virtual. 82% of participants felt they were sufficiently supported with their healthcare throughout the pandemic, although over half (59%) contacted the renal young adult social worker (YASW) at some point. Of those who did, this was mainly to help remember appointments, help liaise with other health professionals, and to have someone to talk to. Only 13% of participants were worried about their physical health throughout, but despite this, 31% underwent shielding at some point. Concerns surrounding the relaxing of isolation rules after a positive COVID test were mixed, but the majority (64%) reported they were not at all or not very concerned. When considering this concern in relation to vaccination status, those who were not at all concerned had, on average, a higher number of COVID-19 vaccinations (mean = 3.00), compared to those who were quite concerned (mean = 2.25).

The COVID-19 pandemic has evidently impacted this cohort in many ways, such as increasing remote appointments and prompting consideration of how to protect their health from the virus. For such a high-risk group, the variation in COVID-19 vaccination uptake is of interest and research exploring the decision-making behind this could be of importance. YASWs appear to have a positive impact on YA's

healthcare as demonstrated by the low proportion of patients feeling unable to cope, and therefore this role should be utilised more widely.

Tuesday 6th June 12:15 – 13:15

Track K – Children & Young People

Poster: 252
Submission: 360

Aortic Dilatation in Children and Young People with Autosomal Dominant Polycystic Kidney Disease – the Root Cause Analysis study

Ms Alexandra Savis[1], Dr Emily Haseler[2], Miss Hayley Beardsley[1], Prof Phil J Chowienczyk[3], Prof John M Simpson[1], Dr Manish Sinha[2,3]

[1]Department of Paediatric Cardiology, Evelina London Children's Hospital, London.
[2]Department of Paediatric Nephrology, Evelina London Children's Hospital, London.
[3]King's College, London

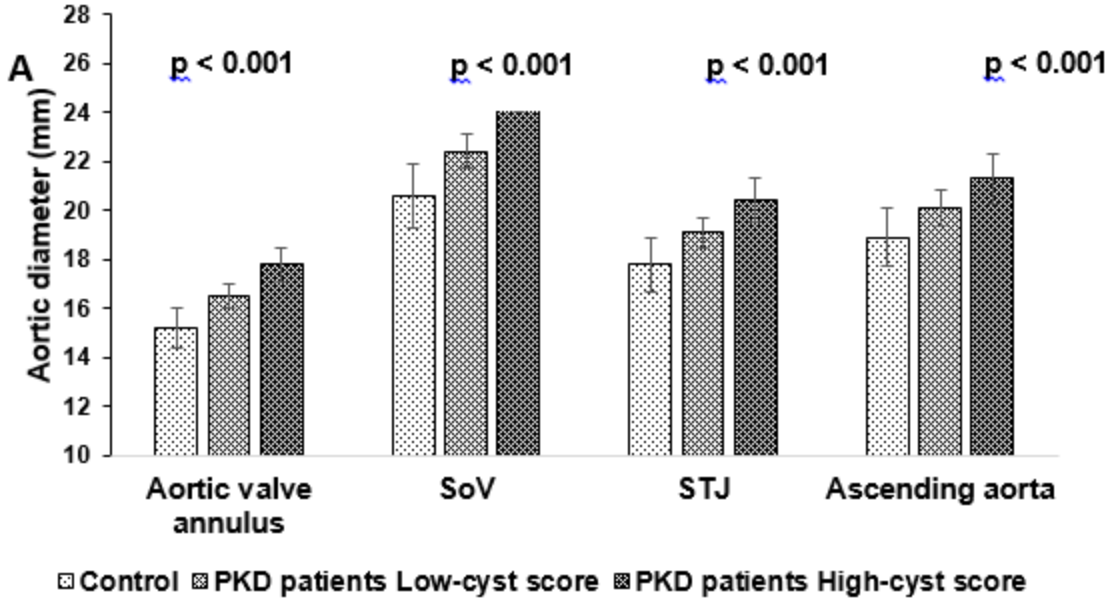
Background and objectives: Aortic dilatation has not been evaluated systematically in children and young people (CYP) with autosomal dominant polycystic kidney disease (ADPKD). Our objective were to (i) measure the size of the aortic root and ascending aorta; and (ii) report the prevalence, severity and determinants of aortic dilatation and compare with children without ADPKD.

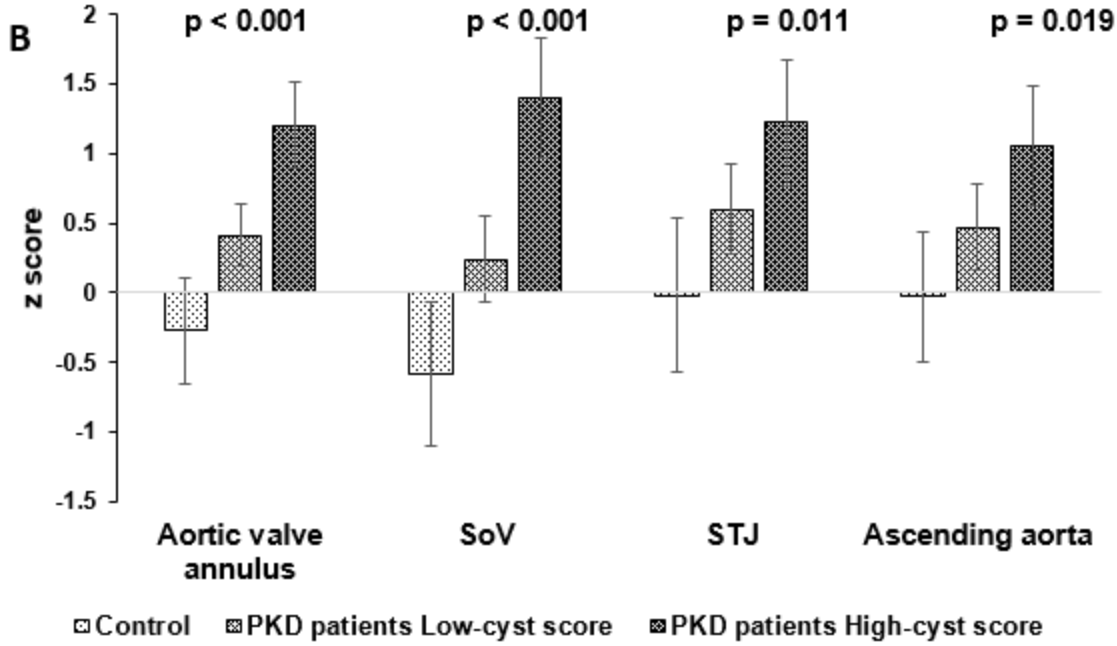
Design, setting, participants and measurements: Single centre, cross-sectional review of echocardiograms performed on CYP within a dedicated paediatric ADPKD clinic. Echocardiograms were evaluated for the presence of dilatation of the aorta at four standardised locations: the aortic valve annulus, Sinuses of Valsalva (SoV), sinotubular junction (STJ) and the ascending aorta. Dilatation was defined by a z-score ≥2 (≥99th percentile) standard deviations from the mean.

Results**:** Ninety seven CYP with ADPKD, median age [IQR] of 9.3 [6.1, 13.6] years were analysed and compared with 19 normotensive controls without ADPKD. The prevalence of dilatation ranged from 5.2-17% in CYP with ADPKD, depending on anatomical location. There was no dilatation of the aortic root or the ascending aorta identified in the control group. In multivariable regression, aortic root dilatation was strongly and positively associated with cyst burden at the aortic valve annulus and SoV (β= 0.42 and β=0.39, both p<0.001), with age at SoV (β= -0.26, p=0.02), SBP z-score at SoV (β= -0.20, p=0.04) and left ventricular mass index at SoV and STJ (β= 0.24, p=0.02 and β= 0.25, p=0.03 respectively) following adjustment for age, sex, BMI z-score, eGFR, SBP z-score and left ventricular mass index). See Figure 1.

Conclusions**:** Our data suggests increased prevalence of aortic root and ascending aortic dilatation in CYP with ADPKD when compared with healthy controls. Further studies are needed to understand the pathogenesis of this dilatation and its contribution to the unacceptably high cardiovascular morbidity in individuals with ADPKD.

Figure 1: Aortic diameters in mm and as z-scores in 97 children and young people with ADPKD stratified by cyst burden and compared with healthy controls. Data shown as marginal means after adjustment for age, sex and SBP z-score. Error bars represent 95% confidence interval. Panel A: aortic diameters in mm; Panel B aortic diameter z-scores. P values refer to difference between groups assessed by analysis of variance.


A
Aortic diameter (mm)
28
26
24
22
20
18
16
14
12
10
p < 0.001
p < 0.001
p < 0.001
p < 0.001
Aortic valve annulus
SoV
STJ
Ascending aorta
Control
PKD patients Low-cyst score
PKD patients High-cyst score


B
z score
2
1.5
1
0.5
0
-0.5
-1
-1.5
p < 0.001
p < 0.001
p = 0.011
p = 0.019
Aortic valve annulus
SoV
STJ
Ascending aorta
Control
PKD patients Low-cyst score
PKD patients High-cyst score

Tuesday 6th June 12:15 – 13:15

Track K – Children & Young People

Poster: 253
Submission: 372

Investigating concordance of kidney care coding between UK Renal Registry data and health records for children with established kidney failure.

Dr Lucy Plumb[1,2], Miss Aisha Bello[1], Dr Anna Casula[1], Dr Shalini Santhakumaran[1], Ms Zoe Plummer[1], Dr Barny Hole[1,2], Dr Manish Sinha[3], Prof Fergus Caskey[2], Prof Yoav Ben-Shlomo[2], Dr Retha Steenkamp[1], Prof Dorothea Nitsch[1,4]

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[2]University of Bristol, Bristol.
[3]Evelina London Children's Hospital, London.
[4]London School of Hygiene and Tropical Medicine, London

Background: Electronic health records (EHRs) such as Hospital Episode Statistics (HES) and the Patient Episode Database for Wales (PEDW) are widely used in epidemiological and clinical research and offer an opportunity to investigate rare diseases and their management. To do so however requires an assessment of data quality, to understand where disease coding may be missing or inaccurate, which may compromise the research validity. Currently, studies that validate the use of hospital records for chronic kidney disease surveillance are lacking for children. Our aim was to examine the concordance of hospital records with UK Renal Registry (UKRR) data for children receiving kidney replacement therapy (KRT) in England and Wales.

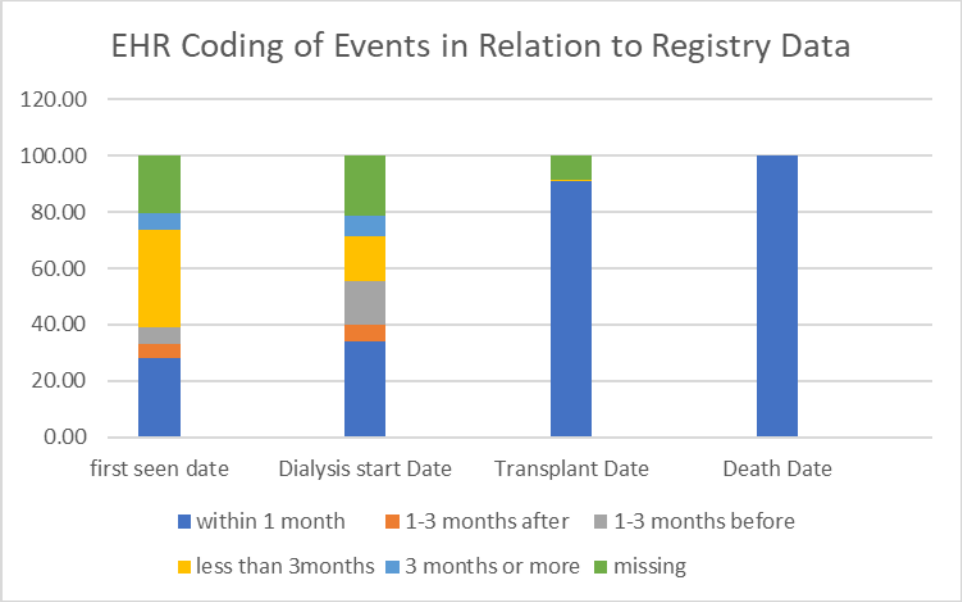
Methods: The study population included incident cases of children aged under 16 years starting KRT between 2000-2020. We compared hospital records to UKRR data (considered 'gold standard') for the timing and detail of key nephrology events including date of first nephrology review, KRT start, transplant and death (where applicable). For key events, the timing of incident codes in HES/PEDW relative to dates in the UKRR dataset were calculated. In addition, a descriptive analysis of the presence of lesser stages of CKD coding and their timing relative to the UKRR-defined KRT start date was examined.

Results: During the study period, 1976 children (59% male) commenced KRT in England and Wales and had linked HES/PEDW data; 46 patients (2%) did not have linked data available. Generally, there was good agreement between UKRR and HES/PEDW records for key dates relating to KRT start, modality and transplantation. At KRT start, 1530 children commenced dialysis (n=635 haemodialysis and n=895 peritoneal dialysis) and 492 (23%) received a pre-emptive transplant; 1386 (91%) and 400 (81%) respectively were coded as such in the electronic record. Overall, 72.3% of patients had an initial KRT modality code within 90 days of KRT start, as defined using UKRR data, with the highest proportion of coding in this timeframe noted for transplant recipients (n=395, 80.3%). Relative to the UKRR record, date of transplant and death in the EHR were highly concordant (91% and 100% coded within a month of UKRR date, respectively) while date of first nephrology review and dialysis start were more variably timed (figure 1). Of those with data, most children had evidence of coding for kidney failure or stage 5

chronic kidney disease in HES/PEDW within a month of KRT start (50%); few children (n=246) had evidence of lesser CKD stage codes in their hospital record prior to KRT start.

Discussion: Electronic health records demonstrate reasonable concordance of important dates relating to KRT start, kidney transplantation and death compared to UKRR-held records, however timing of events such as first nephrology review and CKD progression may be less reliable. Data from EHRs have the potential to reliably supplement observational research examining access and outcomes of dialysis and kidney transplantation.

Figure 1: Timing of coding for key events in HES/PEDW relative to dates held in the UKRR dataset.



Tuesday 6th June 12:15 – 13:15

Track K – Children & Young People

Poster: 254
Submission: 403

Eculizumab in Shiga-Toxin producing Escherichia coli Haemolytic Uraemic Syndrome: A randomised, double-blind, placebo-controlled trial (ECUSTEC)

Ms Natalie Ives[1], Ms Rebecca Woolley[1], Ms Catherine Moakes[1], Dr Aoife Waters[2], Dr Rodney Gilbert[3], Mr Hugh Jarrett[1], Ms Elizabeth Brettell[1], Mr Steve Nash[4], Dr Claire Jenkins[5], Professor Moin Saleem[6], Dr Sally Johnson[7,8]

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[2]University College London, London.
[3]Southampton Children's Hospital, Southampton.
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[6]University of Bristol, Bristol.
[7]Newcastle Upon Tyne Hospitals, Newcastle Upon Tyne.
[8]Newcastle University, Newcastle

Background: Shiga-Toxin producing Escherichia Coli Haemolytic Uraemic Syndrome is an important cause of acute and chronic morbidity and mortality in children. No effective intervention is known, however some studies report eculizumab may be effective.

Methods: This was a multi-centre, randomised, double-blind, placebo-controlled trial. Children aged six months to <19 years weighing ≥5kg, with presumed Shiga-Toxin producing Escherichia Coli Haemolytic Uraemic Syndrome, including “injury” or “failure” category of the acute kidney injury pRIFLE criteria, were randomised in 1:1 ratio to receive either eculizumab or placebo.

The primary outcome measure was a multi-domain clinical severity score, reflecting morbidity until day 60. Secondary outcome measures included survival, duration of renal replacement therapy, persistent neurological defect, and presence of chronic kidney disease at one year.

Results: Thirty-six participants from 10 sites were randomised; 17 to eculizumab and 19 to placebo. The target sample size was 134 participants - recruitment was stopped early due to low recruitment and the COVID-19 pandemic. Low recruitment was due to reduced disease incidence and insufficient infrastructure to support out-of-hours recruitment. The mean clinical severity score at day 60 for participants randomised to eculizumab was 11.5 (SD 8.4) compared to 14.6 (SD 7.7) for participants randomised to placebo (adjusted mean difference: -2.5, 95% CI: -7.8 to 2.8, p=0.3). No significant safety concerns were observed.

Conclusions: There was no significant difference in mean clinical severity score between eculizumab and placebo groups - since the trial was underpowered, this cannot be interpreted as evidence of no effect. We have been unable to show whether eculizumab is a worthwhile treatment for children with this

condition. However, the challenges in delivering clinical research in this setting were highlighted by the ECUSTEC trial, and will need addressing if we are to deliver trials in this area in the future

Tuesday 6th June 12:15 – 13:15

Track K – Children & Young People

Poster: 255
Submission: 423

Using degree of foot process effacement to predict outcome in paediatric patients with steroid resistant nephrotic syndrome: a multi-centre analysis.

Dr Miranda Rogers[1], Dr Anna Mason[2], Dr Samantha Hayward[1], Dr Elizabeth Colby[1], Professor Gavin Welsh[1], Dr Wen Ding[1], Professor Moin Saleem[1]

[1]Bristol Medical School, University of Bristol, Bristol.
[2]Department of Histopathology, Royal Devon and Exeter Hospital, Exeter

Introduction: Steroid resistant nephrotic syndrome (SRNS) is a common cause for end-stage renal failure requiring kidney transplantation in the paediatric population, but recurrence post transplantation is high in those with no identified pathogenic variant. Those with a pathogenic mutation are very unlikely to suffer from recurrence post transplantation.

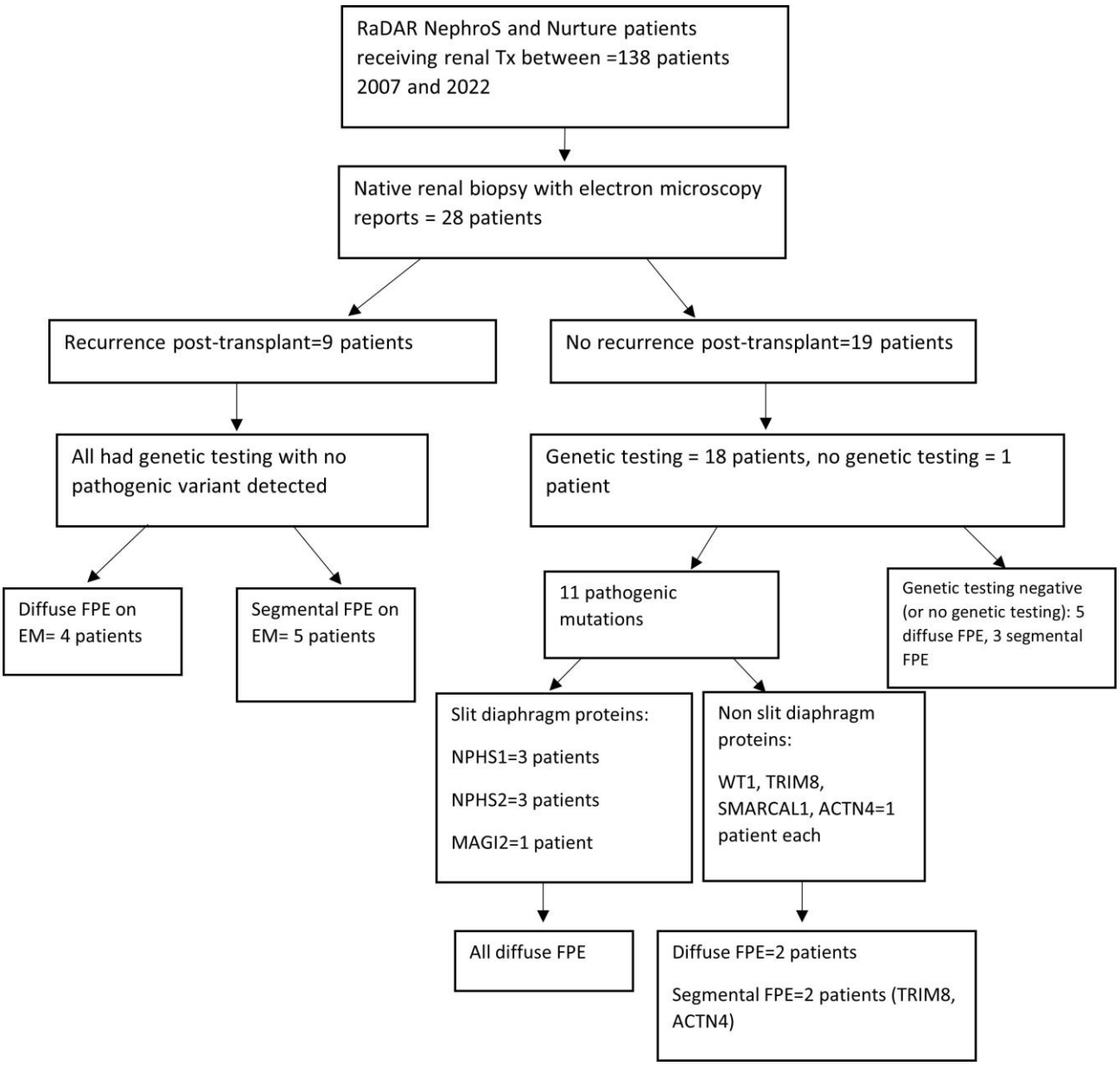
Previous research has identified that the degree of podocyte foot process effacement (FPE) on native kidney biopsies may be able to distinguish between genetic and non-genetic causes of SRNS, although these studies have been limited by small sample sizes and single centre recruitment1,2. Nevertheless, this raises the possibility that the degree of FPE in native biopsies of non-genetic SRNS could identify those at risk of post-transplant recurrence. We hypothesised that diffuse FPE was a marker of circulating factor disease and a predictor of post-transplant recurrence, while segmental FPE was a marker of genetic and non-genetic non-recurrent disease.

Methods: We analysed the degree of FPE in a multi-centre nationwide cohort of paediatric SRNS (RADAR database) patients, to assess if this could be used to predict disease recurrence. 138 paediatric patients on the RADAR database were identified to have a diagnosis of Nephrotic Syndrome and had undergone renal transplantation between 2007 and 2022, and patient information including demographics, diagnosis, date of transplant, genetic testing and recurrence extracted. 28 of these had native renal biopsy with electron microscopy (EM) reports available, and so were included in the analysis. We quantified FPE as either ‘Diffuse’ or ‘Segmental’ from the language used in the report. We categorised patients according to post-transplant recurrence and genetic testing results.

Results: Nine patients (32.1%) experienced transplant recurrence. Twenty seven (96.4%) patients had genetic testing, of which 11 had a causative genetic mutation identified. None of the patients with pathogenic genetic variants developed disease recurrence after transplantation (recurrence if pathogenic variant identified 0/11, 0%; recurrence if no pathogenic variant 9/17, 52.9%, p=0.0039). 81.8% (9/11) of those with a pathogenic variant showed diffuse FPE on EM while 52.9% (9/17) of those without an identified genetic mutation showed diffuse FPE (Fisher’s exact test, 0.2264). Of note, all seven patients with pathogenic mutations in slit diaphragm proteins (NPHS1, NPHS2 and MAGI2) had diffuse FPE (7/11).

Patients with diffuse FPE (recurrence 4/18, 22.2%) demonstrated a trend towards lower recurrence rates than in those with segmental FPE (recurrence 5/10, 50%, Fisher's exact test, p=0.2096).

Conclusion: In this multi-centre patient cohort, we have identified some trends between genetic causes of SRNS and foot process effacement, and the direction of this association contrasts with some of the current literature. We showed that slit diaphragm protein mutations were associated with diffuse FPE. We also showed a trend (not statistically significant) towards diffuse FPE being associated with lower recurrence post-transplant. We recognise that this study is limited by small numbers and its retrospective nature, however the trends identified justify further investigation in larger groups of stratified patients.



Tuesday 6th June 12:15 – 13:15

Track K – Children & Young People

Poster: 256
Submission: 447

Acute kidney injury in a national cohort of children who have undergone a kidney transplant. epidemiology and outcomes

Dr Matrtin Garcia-Nicoletti[1], Miss Winnie Magadi[2], Dr Anna Casula[2], Dr Carol Inward[3], Professor Stephen Marks[4], Dr Jelena Stojanovic[4], Dr Lucy Plumb[2,5], Dr Dorothea Nitsch[6]

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[2]UK Renal Registry, Bristol.
[3]University Hospitals Bristol & Weston NHS Foundation Trust, Bristol.
[4]Great Ormond Street Hospital for Children NHS Foundation Trust, London.
[5]University of Bristol, Bristol.
[6]London School of Hygiene and Tropical Medicine, London

Introduction: Acute Kidney Injury (AKI) is a common reason for loss of kidney transplant function. Children with kidney transplants are more at risk of developing AKI than the general population. In England, NHS trusts are required to flag abnormal or rising serum creatinine values from baseline as possible AKI. These data are submitted to the UK Renal Registry (UKRR) for analysis and reporting.

The aim of this study was to describe a national cross-section of paediatric kidney transplant recipients aged less than 18 years who had an AKI alert issued over a 5-year period and to describe their outcomes, including need for hospitalisation, critical care admission and death within 30-days of receipt of AKI alert.

Methods: Prevalent paediatric kidney transplant recipients in England aged under 18 years of age who had had their allograft for at least 6 months (drawn from a cohort starting in 1998 – 2019) were linked to the AKI Master Patient Index to identify AKI alerts during 01/01/2015 and 31/12/2020, and Hospital Episode Statistics to capture AKI episodes requiring hospitalisation and/or critical care admission.

Results: There were 1,252 children (62.1% male) with kidney transplants for longer than 6 months, of whom 246 (19.6%) experienced an AKI alert between 2015 and 2020. The median age at AKI alert was 11.7 (IQR 7.4-15.3) years. Almost all (95.5%) were recipients of their first kidney transplant; 51.6% had a deceased donor transplant. For most children, the AKI alert occurred in the community, although hospitalisation was subsequently noted in 188 (76.4%). Compared to the total transplant cohort, higher proportions of South Asian and Black children experienced an AKI episode. A third of children experienced a peak AKI stage 3 injury (n=65, 34.6%) and 16 (8.5%) required dialysis within 30 days of an AKI alert. Only a small proportion of the AKI cohort required critical care (5%) and less than 5 transplanted children died within 30-days of an AKI alert.

Discussion: In a national cross-section of children with kidney transplant, AKI was a common event in a 5-year period with most AKI episodes being initially detected outside of hospital settings and most

requiring subsequent hospitalisation. Few patients experienced adverse outcomes such as critical care admission and death. Further work is required to examine the impact of AKI episodes on long-term graft survival al almost 10% with an AKI episode required dialysis within 30 days.

Tuesday 6th June 12:15 – 13:15

Track L1 – CKD 1

Poster: 257
Submission: 085

Key factors that influence the selection of conservative management as a treatment modality for End Stage Renal Disease – a systematic review

Miss Alyaa Mostafa[1], Miss Pavithra Sakthivel[1], Dr Olalekan Lee Aiyegbusi[2,3,4,5]

[1]College of Medical and Dental Sciences, University of Birmingham, Birmingham.
[2]Centre for Patient Reported Outcomes Research, Uni of Birmingham, Birmingham.
[3]Institute of Applied Health Research, University of Birmingham, Birmingham.
[4]NIHR Birmingham Biomedical Research Centre, Birmingham.
[5]NIHR Oxford-Birmingham Blood and Transplant Research Unit, Birmingham

Introduction**:** Renal replacement therapy (RRT), which includes dialysis and kidney transplantation, is the treatment modality used in most patients with end-stage renal disease (ESRD). Conservative management (CM) is an option available for patients who are unsuitable for or do not prefer RRT. However, the decision to pursue CM can be difficult for both patients and clinicians. Thus, the aim of this systematic review is to identify and summarise the key factors that may influence the selection of CM as a treatment modality for ESRD.

Methods**:** A systematic search of the databases: Medline, Embase, PsychINFO and CINAHL+ was carried out, from inception to September 10, 2021. Two authors independently screened abstracts and full texts. Relevant components from the Consolidated criteria for Reporting Qualitative heath research (COREQ) framework, guided the critical appraisal of selected studies.

Results**:** Of 1039 entries retrieved, 15 qualitative studies and 7 survey articles were selected for inclusion in this review (Figure 1). Four main themes were identified, via narrative analysis, regarding the selection of CM: patient-related factors, clinician-related factors, organisational factors, and national and international factors (Figure 2).

Patients and clinicians had variable insight into CM. Key influencers in patients' decision-making included personal values and beliefs. Whilst qualitative data indicated that patients prioritised informal sources of information (e.g., friends and relatives), survey results suggested that these informal sources were less important compared to information from the medical team. A survey comparing patients on dialysis versus CM reported that 90% of patients undergoing CM, believed their own opinion was valued during decision-making compared to only 55% of patients on dialysis (p=0.02). A similar study found that 91% of surveyed patients on CM, reported that they had sufficient time to decide, and very few reported feeling pressured to make a decision or doubted their decision to pursue CM. This can be contrasted with patients undergoing dialysis who reported feeling pressured to choose RRT (31% RRT vs 5% CM, p=0.01).

Clinicians generally reported a lack of confidence surrounding sensitive discussions and handling patient values and expectations. Although 81% of nephrologists in a study reported discussing CM with all patients with ESRD, they only recommended CM to 10% of patients. Another report showed that 39% of primary care physicians indicated limited access to support from a wider multidisciplinary team as a hurdle to delivery of CM. Additionally, some doctors found it challenging to suggest CM for an initial treatment modality, as it can be perceived as 'non-intervention'. Additional barriers including time constraints and lack of reliable prognostic tools or clinical guidance further complicated decision making.

Conclusion**:** An improvement in the provision of education regarding conservative management for patients and clinicians is essential. This would tackle significant barriers surrounding informed discussions and decision-making, which would form the basis of an appropriate management plan, in line with the patients' best interests.

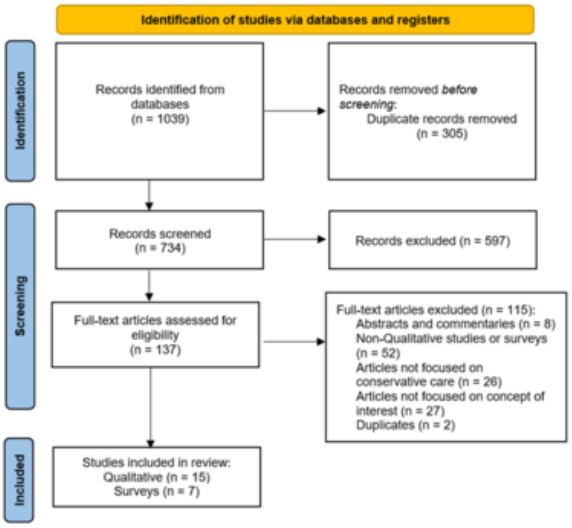

Figure 1

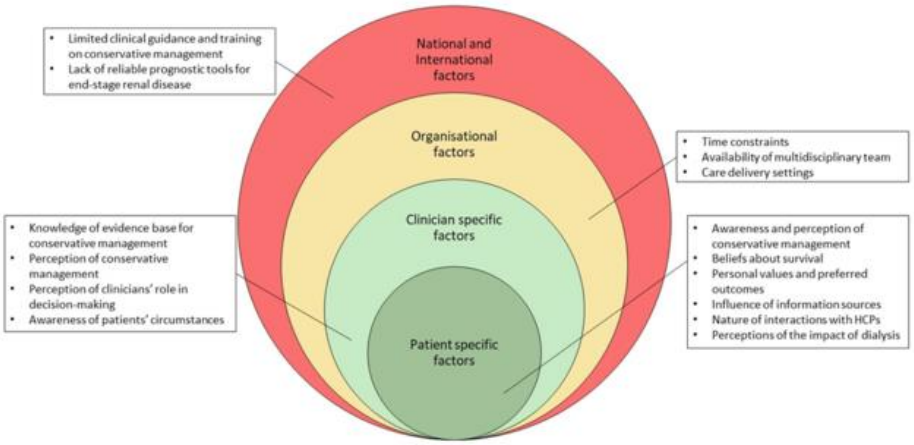

Figure 2

Tuesday 6th June 12:15 – 13:15

Track L1 – CKD 1

Poster: 258
Submission: 088

Maintenance of serum bicarbonate levels in patients with advanced chronic kidney disease- a frequently missed opportunity

Dr Laura Balson, Dr Jyoti Baharani

Birmingham Heartlands Hospital, Birmingham

Introduction: Advanced chronic kidney disease (CKD) often leads to disturbance of acid-base balance. Prevention of acidosis in CKD is proven to have multiple benefits, including a reduced risk of disease progression and reduced mortality. This issue can be addressed with oral sodium bicarbonate, which is an easy to administer and relatively cheap treatment compared to novel drugs such as SGLT-2 inhibitors. Sodium bicarbonate tablets are frequently initiated in CKD but less attention is paid as to whether serum bicarbonate levels are optimised. Not uncommonly, patients may also experience gastrointestinal side effects which can limit titration or compliance.

Methods: In May 2022 we assembled a list of 100 patients recently reviewed in low clearance clinic at our tertiary renal centre. We retrospectively collected data on each of these patients from the electronic patient record (EPR) including their demographics, most recent serum bicarbonate level, and the date that this level was measured. Using clinic letters and electronic GP records we deduced whether each patient was currently prescribed sodium bicarbonate, and whether they had reported any compliance issues or side effects. The data was collated into a spreadsheet and subsequently analysed.

Results: The results from our data collection showed that the majority of patients were having their serum bicarbonate levels monitored regularly in clinic (94% within the preceding 6 months). However, only 46% of patients had a serum bicarbonate level within the optimal range of 22-29mmol/L. Of the patients with sub-optimal sodium bicarbonate levels, 24% of patients did not have sodium bicarbonate tablets prescribed. 2% of patients had documented side effects with sodium bicarbonate, and a further 2% had documented poor compliance.

Conclusion: Overall, this project demonstrates that whilst we perform well in terms of checking serum bicarbonate levels in patients with advanced CKD, there is room for improvement in acting on the results. Given the evidence of clear benefit for prevention of acidosis in CKD, we must promptly initiate sodium bicarbonate when serum bicarbonate levels are low, and we must continue to increase the dose until the serum bicarbonate target is met. As part of routine practice we should ask patients if they are taking sodium bicarbonate as prescribed, and whether they are experiencing any side effects. For patients with gastrointestinal side effects there is likely a role for an alternative gastro-resistant preparation of sodium bicarbonate, although this is not widely used in the UK at present.

Tuesday 6th June 12:15 – 13:15

Track L1 – CKD 1

Poster: 259
Submission: 091

Development of human kidney extracellular matrix hydrogels as 3D platforms to study renal fibrosis

Miss Lucia Marinas del Rey[1], Dr Breda Twomey[2], Dr Giuseppe Mazza[3,1], Prof Krista Rombouts[1], Prof Jill Norman[1], Prof Reza Motallebzadeh[1]

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[2]UCB, Slough.
[3]Engitix Ltd, London

Chronic Kidney Disease (CKD), which describes an irreversible alteration of kidney function, represents a significant worldwide healthcare burden. It can result from many different aetiologies and is one of the leading causes of mortality worldwide. Irrespective of the cause, a common feature of CKD is fibrosis in the tubulointerstitium, where persistent injury causes glomerulosclerosis, tubular atrophy, and fibrosis. The goal of this study is to develop a novel in vitro 3D human kidney hydrogel co-culture system to better understand the cellular and molecular mechanisms underlying fibrosis and provide a platform for testing candidate anti-fibrotic therapeutics.

Normal human kidney cortex (from donor kidneys unsuitable for transplantation) and fibrotic human kidney cortex (from kidney transplants explanted because of chronic graft rejection) were dissected into cubes and decellularised using sequential washes with water, sodium dodecyl sulphate and DNase. Decellularisation was assessed by DNA content (DNeasy Kit, Qiagen), and histology with haematoxylin and eosin (H&E) and picro-sirius red (PSR) staining. Preservation of key extracellular matrix (ECM) proteins was verified by immunohistochemistry (IHC). To develop human kidney ECM (hkECM) solution, decellularised cubes were homogenised, lyophilised, and solubilised with pepsin. hkECM solution was mixed with nanocellulose (30% v/v; Cellink) to form stable hydrogels. Hydrogels were seeded with either a human renal proximal tubular epithelial cell (hRPTEC) line (HK-2), or primary hRPTECs, and cultured for up to 21 days. Viability and metabolic activity were assessed by Live/Dead and PrestoBlue® assays (ThermoFisher), respectively. hRPTEC phenotype, proliferation and apoptosis were assessed with aquaporin-1, Ki-67 and cleaved caspase-3 staining, respectively.

Kidney tissue was successfully decellularised as shown by a 97% reduction of DNA content (Figure 1A). Histological analysis (Figure 1B) confirmed the elimination of nuclei by H&E staining, absence of cellular material (PSR) and collagen preservation (PSR). IHC (Figure 1C) confirmed preservation of key ECM proteins (collagens I and IV, fibronectin, laminin α5). Combination of the normal or fibrotic human kidney cortex hkECM with nanocellulose produced stable hydrogels (Figure 2A) which supported HK-2 cells as indicated by aquaporin-1 expression (Figure 2B), high viability (Figure 2C), metabolic activity (Figure 2D), proliferation and low levels of apoptosis (Figure 2E).

Normal and fibrotic human kidney cortex can be decellularised to develop hkECM solutions which, when combined with hRPTECs, generate a human kidney 3D culture system that supports cell proliferation

and metabolic activity. These models have the potential to recapitulate cell-ECM interactions in physiological and fibrotic conditions. This can provide insights into the role of the ECM in regulating cell differentiation and function, modeling tubulointerstitial fibrosis, and potentially establishing a model for drug testing.

FIGURE 1: HUMAN KIDNEY DECELLULARISATION AND RETENTION OF KEY FEATURES

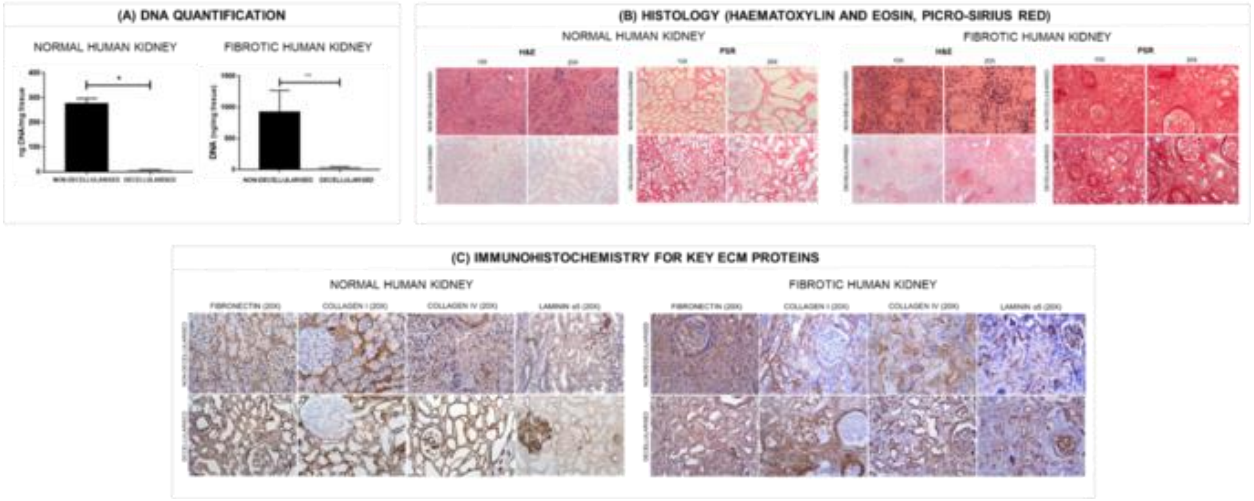
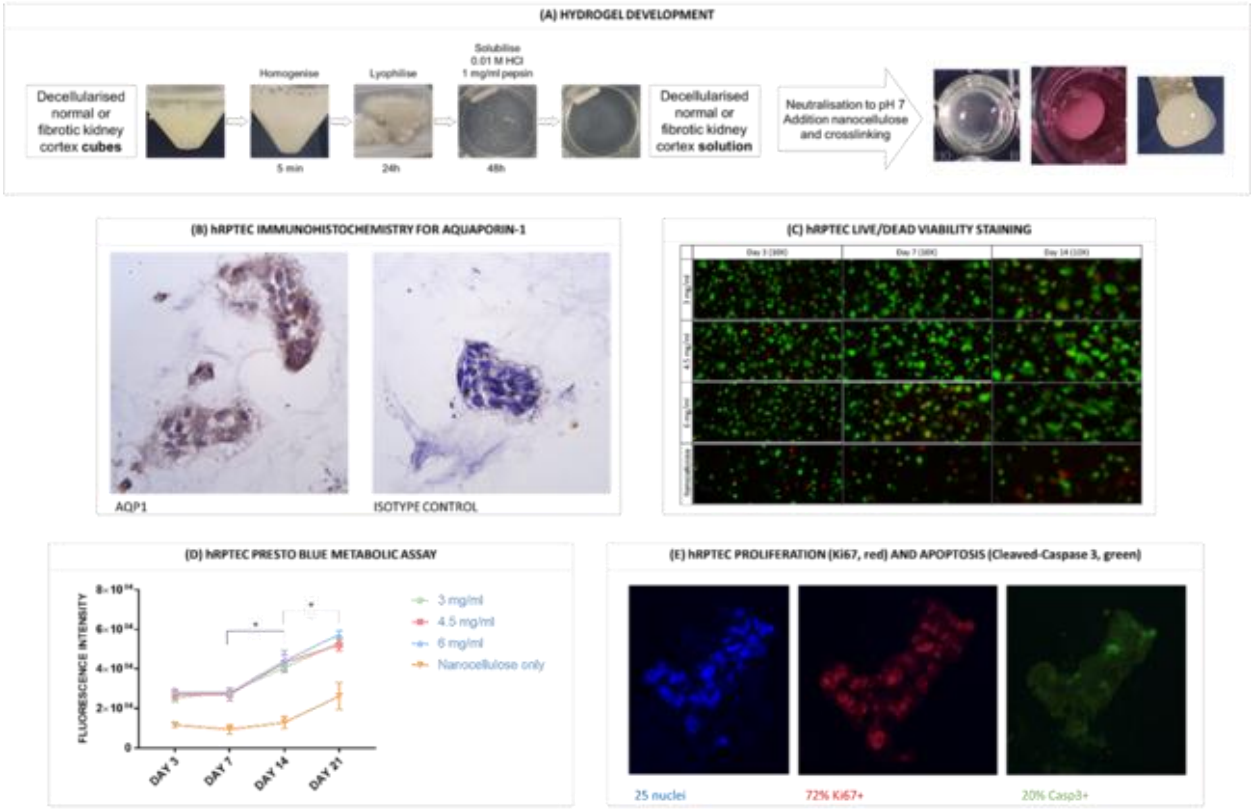


FIGURE 2: HYDROGEL DEVELOPMENT AND CHARACTERISATION



Tuesday 6th June 12:15 – 13:15

Track L1 – CKD 1

Poster: 260
Submission: 107

Potentially modifiable determinants of health-related quality of life for patients with chronic kidney disease - baseline analyses from the NURTuRE-CKD cohort

Dr Thomas Phillips[1,2], Dr Olalekan Aiyegbusi[3], Dr Bethany Lucas[4,5], Professor Paul Roderick[1], Dr Scott Harris[1], Professor Paul Cockwell[6], Professor Philip Kalra[7,8], Professor David Wheeler[9], Professor Maarten Taal[4,5], Dr Simon Fraser[1]

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[2]University Hospital Southampton, Southampton.
[3]Centre for Patient Reported Outcomes Research (CPROR), Institute of Applied Health Research, University of Birmingham, Birmingham.
[4]Centre for Kidney Research and Innovation, Academic Unit for Translational Medical Sciences, School of Medicine, University of Nottingham, Nottingham.
[5]Department of Renal Medicine, Royal Derby Hospital, University Hospitals of Derby and Burton NHS Foundation Trust, Nottingham.
[6]Department of Renal Medicine, Queen Elizabeth Hospital, Birmingham, Birmingham.
[7]Salford Royal Hospital, Northern Care Alliance NHS Foundation Trust, Salford, UK, Salford.
[8]University of Manchester, Manchester.
[9]Department of Renal Medicine, University College London, London

Introduction: Studies examining health-related quality of life (HRQoL) in people with chronic kidney disease (CKD) have described predominantly non-modifiable factors associated with HRQoL. HRQoL measures used are often heterogenous, as are study populations, incorporating those with CKD with or without kidney replacement therapy (KRT). Using baseline data from a multicentre cohort of CKD patients not yet on KRT, we aimed to identify potentially modifiable factors associated with HRQoL.

Methods: Baseline data were drawn from the National Unified Renal Translational Research Enterprise (NURTuRE) CKD study, a patient cohort with all stages of CKD enrolled from 16 nephrology centres in England, Scotland and Wales between 2017-2019. Baseline demographic, biochemical, and anthropometric data were collected. Validated measures included the EuroQol EQ-5D-5L, Palliative care Outcome Scale (POS), Six Item Cognitive Impairment Test (6CIT) and Hospital Anxiety and Depression Scale (HADS). EQ-5D-3L index values were mapped from EQ-5D-5L results according to NICE UK guidance. Univariable and multivariable linear and logistic regression were undertaken to identify associations with poor HRQoL, defined as lower EQ-5D-3L index, report of problems with individual EQ-5D-5L domains (score 2 or above) and the binary variable less than 'perfect health' (index <1.0, therefore problems in any domain). Multivariable models were adjusted for known factors associated with HRQoL including age, sex, ethnicity, renal diagnosis, total number of comorbidities, BMI (Body Mass Index, kg/m2), Karnofsky score, eGFR (estimated Glomerular Filtration Rate, mL/min/1.73m2) and

recruitment centre. Data were prepared and analysed via Python and SPSS. Ethical approval was granted by South Central-Berkshire Research Ethics Committee.

Results: Mean age was 62.6 (SD ±14.8) years, mean eGFR was 37.3 ml/min/1.73 m2 (SD ±17.9). 2958 of 2996 participants had complete EQ-5D-5L data. Univariable logistic regression analyses for less than 'perfect health' (Figure 1) showed associations with health literacy and biochemical targets in CKD for anaemia and mineral bone disease. Multivariable logistic regression models for problems in the individual EQ-5D-5L domains pain, usual activities, self-care, anxiety/depression, and mobility all demonstrated association with high HADS scores. Sarcopenia (based on abnormal results for timed up and go test and hand grip strength) was significantly associated with problems in usual activities, self-care, and mobility. Multivariable linear regression for EQ-5D-3L index (Figure 2) demonstrated significant associations with higher HADS scores, abnormal 6CIT, higher POS pain rating, worse POS mobility rating, greater POS restless legs rating, education status of ‘none’, higher BMI and taking regular over the counter analgesia. Multivariable logistic regression for EQ-5D-5L index value less than ‘perfect health’ demonstrated a significant association with sarcopenia (OR 1.5 p=0.002 CI 1.2–2.0), regular medication number of 5 or above (OR 1.5 p=<0.001 CI 1.2-1.9) and HADS indicating problems with anxiety (OR 3.7 p=<0.001 CI 2.6-5.2) and depression (OR 3.6 p=<0.001 CI 2.2-6.0).

Discussion: In this secondary care cohort of people with CKD not requiring KRT, potentially modifiable factors associated with poor HRQoL included anxiety and depression, many physical symptoms such as pain and mobility, polypharmacy, BMI, and sarcopenia. These represent promising targets for intervention in people with CKD to improve quality of life.

Figure 1.

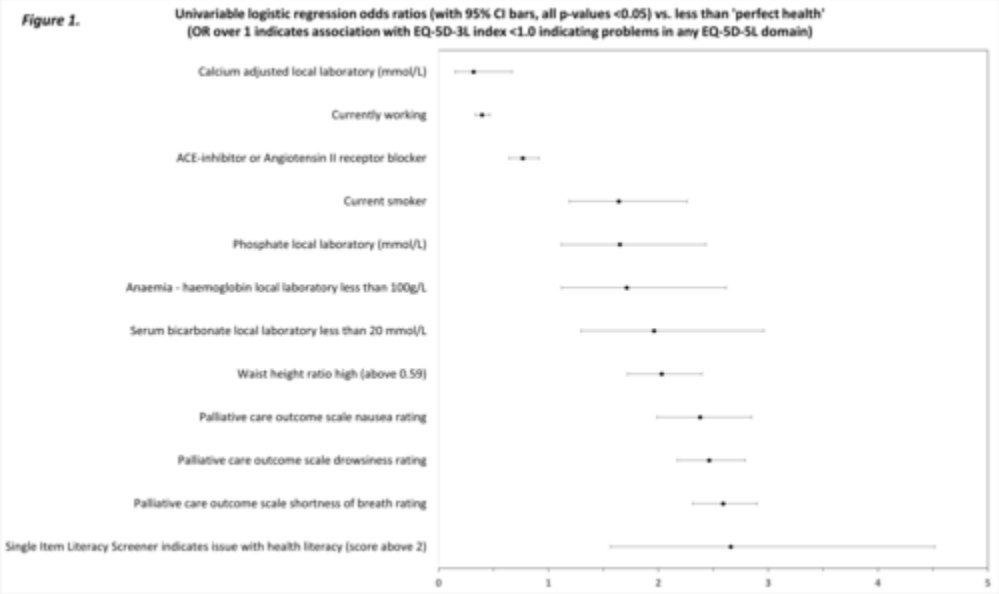
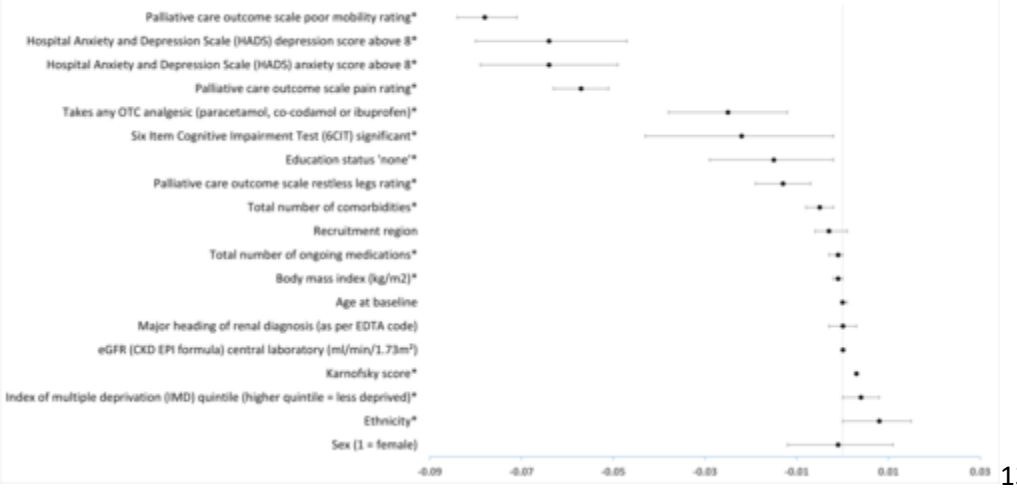


Figure 2.

Coefficients (B) for multivariable linear regression independent variables vs. EQ-5D-3L index values (coefficients above 0.0 have a positive association with higher index value and better HRQoL) Variables marked with * have p-values of <0.05



Tuesday 6th June 12:15 – 13:15

Track L1 – CKD 1

Poster: 261
Submission: 112

TWEAK-Fn14 signalling in mesangial cells drives intrarenal inflammation during CKD progression

Dr Asha Seth, Dr Matthieu Chodorge, Dr Barbara Musial, Dr Timo Haschler, Dr Jatinder Dhillon, Mrs Hong Wang, Dr Pernille BL Hansen

AstraZeneca, Cambridge

Background : It is increasingly recognised that inflammation evokes renal injury and promotes chronic kidney disease (CKD) progression. Tumor necrosis factor (TNF)-like weak inducer of apoptosis (TWEAK), a member of the TNF superfamily, is a pleiotropic cytokine, which binds to the fibroblast growth factor-inducible-14 (Fn14) receptor. TWEAK-Fn14 signalling has been linked with pathogenic processes in the kidney that may contribute to the progression of CKD. However, whether this pathway is a key driver of human disease has yet to be established.

Methods : To further explore the relevance of TWEAK-Fn14 signalling in CKD we have used human transcriptomic data sets to interrogate the expression of both ligand and receptor in kidney disease. To localise the expression of Fn14 within the kidney in human and mouse samples we have used immunohistochemistry (IHC). We have then used human primary mesangial cells to identify regulators of Fn14 expression and explore the mechanisms regulated by the TWEAK-Fn14 pathway in renal cells. Finally, we have used a neutralising TWEAK antibody in vitro and in vivo to explore the therapeutic potential of intervening in this pathway.

Results: Fn14 expression was found to be significantly upregulated in biopsies collected from CKD patients as compared to healthy living donor for example in the Ju Cohort Fn14 expression was 2.63-fold higher in the DKD patient group (p = 2.10E-6). Fn14 expression was also highly correlated with increased kidney damage. In tubulointerstitial samples from the European Renal cDNA Bank (ERCB) cohort the adjusted r squared value of the negative correlation to estimated GFR was 0.273 p=1.13 x1015. IHC showed in patients with DKD, or in pre-clinical models of CKD, Fn14 was localised to the glomerulus, in a pattern consistent with mesangial expression, and in tubule cells. In primary human mesangial cells, PDGF-BB treatment (50 ng/mL) increased cell surface Fn14 expression 9.6-fold as determined by fluorescent activated cell sorting. TWEAK application to human mesangial cells dose-dependently induced increases in cell proliferation and the release of IL-8 and MCP-1. These effects were blocked by treatment with a neutralising TWEAK antibody. We further tested the beneficial effects of TWEAK neutralization in a murine model of rapid progressive glomerulonephritis induced by administration of nephrotoxic serum. We found that anti-TWEAK treatment significantly decreased MCP-1 transcript expression in the kidney and reduced the level of urinary MCP-1 indicating a reduction in intrarenal inflammation.

Conclusion: We have shown that Fn14 is regulated in human CKD and is highly correlated with disease severity. In human primary mesangial cells Fn14 activation leads to release of chemokines such as IL-8

and MCP-1. In vivo, TWEAK neutralisation translates into a decrease in the level of MCP-1 transcript levels and urinary MCP-1 in a model of glomerulonephritis.

Tuesday 6th June 12:15 – 13:15

Track L1 – CKD 1

Poster: 262
Submission: 131

Sub analysis of the STOP ACEi open label randomised muti-centre trial based on Angiotensin converting enzyme inhibitor or angiotensin receptor blocker discontinuation in patients with advanced progressive chronic kidney disease.

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Introduction: In the STOP ACEi trial, discontinuation of renin–angiotensin system inhibitors (RASi) - including angiotensin-converting–enzyme inhibitors (ACEi) and angiotensin-receptor blockers (ARBs) had no effect on the rates of decline in eGFR or kidney events in people with advanced progressive chronic kidney disease (CKD). We assessed whether there was a difference in these outcomes for patients on ACEi or ARB at randomisation.

Methods: In STOP ACEi, a multicentre, open-label trial, 411 participants with an eGFR of <30ml/min/1.73m^2 and progressive CKD were randomised to discontinue or continue RAS inhibitors. We used repeated-measures, mixed-effects linear regression models to estimate the between-group difference in eGFR at 3 years and effects on eGFR slope and the three-way interaction among the variables of treatment, time, and subgroup (ACEi or ARB). A Cox proportional-hazards model was used to calculate hazard ratios (HR) and 95% confidence intervals (CI) for development of end stage kidney disease (ESKD) or the initiation of kidney-replacement therapy (KRT).

Results: At baseline, 99 participants on an ACEi and 104 on an ARB were randomised to stop and 123 and 77 respectively to continue RASi.

At 3 years, the least-squares mean (±standard error) eGFR was 14.6±1.2ml/min/1.73m^2 for those who stopped ACEi and 14.0±0.7ml/min/1.73m^2 for those continuing ACEi (difference, -0.4; 95% CI, -3.2 to 2.3); and 11.9±0.7ml/min/1.73m^2 for those who stopped ARB and 12.5±1.1ml/min/1.73m^2 for those continuing ARB (difference, -0.6; 95% CI, -3.1 to 2.0). No heterogeneity in outcome according to subgroup was observed (p=0.55).

ESKD or initiation of KRT occurred in 64 (65%) and 67 patients (54%) in the ACEi discontinuation and continuation subgroups respectively (HR, 1.52; 95% CI, 1.07 to 2.16) and in 62 (60%) and 40 patients

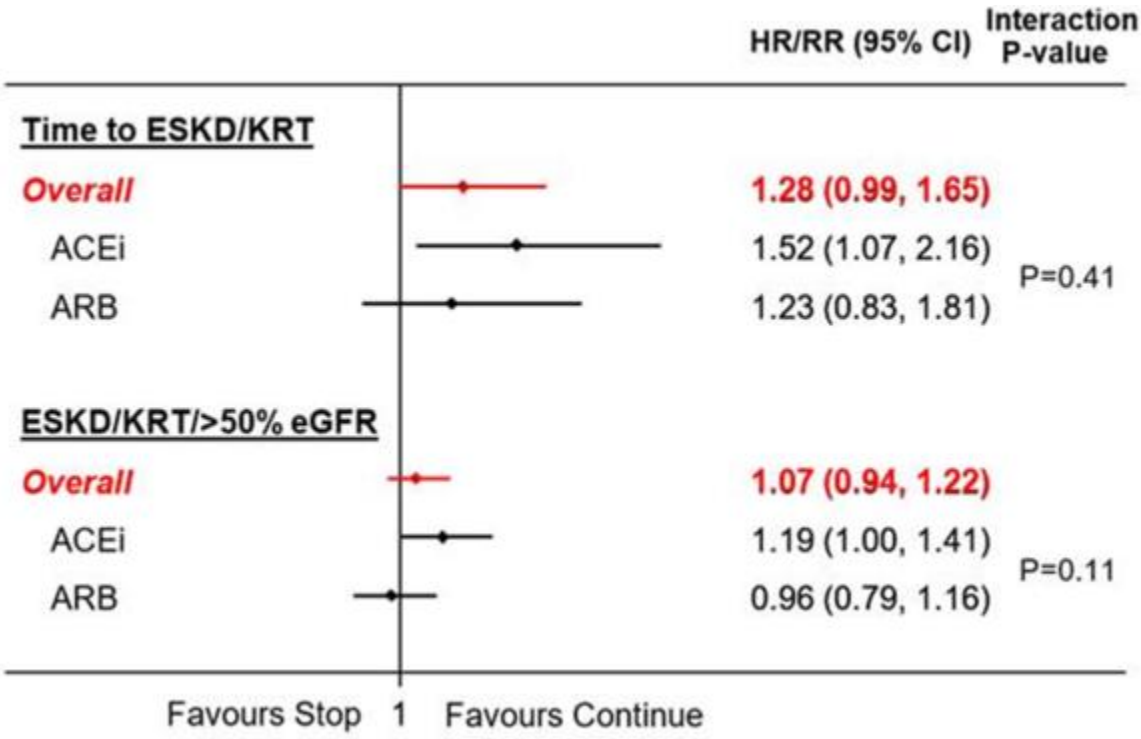
(60%) in the ARB discontinuation and continuation subgroups respectively (HR, 1.23; 95% CI, 0.83 to 1.81) (Figure).

A composite of ESKD, a >50% fall in eGFR or KRT occurred in 70 (71%) and 72 patients (59%) in the ACEi discontinuation and continuation subgroups respectively (relative risk, 1.19; 95% CI, 1.00 to 1.41) and in 68 (65%) and 53 patients (69%) in the ARB discontinuation and continuation subgroups respectively (relative risk, 0.96; 95% CI, 0.79 to 1.16) (Figure).

Adverse cardiovascular events were numerically similar for the ACEi subgroup (stop vs continue: 46 vs 50) but lower for ARB continuation (stop vs continue 62 vs 36). The distribution of deaths was similar between ACEi and ARB subgroups.

Slope change in eGFR over 3 years censored for death, dialysis or transplantation in the stop and continue groups were -6.5ml/min and -5.8ml/min over 3 years and was similar for ACEi and ARB subgroups.

Conclusions: Among patients with advanced and progressive CKD, neither discontinuation of ACEi nor ARB altered the rate of decline of eGFR over 3 years. Although, a trend to a delay in ESKD/KRT was observed by continuing ACEi, this was not significantly different from continuing ARB. However, the trial was not designed or powered to address such differences. A trial of switching ARB to ACEi versus continuation of ARB may be warranted.



Tuesday 6th June 12:15 – 13:15

Track L1 – CKD 1

Poster: 263
Submission: 141

Computed tomography-derived pectoral muscle mass cross-sectional area and association with markers of sarcopenia in patients with kidney failure

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Introduction: Sarcopenia is the reduction in muscle mass and strength, which becomes more common with increasing age and in patients with chronic kidney disease (CKD). In CKD, sarcopenia is associated with increased morbidity and mortality, though is not routinely diagnosed or monitored in clinical practice. Computed tomography (CT) scans are part of routine clinical care and may be used to assess muscle mass. This study assessed the feasibility of estimating muscle mass from thoracic CT scans in patients with established kidney failure, and tested associations of CT-estimated muscle mass with known predictors of sarcopenia.

Methods: Data were from baseline measurements in two research studies conducted in patients with kidney failure (ViKTORIES: kidney transplant recipients; KTR; and TICKER: haemodialysis patients; HD). Pectoral muscle cross-sectional area (PMA) was measured as a surrogate marker of muscle mass from non-contrast thoracic CT scans taken at the baseline assessment. The reference slice was the first image in which the maximum width of pectoral muscle was visible. Regions of interest were manually drawn around the full pectoral muscle area on the first, third and fifth slices of each scan. The average PMA was indexed to body surface area (PMA-BSA). Multivariable-adjusted linear regression analyses explored associations between age, sex, diabetes status and kidney failure type (KTR versus HD) on PMA-BSA. Image analysis was conducted using Horos software for Mac; statistical analysis was conducted using R statistical software.

Results: There were 108 participants with appropriate CT data available for analysis (n=82 KTR in ViKTORIES; n=26 HD patients in TICKER). KTR were younger, with similar PMA, lower BSA and higher PMA-BSA (Table 1). On univariate analysis, higher PMA-BSA was associated with younger age ($p<0.001$), male sex ($p=0.014$) but not diabetes status ($p=0.519$) or kidney failure type ($p=0.051$). Sex-stratified, unadjusted associations between age and PMA-BSA can be visualised in Figure 1. After adjustment for diabetes status and kidney failure type, older age was associated with lower PMA-BSA in men (β per 1-year increase in age: -0.12 (SE 0.02); $p<0.001$) but not in women (β: 0.00 (SE 0.03); $p=0.909$).

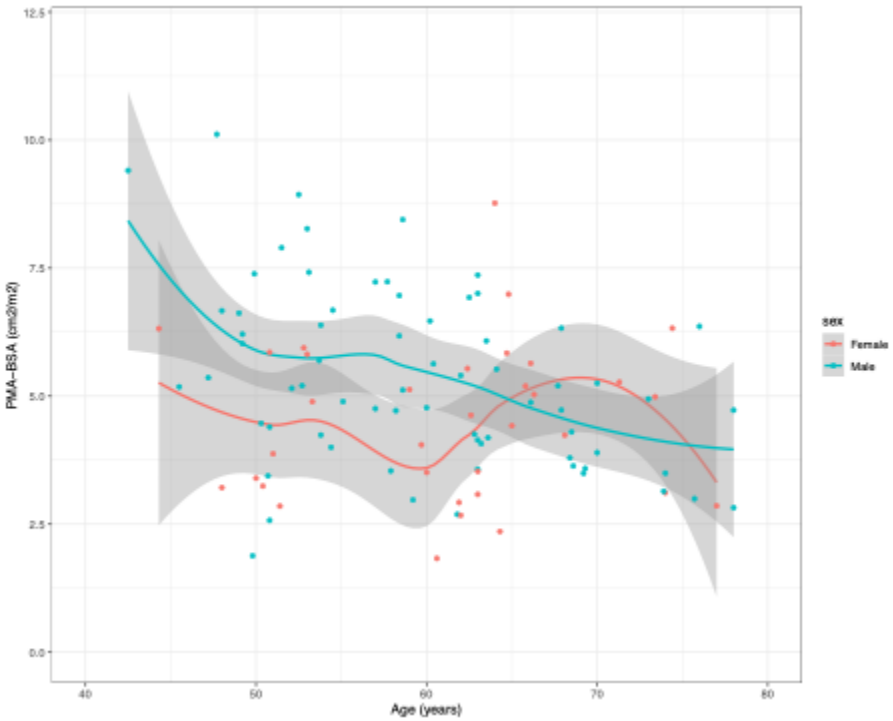
Discussion: Quantification of PMA on thoracic CT scans, conducted for other indications, is feasible in patients with kidney failure. In keeping with published works, PMA-BSA quantified muscle mass is higher in men, is lower at older age, and the rate of decline of muscle mass with increasing age is greater in

men. PMA-BSA provides an opportunity to detect and monitor sarcopenia in patients with kidney failure.

Table 1

	KTR in ViKTORIES	HD in TICKER	P value
N	82	26	n/a
Age (mean (SD))	57.8 (9.4)	64.7 (9.4)	<0.001
Sex = Women (N %)	24 (29.3)	10 (38.5)	0.524
Diabetes (N %)	18 (22.0)	10 (38.5)	0.156
Pectoral mass area (PMA; cm2) (median [IQR])	10.0 [7.8, 11.9]	8.6 [6.6, 10.5]	0.179
Body surface area (BSA; m2) (median [IQR])	1.9 [1.8, 2.0]	2.1 [1.9, 2.2]	0.046
PMA indexed to BSA (cm2/m2) (median [IQR])	5.2 [4.1, 6.3]	4.0 [3.4, 5.2]	0.030

Figure 1



Scatter plot of age versus PMA-BSA with sex-stratified locally-weighted linear regression trend lines

Tuesday 6th June 12:15 – 13:15

Track L1 – CKD 1

Poster: 264
Submission: 160

Prevalence and management of chronic complications in patients with diabetes and advanced chronic kidney disease: a retrospective audit

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Introduction and background : Current guidelines recommend that all patients with Chronic Kidney Disease (CKD) stage 3b or higher should be monitored and treated for anaemia, mineral bone disorder (BMD) and metabolic acidosis. We audited the prevalence and management of these complications in a cohort of patients with diabetes and advanced CKD.

Methods: A retrospective audit was undertaken using KDIGO guidelines as standard and necessary approvals were secured from the governance team at University Hospitals Birmingham. We included patients with (a) diabetes (b) eGFR 30 and 15 ml/min/1.73m2 and (c) attending diabetes clinics as of 30/09/2022. Using electronic patient records, we collected: demographics, co-morbidities, complications, treatments, body weight, BMI, blood pressure and serial biochemistry (creatinine, Hba1c, cholesterol, UAlb/Creat ratio, bicarbonate, haemoglobin, vitamin D, parathyroid hormone (PTH)). Following definitions were applied: anaemia as Hb <13g/dl for men and <12g/dl for women, BMD as vitamin D <40nmol/l plus raised PTH, acidosis as bicarbonate <22meq/l. Data was analysed using SPSS 26. Descriptive statistics (frequencies and cross tabulations) were used to estimate prevalence. Independent means test was used for continuous variables. Comparison between groups was undertaken using the Chi Square test and one way ANOVA test.

Results: Data for 192 subjects (110 European (EUR), 40 South Asian (SA), 42 African-Caribbean (AFC) /other) was analysed. Mean age (SD) was 73 (+/-11) years. There were no significant differences in general characteristics between the ethnic groups except for albuminuria which was greater in SA and AFC compared to EUR (193 v 133 v 95.5mg/mmol; p=.038). 47% of the cohort had at least one diabetes related complication. 63/192 (32.8%) had cardiovascular disease, 49/192 (25.5%) had retinopathy and 19/192 (9.9%) had neuropathy. Insulin was the most common prescribed glucose lowering agent 105/192 (55%) with proportionately more SA treated with insulin (65%).

Anaemia was present in 171/183 (93.4%) of the patients. 82/101 (81.2%) had BMD, and 135/168 (82.8%) of patients had metabolic acidosis. 65/192 (33.9%) of patients had all 3 complications. Only 38/133 (22%) of those with anaemia were receiving treatment out of which only 36.8% were treated adequately with a Hb of >10g/l. Corresponding figures for BMD and metabolic acidosis were: BMD: 39/82 (47.6%) treated and 42% optimally corrected, metabolic acidosis: 54/135 (40%) treated and 53% optimally corrected. There were no significant differences between ethnic groups in prevalence or treatment of these complications.

Conclusion: The prevalence of CKD related complications is high. The management of these complications however, is suboptimal. Increased emphasis on the management of these complications is required to improve outcomes in patients with advanced CKD.

Complication	Prevalence N(%)	Treated N(%)	Treated and Adequately corrected %
Anaemia	171 (93.4)	38 (22.0)	36.8
BMD	82 (81.2)	39 (47.6)	42.0
Metabolic acidosis	135 (82.8)	54 (40.0)	53.0

Table 1: prevalence and management of CKD-related complications

Tuesday 6th June 12:15 – 13:15

Track L1 – CKD 1

Poster: 265
Submission: 167

Haemoglobin stability in the ASCEND-D and -ND trials

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Introduction: Maintaining haemoglobin (Hb) levels in target ranges per clinical care guidelines for patients (pts) with chronic kidney disease (CKD) is complex. We examined Hb stability in pts with CKD on dialysis (ASCEND-D, NCT02879305) or not on dialysis (ASCENDND, NCT02876835) treated with daprodustat (Dapro) or erythropoiesis-stimulating agents (ESAs).

Methods: ASCEND-D and -ND were global, open-label, event-driven cardiovascular outcome trials. Our analyses examined the percentage of pts who achieved a mean Hb within the analysis target range (10.0–11.5g/dL); the percentage of time within range in the evaluation period (EP: weeks 28–52) and maintenance period (MP: week 28–end of treatment); Hb excursions (≥12g/dL or <7.5g/dL); Hb increases and decreases >2g/dL during EP. Separate analyses were performed for Dapro and ESA per study.

Results: Of enrolled pts, 2485/2964 (83.8%; ASCEND-D) and 3011/3872 (77.8%; ASCEND-ND) had evaluable Hb during the EP. Hb was within the target range in 903/1238 (73%) Dapro pts and 866/1247 (69%) ESA pts (p=0.0367; ASCEND-D), and 1167/1491 (78%) Dapro pts and 1063/1520 (70%) ESA pts (p<0.0001; ASCEND-ND). In both studies, for Dapro vs ESA, respectively, Hb stayed within the target range for a greater proportion of time (61% vs 59%, p=0.0805 [ASCEND-D]; 71% vs 63%, p<0.0001 [ASCEND-ND]) and a greater proportion of pts exhibited an Hb increase >2g/dL (15% vs 10%, [ASCEND-D]; 10% vs 7% [ASCEND-ND]) (Table). The proportions of Dapro pts achieving target Hb and time in the target Hb range were higher in ASCEND-ND than -D.

Discussion: In ASCEND-D and -ND, more pts treated with Dapro achieved target Hb and spent more time in the target Hb range than pts treated with ESAs. This suggests that Dapro may provide increased Hb stability vs conventional ESA.

Encore statement: This abstract is an encore of abstract #TH-PO692 presented at the American Society of Nephrology (ASN) 2022 meeting (Orlando, FL, USA, and Virtual, 3–6 Nov 2022). The full citation is as

follows: V Jha, KL Johansen, P Pergola, D Coyne, K St Ledger, S Mallett, P Bhatt, M Duarte, AK Singh: Hemoglobin Stability in the ASCEND-D and -ND trials [Abstract]. J Am Soc Nephrol 33, 2022: 244.

Funding: These studies were funded by GSK (208807 and 208808).

	ASCEND-D N=2964		ASCEND-ND N=3872	
	Dapro n=1487	ESA n=1477	Dapro n=1937	Darbe n=1935
Pts with evaluable Hb during EP, n/N (%)	1238/1487 (83)	1247/1477 (84)	1491/1937 (77)	1520/1935 (79)
Pts with evaluable Hb during MP, n/N (%)	1239/1487 (83)	1247/1477 (84)	1499/1937 (77)	1525/1935 (79)
Responders with Hb within target range, n/N (%)				
EP	903/1238 (73)	866/1247 (69)*	1167/1491 (78)	1063/1520 (70)†
MP	1003/1239 (81)	1000/1247 (80)‡	1220/1499 (81)	1140/1525 (75)§
Median % of time with Hb within target range				
EP	60.9	59.4¶	70.5	63.2**
MP	60.9	57.7††	66.1	62.1**
Hb excursions during EP				
≥12g/dL				
Pts, n/N (%)	430/1238 (35)	332/1245 (27)	345/1490 (23)	342/1515 (23)
Mean + SD % of time	7.6+17.8	5.4+14.4	4.8+14.6	5.7+16.7
<7.5g/dL				
Pts, n/N (%)	23/1238 (2)	30/1245 (2)	17/1456 (1)	19/1476 (1)
Pts with Hb increases and decreases >2g/dL in any 4 wk period to wk 52, n (%)				
Increase >2g/dL	210 (15)	148 (10)	182 (10)	136 (7)
Decrease >2g/dL	242 (17)	244 (17)	180 (10)	169 (9)

Data shown for evaluable pts. Cochran-Mantel-Haenszel chi-squared test for the responder analyses and van Elteren's test for percentage time in range. Analyses adjusted for region and current ESA use (ASCEND-ND) and dialysis type and region (ASCEND-D). Missing data handled using multiple imputation methods. P-values are nominal. All analyses are pre-specified unless otherwise stated.
*Difference in response rate (Dapro-ESA) 3.5 (CI -0.1, 7.1 p=0.0367); †% difference in response rate (Dapro-Darbe) 8.3 (CI 5.2, 11.4 p<0.0001); ‡Post-hoc analysis difference in response rate 0.8 (-2.4, 3.9), p=0.366; §Post-hoc analysis difference in response rate 6.6 (3.7, 9.6), p<0.0001; ¶p=0.0805; **p<0.0001; ††p=0.0139.
CI, confidence interval; CKD, chronic kidney disease; Dapro, daprodustat; Darbe, darbepoetin alfa; EP, evaluation period; ESA, erythropoiesis-stimulating agent; Hb, hemoglobin; MP, maintenance period; pts, patients; wk, week.

Tuesday 6th June 12:15 – 13:15

Track L1 – CKD 1

Poster: 266
Submission: 169

Associations of haemoglobin values rate of changes with MACE in the ASCEND-D randomised clinical trial

Dr Gregorio Obrador[1], Prof Iain Macdougall[2], Dr Kirsten Johansen[3], Prof Vivekanand Jha[4], Dr Ricardo Correa-Rotter[5], Dr Lucia Del Vecchio[6], Dr Aleix Cases[7], Mrs Michele Robertson[8], Mr Stephen Mallett[9], Dr Christine Bailey[10], Dr Alexander Cobitz[10], Prof Ajay Singh[11], Mr Rhys Gallager[11]

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[7]Universitat de Barcelona, Barcelona.
[8]Robertson Centre for Biostatistics, University of Glasgow, Glasgow.
[9]R&D, GSK, Brentford.
[10]R&D, GSK, Collegeville.
[11]Brigham and Women's Hospital and Harvard Medical School, Boston

Introduction: Absolute haemoglobin (Hb) values and rapid Hb changes may be associated with adverse outcomes in patients with anaemia of chronic kidney disease (CKD) treated with erythropoiesis-stimulating agents (ESAs). In this exploratory post-hoc analysis of the ASCEND-D trial, we investigated the association between absolute Hb values or Hb changes over 4-week periods and the occurrence of the first adjudicated major adverse cardiovascular event (MACE) in patients with CKD on dialysis receiving daprodustat or ESAs.

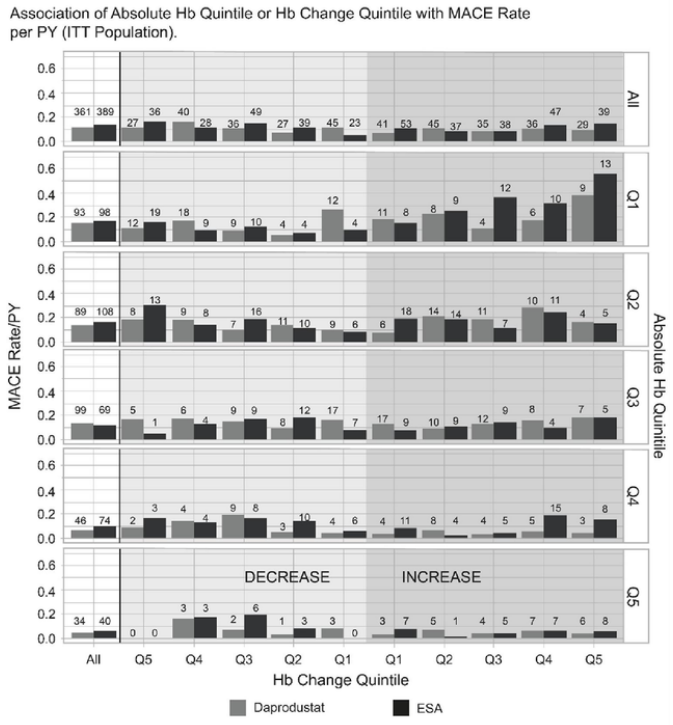
Methods: ASCEND-D (NCT02879305) was an event-driven cardiovascular-outcomes trial that randomised 2964 CKD patients undergoing dialysis with a baseline Hb of 8.0 to 11.5g/dL to receive oral, once-daily daprodustat (1 to 24mg; 1487 patients), or a conventional ESA (epoetin alfa [1500 to 60,000 U total weekly dose] or darbepoetin [20 to 400 µg total 4-weekly dose]; 1477 patients). The co-primary endpoints of non-inferiority for first occurrence of adjudicated MACE and mean Hb change from baseline to weeks 28 through 52 were met. MACE was a composite of death from any cause, non-fatal myocardial infarction, or non-fatal stroke. Events were adjudicated by a blinded independent clinical events committee. We divided patients time in the study before a first MACE or end of follow-up into 4-week intervals and calculated a post-randomisation mean Hb value and Hb rate of increase or decrease at each 4-week interval. We grouped these 4-week periods into quintiles of mean Hb values and Hb rates of increase or decrease (Table) for each treatment arm, and calculated MACE rates for each quintile. This analysis did not include MACE occurring before Week 4 (when the first post-randomisation Hb collection was scheduled).

Results: This analysis included 361 and 389 first MACE in the daprodustat and ESA treatment groups, respectively. When evaluating rates of the first adjudicated MACE by absolute Hb value quintiles and irrespective of Hb change ('All' column, Figure), MACE rate was higher in the low Hb quintile than in the high Hb quintile across treatment groups. When evaluating rates of first MACE by Hb change quintile and irrespective of absolute Hb value ('All' row, Figure), rates of MACE were comparable across Hb change quintiles across treatment groups. When MACE risk was evaluated by both absolute Hb value and Hb change quintiles, the highest MACE rate was observed in the lowest Hb quintile (Q1 row) with the largest positive change (Q5 increase column); this was more pronounced in the ESA group.

Discussion: There may be an association between Hb quintile and MACE outcome for both absolute and fluxes in Hb values. This analysis is limited by the small number of events in each quintile, possible confounding by disease severity, and the choice of assessment window.

Encore statement: This abstract is an encore of the abstract MO534 presented at the European Renal Association 2022 meeting (Paris, France, and Virtual, 19–22 May 2022). The citation is as follows: G Obrador, et al.: Associations of Haemoglobin Values and Rate of Changes With Mace in the ASCEND-D Randomised Clinical Trial [Abstract]. Nephrol. Dial. Transplant 37, 2022: gfac072.016.

Funding: GSK (208807).



The analysis includes all first MACE events from Week 4 to study completion, study withdrawal, or death. Values shown are the number of first MACE events in each category. Hb quintiles were defined for each treatment, as described in the table.
ESA, erythropoiesis-stimulating agent; Hb, haemoglobin; ITT, intent-to-treat; MACE, major adverse cardiovascular event; PY, patient-year.

Tuesday 6th June 12:15 – 13:15

Track L2 – CKD 2

Poster: 267
Submission: 176

Chronic Kidney Disease and Anemia Questionnaire (CKD-AQ): a reliable and sound patient-reported outcome measure for use in patients with anemia of chronic kidney disease

Dr Tom Keeley[1], Dr Wen-Hung Chen[2], Dr Rodrigo Refoios Camejo[1], Dr Tony Okoro[2], Dr Purav Bhatt[2], Dr Margaret Vernon[3], Dr Ray Hsieh[4], Dr Sonja Stringer[4], Dr Kirsten Johansen[5]

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Introduction: CKD-AQ is the first patient-reported outcome (PRO) measure designed specifically to assess the symptom burden of anemia of chronic kidney disease (CKD). It includes 21 items that give three domain scores (Tired/Low Energy/Weak, 10 items; Chest Pain/Shortness of Breath, 4 items; Cognitive, 3 items) and four individual item scores (difficulty sleeping, difficulty standing for long periods of time, severity-shortness of breath while sitting/resting, time with shortness of breath while not doing activity). We report on the measurement properties of CKD-AQ in patients with anemia of CKD.

Methods: Two separate samples (n=399, n=450) of combined data from patients with anemia of CKD not currently receiving dialysis and patients initiating dialysis were used. Factor structure was identified and tested using exploratory and confirmatory factor analyses (EFA/CFA). Other assessments: internal-consistency and test-retest reliability; construct validity; responsiveness; differential item functioning (DIF) analysis between patients on and not on dialysis.

Results: The three multi-item domain structure identified through EFA was confirmed with CFA, with factor analytic fit statistics above or just slightly below the recommended standard. Internal-consistency reliability was good (Cronbach's alpha 0.734–0.955) and test-retest reliability was adequate (intraclass correlation coefficient 0.555–0.701) for all scales. Convergent validity analysis showed hypothesized associations with Short-Form (SF)-36, Euroqol 5-dimension, and Work Productivity and Activity Impairment scores. CKD-AQ scores were significantly different among Patient Global Impression of Severity groups, supporting known-groups validity. Supporting responsiveness, improvements in CKD-AQ scale scores were consistently associated ($r>0.3$) with improvements in multiple external validation anchors (including SF-36 domains and component scores). There was no systematic difference in the way that dialysis and non-dialysis patients answered the CKD-AQ items.

Conclusions: CKD-AQ is a valid, fit-for-purpose and psychometrically sound PRO tool suitable for use in patients with anemia of CKD. The measure is licensable and ready for future use. Funding: GSK (Study 215131).

Tuesday 6th June 12:15 – 13:15

Track L2 – CKD 2

Poster: 268
Submission: 191

Burden of itching in patients with moderate to advanced kidney disease: a mixed-methods study.

Dr Emily Beadle[1], Dr Enric Vilar[2], Dr James Fotheringham[3], Dr David Wellsted[1], Dr Ken Farrington[2], Dr Shivani Sharma[1]

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[3]Sheffield Teaching Hospitals NHS Foundation Trust, Sheffield

Introduction: Chronic Kidney Disease- associated pruritis (CKD-ap), often referred to as itch/itching, has been estimated to impact approximately 40% of adult patients. Despite recognition of symptom burden, CKD-ap is often under-recognised. The aim of this study was to increase knowledge on the burden, experience and impact of CKD-ap and to identify patient priorities for management.

Methods: This study involved both one-to-one interviews and a survey of adult patients with CKD stages 3a-5 receiving any modality of care. The illness perceptions framework guided interview questions. Thematic analysis was used to summarise findings. The survey included the Kidney Disease Quality of Life (QoL) Instrument, Generalised Anxiety Disorder-2 and Patient Health Questionnaire-2 (to measure mood), demographic questions, details on kidney disease, and about pruritus. Both the interview questions and the survey were co-developed with patient involvement, and patients recruited across partnering NHS sites as well as through community networks.

Results: Nine patients (5 male and 4 female – M age = 58.78) participated in interviews, who identified with a range of ethnic groups: 3 minority ethnic and 6 white heritage. Results identified themes associated with the 5 elements of illness perceptions: identity, cause, consequences, timeline and controllability. Patients described the variable nature of their itch, impact on sleep and social functioning, previous trial-and-error with treatments and what they would be willing to try in future.

The survey respondents (n=135) included a mix of stages of CKD and treatment forms with 68% indicating that they have experienced a persistent itch. These individuals showed significantly poorer QoL, in particular the effects of kidney disease on daily life ($t(131) = -4.05$, $p < .001$). Participants overwhelming described their itch as “irritating” and described how it occurred in several places on their bodies. The biggest impact of itch was on participants sleep, however effects on mood, social life, intimacy, work and fatigue were also indicated. The degree to which the itch was bothersome, and the severity of the itch were shown to be associated with quality of life and mood, as were the effects of itching on sleep, leisure and housework, with poorer wellbeing associated with a higher burden.

Discussion: The results of this study add to previous research highlighting the burden of CKD-ap. Its impact on everyday life is far ranging, extending to domains such as sleep, social functioning, and overall

quality of life. The results of the survey especially highlighted the negative impact that itch can have on emotional/mental health. Collectively, the findings indicated that the burden of CKD-ap was not consistent, it changed as treatment regimens changed, with variable support along the way. There was consensus that patients had engaged in a range of trial-and-error methods to elevate symptom experience. Addressing future symptom burden was a key priority, though most were not favourable about long-term medications specifically as they were already contending with high pill burden. Overall, the research identifies an unmet need in exploring CKD-ap as part of routine care, as well as progressing advice and support to patients about its management.

Tuesday 6th June 12:15 – 13:15

Track L2 – CKD 2

Poster: 269
Submission: 194

Analysis of macrophage populations in the kidney with renal tubular cell-specific senescence induction

Mr Ross Campbell[1], Dr Marie-Helena Docherty[1,2], Dr David Baird[1,2], Dr David Ferenbach[1,2], Dr Katie Mylonas[1]

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Ageing is a risk factor for multiple diseases, including kidney disease. To improve quality of life, pharmaceutical treatments are given to ageing patients, often with side-effects and cross-reactions. Research is needed into the effects and mechanisms of ageing in order to identify new druggable targets to improve quality of life. Cells can become senescent with age and are seen at sites of tissue injury. Senescent cells (SCs) undergo irreversible cell-cycle arrest, but remain metabolically active, producing a range of signalling molecules called the senescence associated secretory phenotype (SASP, made up of pro-inflammatory/fibrotic elements). Senescent cells within the kidney post-acute kidney injury (AKI) may be involved in ongoing damage, leading in some cases to chronic kidney disease (CKD), possibly due to interactions with macrophages. We hypothesise that the recruitment of monocytes/macrophages by senescent cells is due to the signalling components present in their SASP.

Pax8 is renal tubule marker. We use Pax8-creERT2;mdm2 fl/fl mice to study kidney-specific senescence induction in absence of age/injury. Upon administration of tamoxifen, the mdm2 alleles are floxxed out by cre recombinase, allowing p53 to stabilise and activate the p21CIP1 cell-cycle inhibitor, inducing senescence in Pax8+ kidney-specific cells. The use of an endogenous tdTomato reporter allows visualisation of cells undergoing successful recombination upon the administration of tamoxifen (TAM).

As expected, cell-cycle inhibitor/SC marker, Cdkn1a was upregulated by qPCR in TAM-treated young murine whole kidneys 10-fold compared to controls ($p=0.0173$) (Figure 1). Ccl2 (monocyte chemoattractant) was up-regulated 20-fold in young ($p=0.0405$) TAM-treated TG mice vs controls (Figure 1). In agreement with an increase of Ccl2 transcripts, there was a significant increase of renal macrophages as quantified by flow cytometry of kidney digests ($p=0.0141$) in TAM treated young TG mice. Immunofluorescence staining of transgenic mice revealed an increase of Iba1 positive macrophages, correlated with staining of tdTomato tubules, suggesting that increase in macrophage numbers was in response to senescence induction (Figure 2). Iba1-p21 co-stains show a increases in p21 positive cells in TAM-treated transgenic mice, evidently a result of construct activation and appear in proximity to the macrophages (Figure 2).

Apparent increases in macrophages due to the presence of senescent cells may indicate one of the mechanisms by which AKI progresses to CKD, particularly if inflammatory macrophage phenotypes are present and persist. Macrophage and monocyte populations fluctuate with age (figure 3) and the use of

this model allows analysis of macrophage recruitment/polarisation due to senescent cell burden in the absence of age/injury and possible confounding factors, in young mice.

Figure 1

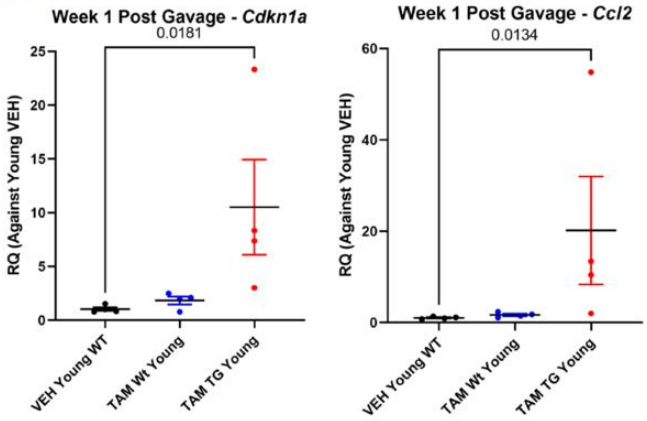


Figure 2

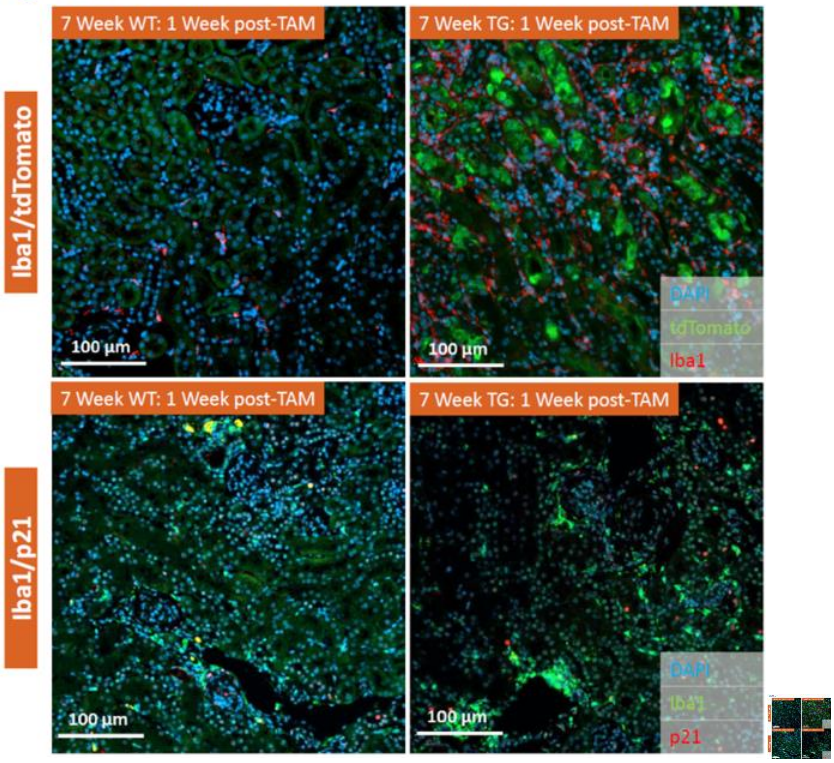
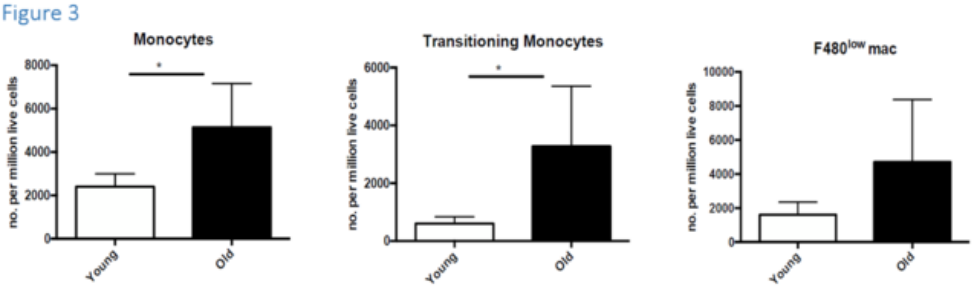


Figure 3



Tuesday 6th June 12:15 – 13:15

Track L2 – CKD 2

Poster: 270
Submission: 218

Description of our 'one stop shop' service delivery model of our renal-diabetes clinic.

Dr Abilash Sathyanarayanan, Dr Ashok Poduval

Sherwood Forest Hospitals NHS Foundation Trust, Sutton-in-Ashfield

Introduction: The emergence of new therapeutic targets for reducing the progression of the CKD in patients with diabetes has necessitated more specialist input into the management. Anecdotal experience, especially during and after the COVID 19 pandemic, shows that there exists therapeutic inertia in implementing these interventions due to many reasons - 1) long waiting times leading to delays in discussions between nephrologists and diabetologists before treatment initiation. 2) need for a preemptive plan for dose adjustments, monitoring, and withdrawal of antidiabetic medications as the eGFR falls. 3) Lack of an unified approach to treatment leading to unclear messages to primary care practitioners. 4) The diagnosis of CKD secondary to diabetes being unclear during initiation of therapy. 5) Patient and carer engagement attrition due to multiple clinic visits.

Methods: We describe a service model that has been successfully implemented in our trust which mitigates many of the above. The design of the service is based on a 'one-stop shop' model of delivery. The renal-diabetes clinic is set up to run with both a nephrologist and a diabetologist in the same sitting. The aims of the clinic are to ensure the following - 1) to obtain a detailed history of the natural history of the patient's CKD and diabetes - this is to ensure that alternative diagnoses are fully considered and onwards referrals as appropriate are made (e.g., to urology if progression is not in keeping with diabetes related CKD, to perform a work up if nephrotic syndrome is suspected). 2) to intensify antidiabetic medications (e.g., initiation of insulin), and withdrawal of medications contraindicated in CKD including dose alteration of metformin. 3) to initiate and make a robust dose escalation plan for renoprotective therapy, including advice on the use of potassium binding agents. 4) The disposition of patients from the clinic takes one of three routes - a) follow up in a specialist nephrology unit if an alternative diagnosis is made or if there is a need to consider accelerated entry to the low clearance clinic. b) discharge back to the referring diabetologist for routine diabetes follow up with a clear bullet point plan for renoprotective drug dose escalation and monitoring. c) discharge back to the GP practice with above plans and indications for re-referral to the nephrologist. 5) letter to the patient has these steps listed clearly so that they take an active part in treatment progression.

Discussion: This service model has the following benefits 1) disposition routes are clear and specialist time is spent seeing more patients therefore maximizing benefit to a large population. 2) multiple clinical decisions are made in parallel, which would otherwise take many weeks to be done in a stepwise fashion. 3) Grouping these patients into one clinic improves clinician expertise and allows implementation of the latest therapeutic strategies - this is the key strength of this clinic. 4) provides a patient centred experience with personalized decision making. We will describe selected patient journeys in the figure, and demonstrate how this model has successfully altered the course of their disease.

July 2022

Initial Referral

Patient referred to the renal diabetes clinic due to worsening renal function and microalbuminuria. Patient had type 1 diabetes for more than 30 years with reasonable control.

September 2022

Seen in the Renal-Diabetes clinic

- progression of her condition was not in keeping with diabetes related kidney disease alone.
- reported multiple symptoms that could be attributed to obstructive uropathy.
- some symptoms suggestive of systemic vasculitis including recurrent prior miscarriages.

Insulin regimen altered to improve diabetes control, referred to a weight management service.

Further investigations including for multiple myeloma, vasculitis, and obstructive uropathy done.

October 2022

Investigations reviewed - remotely

No evidence of a systemic condition noted.

Referred to Urology for definitive management of obstructive uropathy.

Monitoring advice provided to primary care and parent diabetes team.

July 2022

Initial Referral

Patient referred to the renal diabetes clinic from the foot clinic, due to worsening renal function on a background of type 2 diabetes, with nephrotic range proteinuria and hyperkalemic episodes not explained by diabetes alone.

October 2022

Seen in the Renal-Diabetes clinic

- Review of her progression showed that the creatinine and potassium rise was temporally associated with worsening of her chronic foot infection and cotrimoxazole usage.
- Other contributory factors for the proteinuria identified, including morbid obesity and inadequately controlled hypertension.

Plan for altering her GLP1 agonist was made to help weight loss, with plans for introduction of SGLT2i next.

Further investigations for the proteinuria requested.

November 2022

Investigations reviewed - remotely

No other acute reversible cause of the proteinuria identified.

Renal function improved with observation.

Primary care advice for appropriate next step with antihypertensive medications given due to CKD.

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Track L2 – CKD 2

Poster: 271
Submission: 232

Enabling understanding of the impact of analytical performance of creatinine upon CKD staging; using computerised simulation and concordance estimates to link analytical performance to outcomes

Dr William Bartlett[1], Dr Ellie Dow[2], Dr Rachel Marrington[3], Mr Finlay MacKenzie[3]

[1]School of Science and Engineering, University of Dundee, Dundee.
[2]Ninewells Hospital and Medical School, Dundee.
[3]Birmingham Quality (UK NEQAS), Birmingham

Background: Estimated glomerular filtration rate (eGFR) is used to diagnose and stage chronic kidney disease (CKD). This requires measurement of creatinine, and use of formulae. The eGFR is assessed against fixed internationally agreed staging criteria (CKD stage 1 to 5). Variation in analytical performance of creatinine assays directly impacts patient outcomes. Diagnostic criteria are fixed and shared across healthcare systems; comparative performance of creatinine assays therefore becomes critical from a population health perspective. Assay calibration against international standards, high accuracy, and low imprecision enable equity of access to protocol-driven healthcare and outcomes. A fixed bias will alter the population distribution to CKD stages misclassifying patients. Imprecision will cause oscillation of population between stages to impact on the veracity of CKD staging and outcomes. These issues are explored.

Method: A database of creatinine results (114,962) from 62,722 (34,755 females) anonymized adult patients was used. These results represent a 3-month primary and secondary care workload for a laboratory serving a population of 425,000. Simulations, using Microsoft Excel, were used to assess the impact of variation in imprecision and bias of creatinine assays upon concordance of CKD stages based on eGFR results (CKD EPI, 2009 and 2021 equations).

Results: The impacts and interactions of changes in bias and imprecision can be complex. Simulation of a fixed positive bias of 1 µmol/L results in 1.6% of the population of 114,962 results moving into a higher CKD group (1 through to 5); this total does not reflect the movement between groups. The concordance of (eGFR equation: EPI 2009) results drops from 100% to 97.3%. At zero bias, a CV of 1.5% will deliver concordance of eGFR at -1 SD of 96.5% and +1SD of 96.6%. With a fixed bias of +1 µmol/L, the concordance figures are 99.9% and 94.0% respectively.

Conclusion: Simulations employing a patient database and concordance measures can enable insight into complex interrelationships of analytical performance indices that need to be controlled to assure equitable patient outcomes. They may also deliver a method for identification and assessment of analytical performance specifications.

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Track L2 – CKD 2

Poster: 272
Submission: 248

The role of coagulation protease-mediated signalling on the development of renal fibrosis

Dr Hugh Leonard, Professor Claire Sharpe, Professor Anthony Dorling

Department of Inflammation Biology, KCL, London

Introduction: There are currently no treatments for renal fibrosis, the histological process underlying the development of chronic kidney disease as the common end pathway of numerous disease processes in both native and transplanted kidneys. Fibrosis results from deposition of excess extracellular matrix (ECM) by myofibroblasts leading to loss of function. The signalling pathways leading to the differentiation and proliferation of myofibroblasts are incompletely understood, with both pericytes and fibroblasts identified as potential myofibroblast precursors. Coagulation proteases, including thrombin, have been postulated to play a role in fibrogenesis in several organs including the kidneys. For this study we employed transgenic mice expressing coagulation protease inhibitors on different promoters to examine the cell-specific roles that coagulation protease-mediated signalling plays in renal fibrogenesis.

Methods: The three strains of transgenic mice expressed either human Tissue Factor Pathway Inhibitor (TFPI) on CD31 (expressed by endothelial cells and infiltrating monocytes) or αSMA (expressed by vascular smooth muscle cells, myofibroblasts and pericytes) promoters, or hirudin on a CD31 promoter. Renal fibrosis was induced using both a tubulotoxic (aristolochic acid) and ischaemia reperfusion injury models in transgenic and wild-type C57BL/6 mice and fibrosis quantified through histology, RT-qPCR and biochemical methods. Some mice were culled early following injury to assess inflammatory infiltrate and pericyte mobilisation.

Primary renal interstitial fibroblast cultures were used to examine the effect of coagulation protease-mediated signalling on a known myofibroblast precursor. Selective proteomic analysis, RT-qPCR and proliferation assays were performed on fibroblasts treated with thrombin or its precursors.

Results: While there was an altered myeloid infiltrate observed in all transgenic mice early following injury (reduced Ly6C Hi monocytes and iNOS+ macrophages compared to wild type), only the mice expressing the transgene on an αSMA promoter (α-TFPI-Tg mice) exhibited reduced renal fibrosis in both models (34 and 41% reduction). Using a reciprocal bone marrow transplant model, this protective phenotype was confirmed to be conferred by renal parenchymal cells. These α-TFPI-Tg mice exhibited altered pericyte response to renal injury in a transgene-dependent fashion.

Thrombin stimulation of renal interstitial fibroblasts led to increased proliferation and amplification of TGF-β-induced myofibroblast transformation. These effects were muted in fibroblasts derived from α-TFPI-Tg mice compared to wild type exposed to TF, FVIIa, FX and FII, indicating reduced coagulation protease-driven fibroblast proliferation and activation as a potential mechanism leading to reduced

fibrosis in α-TFPI-Tg mice compared to CD31-Tg mice or wild type mice. Proteomic analysis of thrombin-treated fibroblasts revealed several potential effector proteins of the fibrotic response.

Discussion: These data reveal that coagulation proteases play two roles during AKI; influencing myeloid cell recruitment, and driving progressive fibrosis. The protective phenotype conferred by coagulation protease inhibition on αSMA+ cells indicates that this second mechanism may be through direct PAR activation on myofibroblasts or their precursors (e.g. pericytes or interstitial fibroblasts). The proteomic analysis of coagulation protease-treated fibroblasts has yielded novel data including potential effector proteins contributing to the development of renal fibrosis and chronic kidney disease. Further investigation of these molecules may yield novel therapeutic targets in the treatment of chronic kidney disease.

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Track L2 – CKD 2

Poster: 273
Submission: 264

Discovery and validation of novel renal epithelial senescence associated biomarkers.

Dr David Baird[1], Mr Maximilian Reck[1], Mr Ross Campbell[1], Dr Eoin O'Sullivan[1], Dr Marie-Helena Docherty[1], Mrs Carolynn Cairns[1], Dr Cyril Carvalho[1], Dr Matthieu Vermeren[1], Prof Jeremy Hughes[1], Prof Patrick Mark[2], Dr Laura Denby[1], Dr Bryan Conway[1], Dr Katie Mylonas[1], Dr David Ferenbach[1]

[1]University of Edinburgh, Edinburgh.
[2]University of Glasgow, Glasgow

Background: Renal tubular senescence in response to ageing and injury is proposed as a driver of kidney fibrosis. Senescent cell depletion in mice improves outcomes in multiple organs including the kidney. There are currently no non-invasive biomarkers for quantifying renal senescence available. We are using a multi-omics approach and utilising human renal proximal tubular epithelial cells (hRPTECs) in culture, a murine model of renal senescence and human samples, to identify urinary biomarkers of renal tubular senescence and determine if they can predict decline in kidney function.

Methods: In vitro: We optimised a model of induced senescence in hRPTECs using 10Gy irradiation and treatment with MDM2-antagonist Nutlin 3A. Transcriptomic studies using bulk RNAseq were performed comparing senescent cells with proliferating controls (each group n=5). Genes with >x2 fold-change between groups and adjusted p values <0.01 were regarded as differentially expressed.

In vivo: Senescence was induced using 7Gy total body irradiation (TBI) in mice whilst the Bcl2/w/xL inhibitor ABT-263, was used to deplete senescent cells. We performed LC-MS proteomic studies on urine from mice comparing healthy controls with mice exposed to TBI with or without subsequent senolytic therapy.

In human kidney biopsy samples from 55 patients with CKD, we performed immunofluorescence staining for senescence marker p21CIP1, proliferation marker Ki67 (absent in senescent cells) and tubular markers CD10 and CKPAN and quantified tubular senescence using machine learning algorithms in the software QuPath (see figure).

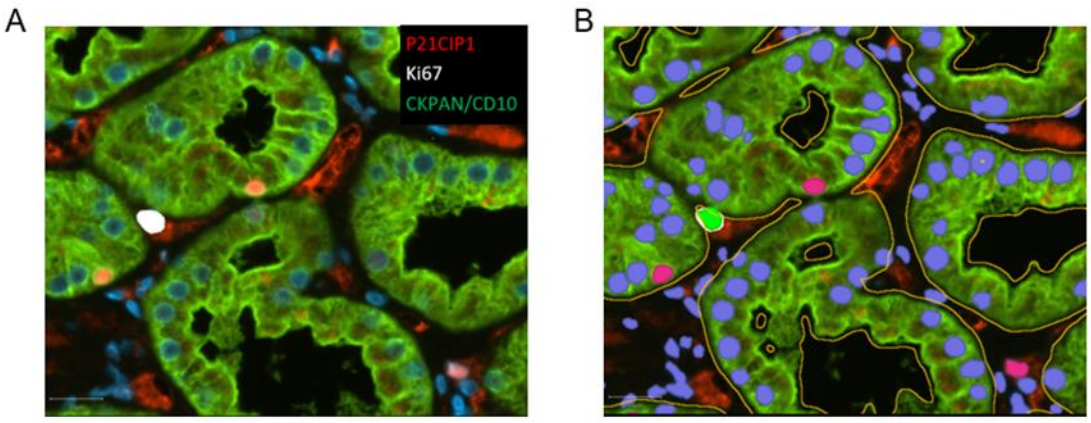

Figure: Immunofluorescence staining of a human kidney (A) with machine learning algorithms facilitating the counting of tubular senescent cells (B).

Results: Irradiated and Nutlin 3A treated cells had increased mRNA levels of CDKN1A and reduced LMNB1 and MKI67 in keeping with senescence induction. Other transcripts including CXCL8 and IL6 rose in irradiated cells compared to controls but fell in Nutlin 3A treated cells. 1272 genes where differentially expressed in irradiated cells compared to controls; 760 of these genes were differentially expressed in the same direction in Nutlin 3A treated samples. Over representation analysis highlighted pathways relating to the cell cycle, consistent with senescence induction.

LC-MS studies on murine urine samples identified 15 proteins that fell in mice exposed to TBI compared to healthy controls but reverted towards baseline with senolytic treatment. By combining my datasets with publicly available data, we identified several candidate biomarkers of senescence. This includes urokinase plasminogen activator surface receptor, a protein linked with senescence and ageing as well as other novel senescence markers (not named due to pending patent applications).

Renal tubular senescence in human kidney biopsies correlated with age (rho = 0.64, $p<0.001$) and inversely with eGFR (rho = -0.51, $p<0.001$). LC-MS and ELISA studies in matched urine samples are ongoing to determine which molecules most closely correlate with senescence histologically in the human kidney; these will be presented at the meeting.

Discussion: We have identified several candidate urinary biomarkers of senescence; ongoing studies will determine which molecules correlate with renal senescence histologically. Further studies in a cohort of >380 patients with >4 years follow-up will determine if the most promising biomarkers predict renal outcomes and will also be presented at the meeting.

Tuesday 6th June 12:15 – 13:15

Track L2 – CKD 2

Poster: 274
Submission: 278

Using single-nuclei multiomic profiling to identify gene regulatory networks driving human kidney injury

Mr Maximilian Reck, Ms Carolynn Cairns, Dr Laura Denby, Dr Alexander Laird, Dr David Ferenbach, Dr Tamir Chandra, Dr Bryan Conway

University of Edinburgh, Edinburgh

Background: Chronic kidney disease (CKD) is typically asymptomatic until the late stages and patients often already have advanced disease at the time of diagnosis. Current treatments slow progression of CKD, however many patients still progress to require dialysis or transplantation. Therefore, novel treatments which enhance kidney repair are an attractive prospect. Here, we used paired single-nuclei RNA and ATAC sequencing (snRNA+ATAC-seq) to profile the transcriptome and gene regulatory landscape to identify key regulators which drive kidney injury in humans and explore how these regulators can be targeted to expedite renal repair.

Methods: We compiled nephrectomy specimens from patients with ureteric obstruction due to a transitional cell carcinoma in the ureter causing kidney injury (n=6) while patients who were never obstructed act as controls (n=7).

Nuclei were isolated from snap-frozen samples and gene expression and chromatin accessibility libraries were prepared using the 10x Genomics Multiome kit. Additionally, a SNP-based sample pooling approach was used to reduce batch variability and reduce per-sample costs.

Computational analysis was used to identify genes differentially expressed in injured proximal convoluted tubule cells, immune cell subsets and other cell types. Coupling the information of gene expression and open chromatin regions allowed the identification of *cis*-regulatory elements which facilitate gene expression. Analysis of DNA motifs present within regulatory regions allowed inference of the activity of individual transcription factors (TFs) and their role in orchestrating complex transcriptional programs.

Results:

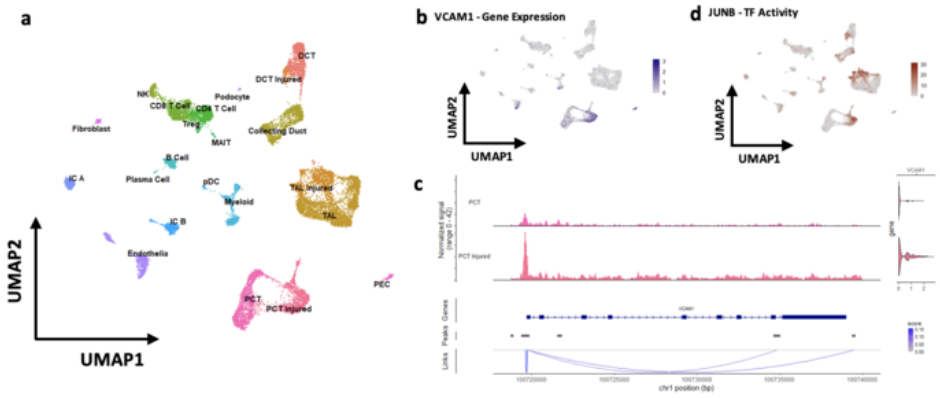

Figure 1a) UMAP representation of the integrated RNA and ATAC datasets showing detected cell types.
b) Gene expression of VCAM1, a well-recognized marker of injured proximal tubule cells.
c) Bulk chromatin accessibility track at the VCAM1 locus. Paired gene expression data (top right panel) shows a strong correlation with the chromatin state at the promotor site (bottom panel).
d) Predicted JUNB transcription factor activity determined through TF binding motifs enriched in open chromatin regions on a single-nucleus level.

We simultaneously profiled the transcriptome and chromatin state of >30,000 nuclei originating from healthy and injured kidneys. We observe all expected cell types including glomerular and tubular epithelial, endothelial, mesenchymal and immune cells. In agreement with other studies, we find an upregulation of injury markers such as *KIM-1* and *VCAM1* in injured cells which are strongly enriched in obstructed samples. Furthermore, across all cell types we identified >250,000 open chromatin peaks of which many are cell type specific.

Additionally, analysis of the DNA binding motifs in regulatory regions, used by transcription factors to recognize their targets, allowed for the inference of transcription factor activity on a single-nucleus level. By leveraging the joint modalities, we identified putative links between gene expression, regulatory sequences and the TFs binding to these sequences. This enabled the inference of complex gene regulatory networks which provide a unique opportunity to understand the key regulators of transcriptional programs. For example, in injured tubular epithelial cells we found a strong enrichment of binding sites of well-known TFs such as AP-1 subunits or NFKB1 but also novel TFs which have not been implicated in renal disease yet. We are currently investigating the role of the most promising TFs.

Discussion: We have generated a multiomic atlas of renal injury in humans. The joint gene expression and open chromatin datasets provide a powerful resource to explore the gene regulatory landscape underlying renal epithelial injury, as well as other cell types. In addition to identifying well known TFs, we have found several novel ones not yet associated with kidney disease. Ongoing mechanistic studies will determine their role and their prospect as therapeutic targets.

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Track L2 – CKD 2

Poster: 275
Submission: 298

Longitudinal availability and frequency of Hb measurements in UK and US paediatric patients with anaemia of chronic kidney disease (CKD) on dialysis (D) or not on dialysis (ND) treated with erythropoiesis-stimulating agents (ESA): a retrospective chart review

Dr Sally Mountcastle[1], Dr Alice Rouleau[2], Dr Neil Brett[3], Dr Justyna Amelio[4], Dr Thomas Hiemstra[4], Dr Juliet Roberts[5], Dr Jamila Astrom[6], Dr Kathy Fraeman[7], Dr Jake Hunnicutt[8], Dr Veronique Page[3], Dr Susanna Cuadripani[4], Dr Celena Kent[9], Dr Mayadah Shabbout[10], Dr David Webb[5], Dr Sudarsana De[11], Dr Amrit Kaur[12], Dr Rukshana Shroff[13], Dr Keele Wurst[4], Dr Anna Richards[5]

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Introduction**:** Anaemia is common in paediatric CKD and is associated with adverse clinical consequences and impaired quality of life. We assessed the availability and frequency of describing haemoglobin (Hb) measurements during ESA treatment in paediatric patients with anaemia of CKD (D/ND) in the US and UK.

Methods**:** A retrospective chart review was conducted 1 Nov–20 Dec 2021 in the US and UK in patients aged <18 yrs at index date who received ESA for anemia of CKD (D/ND). Chart reviews were completed by treating physicians from a panel in the US and by treating physicians/authorized delegated staff in the UK. Eligibility period was 1 Jan 2017–31 Dec 2018. Index date was defined as 1 Jan 2017 if a patient was already receiving ESA treatment at the beginning of the eligibility period (prevalent user), or the date of ESA treatment initiation within the eligibility period (new user). Data was collected using an electronic case report form (hosted through the LiveTracker® platform) from index date until earliest of either: permanent ESA discontinuation, 52 wks after index date (for those without renal transplant), 52 wks from the receipt of renal transplant (for those with transplant), loss to follow-up, or death.

Results**:** Fifty patients were included, 14 (28.0%) from the US and 36 (72.0%) from the UK (as per oversampling in the plan); the median age was 9.0 yrs (min/max: <1/15; IQR: 4.0– 11.0) and 22 (44.0%) were female. Mean (SD) baseline Hb level was 10.0 (2.0) g/dL overall (one missing value), 9.5 (2.0) g/dL

in those on dialysis (n=23/49) and 10.5 (1.8) g/dL in those not on dialysis (n=26/49). At index, 23 (46.0%) were prevalent ESA users and 27 (54.0%) were new users. The range of patient follow-up was 33.1–97.3 wks. The mean (SD) number of times serum Hb was tested during the index ESA treatment line was 21.9 (33.1) overall, 31.4 (41.1) for those on dialysis, 13.6 (21.5) for those not on dialysis. The median interval (min/max) between any Hb measurements for all patients (with at least two Hb measurements) was 4.0 weeks (0.1–51.6 weeks), 2.6 weeks (0.1–17.4 weeks) for those on dialysis, and 5.9 weeks (0.1–51.6 weeks) for those not on dialysis. Median (95% CI) time from index to second Hb measure was 4.9 weeks (3.0–8.3) overall, 3.6 weeks (0.7–16.9) for patients on dialysis, 4.9 weeks (3.0–12.1) for those not on dialysis, 3.6 weeks (1.3–4.9) for UK patients, and was not estimable for US patients (8/14 had only one captured Hb measure); post-transplant (n=8), the median (95% CI) time was 1.8 weeks (0.4–4.7).

Conclusions**:** This assessment provides important data on the frequency and availability of Hb measurements during ESA treatment. Hb measurements were undertaken more frequently in the dialysis population. There were fewer second Hb measures in the post-index period recorded in the US data, perhaps due to chart review data availability and extraction methods differing between countries.
Funding: GSK (Study 213734)

Tuesday 6th June 12:15 – 13:15

Track L2 – CKD 2

Poster: 276
Submission: 321

Screening for Albuminuria in Patients with Monoclonal Gammopathy of Uncertain Significance: A Single Centre Experience

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University Hospitals Birmingham, Birmingham

Introduction: Albuminuria is biomarker of kidney damage and may be indicative of monoclonal gammopathy of renal significance (MGRS) in patients with a monoclonal gammopathy. Guidelines relating to screening for albuminuria in patients with monoclonal gammopathy of uncertain significance (MGUS) are not well defined and it is not known whether this should be a part of baseline assessment.

Methods: This study evaluated 349 patients followed up in the nurse led telephone MGUS clinic, with a questionnaire and screened patients for albuminuria with spot urine albumin creatinine ratio (ACR).

Results: Overall, 281/349 (81%) patients provided a urine sample. 70/281 (25%) had evidence of albuminuria (ACR >3 mg/mmol). Of the 70 patients, 54 (77%) had moderate albuminuria (ACR 3-30 mg/mmol) and 16 (23%) had heavy albuminuria (ACR > 30 mg/mmol). 24/70 (34%) patients were already under renal follow up. Screening resulted in a new diagnosis of AL amyloidosis in 1 patient and led to better BP control management in the second patient.

Conclusion: Defining the prevalence of albuminuria in this cohort resulted in a new diagnosis of immunoglobulin light chain (AL) amyloidosis in 1 patient and identified 45/281 (16%) patients that may benefit from a repeat ACR test and/or renal opinion. Larger prospective studies are required to assess the impact of this approach and whether ACR should be incorporated into risk assessment system at baseline for MGUS patients.

Tuesday 6th June 12:15 – 13:15

Track L3 – CKD 3

Poster: 277
Submission: 322

Albuminuria at baseline and 12-months in patients with newly diagnosed multiple myeloma; results from the UK NCRI Myeloma XI trial.

Dr Ritika Rana, Dr Jennifer Pinney, Professor Paul Cockwell, Professor Mark Drayson, Professor Guy Pratt

University hospital Birmingham, Birmingham

Introduction: Kidney disease in myeloma is heterogenous and associated with worse outcomes. Albuminuria is a powerful adverse determinant of outcomes in kidney disease but there are limited data on patients with multiple myeloma.

Methods: We evaluated the Myeloma XI trial at diagnosis and one-year for (i) albuminuria incidence and prevalence by urinary albumin to creatinine ratio (ACR); and (ii) the relationship between ACR and excretory kidney function as categorised by estimated glomerular filtration rate (eGFR). Patients were matched for age, sex, baseline free light chain level and 12-month clonal response and 529 patients met the criteria.

Results: At presentation 305 patients (58%) had albuminuria (ACR >3 mg/mmol). In 15 patients (3%) this approximated to ≥1 gram/24 hours (ACR ≥70 mg/mmol). Albuminuria at baseline was not independently associated with a lower eGFR category at 12 months. At 12 months, 162 patients (30%) had albuminuria.

Conclusion: We show that majority of patients with newly diagnosed myeloma have albuminuria at presentation and almost one-third have albuminuria at 12 months. In this study albuminuria at presentation was not independently associated with decline in eGFR at 12 months. Further studies are needed to identify whether persistent albuminuria is independently associated with increased risk of adverse outcomes in patients with myeloma.

Tuesday 6th June 12:15 – 13:15

Track L3 – CKD 3

Poster: 278
Submission: 324

Sociodemographic health inequalities and incident hypertension among adults with chronic kidney disease: a multi-centre observational study

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Background: Chronic kidney disease (CKD) affects around 3.5 million people in the UK but not everyone is affected equally. Those from minority ethnic groups are five times more likely to have CKD and their condition is also more likely to progress to kidney failure. Health inequality is not just limited to race; lower socioeconomic groups, men, women, and the elderly all experience different challenges with CKD with discrepancies in prevalence, rate of progression, and access to kidney replacement therapy. It is imperative that we understand how different groups are affected by CKD so that we can identify those at risk and target our attention towards those that need it most. High blood pressure is one of the main causes of CKD, and its management is a cornerstone of successful CKD care. In this analysis, we aimed to explore the relationship between sociodemographic and clinical factors and incident hypertension in patients with CKD.

Methods: Patients with any stage of non-dialysis dependent CKD were recruited into a UK multicentre prospective observational cross-sectional study. Participants' self-reported sociodemographic and health status was collected using a bespoke survey. Clinical data was extracted from patients' records. Incident hypertension was defined as an uncontrolled blood pressure at the time of survey completion, specifically a systolic or diastolic blood pressure ≥140 or 90 mmHg, respectively, as recorded at last clinical visit. Binary logistic regression models were performed to assess the association of age, sex, ethnicity, index of multiple deprivation (IMD), kidney function (eGFR), and number of long-term conditions on the presence of incident hypertension. Data is shown as odds ratio (OR) and 95% confidence intervals (CI).

Results: Of the 1015 participants recruited, 584 had recent blood pressure data recorded. The mean age of these 584 participants was 66.4 (±14.2) years. 62% were male and 92.4% were White British. Mean eGFR was 32.6 (±20.5) ml/min/1.73^2. Of these 584, 416 (71%) had incident hypertension. Univariate analyses showed the odds of having incident hypertension if male was 1.6 times higher than females (OR=1.63, CI=1.08 to 2.45, p=0.019). All other variables were insignificant. In a multivariable analysis, being male (OR=1.46, CI=0.95 to 2.24, P=0.087) and age (OR=1.01, CI=1.00 to 1.03, P=0.070) increased the odds of uncontrolled BP; however, neither were significant.

Discussion: Our findings show a high level of uncontrolled blood pressure amongst those with CKD. These high levels may be indicative of medication non-compliance or treatment resistant hypertension, an important clinical problem in people with CKD. We found the odds of having incident hypertension was higher in males with CKD. Sex disparities in hypertension prevalence has been shown in previous research of the general population, although less is known in CKD. Interestingly, ethnicity or

socioeconomic status was not associated with incident hypertension, but this could be due to a somewhat homogenic population included. Addressing health inequalities in patients with CKD is a focal point for improving outcomes for these patients but more research is still needed to determine the extent of this issue and how we can act to rectify it.

Tuesday 6th June 12:15 – 13:15

Track L3 – CKD 3

Poster: 279
Submission: 336

The characteristics of hospital admissions in patients with chronic kidney disease and heart failure.

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Introduction: The prevalence of heart failure (HF) with chronic kidney disease (CKD) is increasing. Both conditions are associated with poor outcomes including fluid overload causing hospitalisations and mortality. Patients with CKD are also less likely to have optimal pharmacological therapies for HF due to concerns over hyperkalaemia and declining renal function. The characteristics of CKD-HF patients presenting to hospital is unknown which is what this project aims to determine.

Methods: Data on consecutive patients attending a CKD-HF clinic between 12th April 2019 and 11th September 2021 were retrospectively identified using electronic health records and included demographic factors (age, sex, BMI), renal and heart function, mortality, medications, and the number and cause of hospital admissions within the study period. Adjusted binary logistic, Poisson, and bivariate regressions determined the characteristics of patients admitted to hospital for any cause and for worsening HF. All analyses and data cleaning were performed in R version 4.2.1.

Results: The sample of 318 patients had a mean age of 74.4 years (SD 13.3), 65.7% were male, mean BMI was 28.4 kg/m2 (SD 7.0), 54.6% had diabetes, and 24.6% died during the study period. They had a mean eGFR of 28.1 (SD 12.6) and a mean EF of 41.8 (SD 13.5). The proportion of patients on beta-blockers were 79.9%, loop diuretics 73.3%, ACE inhibitors or angiotensin receptor blockers (ACEi/ARBs) 62.3%, mineralocorticoid receptor antagonists (MRA) 27.0%, and SGLT2 inhibitors 26.7%. The 318 patients contributed to a total of 443 person-years of follow-up with 667 all-cause and 201 HF admissions. Of the 318 patients, 227 (71.4%) had at least one hospital admission for any reason and 110 (34.6%) had at least one hospital admission for worsening HF. ACEi/ARB use was significantly higher in patients with no hospital admissions. Patients with at least one admission were more likely to be on diuretic therapy and to have a higher daily diuretic dose than those with no admissions. Poisson regression showed CKD stage 4/5 was associated with more all-cause (incidence rate ratio 1.38, 95% CI 1.16, 1.64) and HF (IRR 1.56, 95% CI 1.14, 2.16) admissions compared to CKD stage 3. Higher haemoglobin levels were associated with a reduction in all-cause admissions (IRR 0.99, 95% CI 0.99, 1.00). Adjusted bivariate regression (with outcome variables being counts of HF and non-HF admissions) showed CKD stage 4/5 to be associated with more non-HF admissions (IRR 1.84, 95% CI 1.27, 2.67). Adjusting for covid deaths, advanced age, hospital admission, and reduced eGFR were associated with an increased risk of death.

Conclusions: A large number of hospital admissions for people with CKD and HF were for worsening heart failure. There were high rates of ACEi/ARB use and this was associated with fewer all-cause and HF admissions. Worsening kidney function and lower haemoglobin were associated with more hospitalisations. Loop diuretic use may be a surrogate for more severe disease and diuretic resistance, both of which are associated with poor outcomes, and potentially explaining its association with more all-cause and HF admissions.

Tuesday 6th June 12:15 – 13:15

Track L3 – CKD 3

Poster: 280
Submission: 344

Baseline blood pressure control in the NURTuRE CKD cohort study

Dr Bethany Lucas[1,2], Professor Paul Cockwell[3], Dr Simon Fraser[4], Professor Philip Kalra[5], Professor David Wheeler[6], Professor Maarten Taal[1,2]

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Introduction: Blood pressure (BP) control is one of the most important therapeutic interventions in chronic kidney disease (CKD) and has been shown to reduce cardiovascular morbidity, mortality and progression to end stage kidney disease (ESKD). There is debate as to the optimal BP target for patients with CKD, with several guidelines making different recommendations. Analysis of the UK multicentre NURTuRE CKD cohort study will assess achievement of BP targets and investigate associations with achieved BP in participants from secondary care nephrology centres.

Methods: 2996 participants with CKD stages G3-4 or stages G1-2 plus albuminuria >30 mg/mmol were enrolled from 16 nephrology centres in the UK from 2017 to 2019. Medical history, demographic, biometric and laboratory samples were taken at baseline. BP was measured according to a standard operating procedure. Three measurements that differed by <10% were recorded and the mean value was used for analysis. BP control was assessed against the following guidelines: National Institute for Health and Clinical Excellence (NICE), Kidney Disease Improving Global Outcomes (KDIGO) 2012 and 2021 guidelines. Descriptive statistics were used for BP control and univariate and multivariable analysis for factors associated with BP control.

Results: The mean systolic BP for the cohort (2992 participants with baseline BP measurement) was 139±20 and diastolic 80±12 mmHg. Analysis of BP in clinically important subgroups is shown in Table 1. A higher mean systolic BP was associated with age ≥65 years, male sex, black ethnicity, lower eGFR values, higher albuminuria category, diabetes, body mass index (BMI) >30 kg/m2 and a history of atherosclerotic cardiovascular disease. There was no significant difference between systolic BP for index of multiple deprivation quintiles, health literacy by the single-literacy item screener or smoking status.

Achievement of BP targets is shown in Table 2. Of 2723 with centrally calculated urine albumin creatinine ratio (ACR) and BP data, only 1036 participants (38.0%) met the NICE guideline recommended

BP. For the KDIGO 2012 guideline, 794 participants (29.2%) achieved recommended BP control. For KDIGO 2021, only 420 participants (15.4%) met the standard of systolic BP <120mmHg. For those in the highest risk albuminuria category (A3) only 143 (18.6%) and 96 (12.5%) of participants met the KDIGO BP recommendations for 2012 and 2021, respectively.

Discussion: BP control in the NUTuRE-CKD cohort at baseline was suboptimal when compared to all three major guidelines. Unfortunately, subgroups at highest risk of adverse outcomes demonstrated poorer BP control. Given the importance of BP control in people with CKD, further research into BP management approaches and barriers to achieving optimal control is required. Priority should be given to developing a patient-centred approach to reduce BP more effectively.

Table 1. Blood Pressure according to baseline demographic and biometric factors

	Patient number (%)	SBP mmHg	DBP mmHg	p value SBP	p value DBP
Whole cohort	2992	139±20	80±12		
Age					
≥65	1575 (53)	143±21	76±12	<0.001	<0.001
<65	1417 (47)	136±19	84±12		
Sex					
M	1751 (59)	140±20	80±13	0.015	0.768
F	1241 (41)	138±21	80±12		
Ethnicity					
White	2609 (87)	140±20	79±12	<0.001	<0.001
Black	91 (3)	148±22	88±16		
Asian	188 (6)	134±19	81±13		
Other	102 (3)	136±17	82±11		
eGFR ml/min/1.73m^2					
>60	306 (10)	134±19	84±12	<0.001	<0.001
45-60	505 (17)	136±19	82±12		
30-44	981 (33)	141±21	80±12		
15-29	1105 37)	141±21	78±13		
<15	95 (3)	143±20	76±13		
Albuminuria mg/g					
<30	638 (23)	134±19	78±11	<0.001	<0.001
≥30-300	892 (33)	138±20	79±12		
≥300	1193 (44)	144±21	82±13		
Diabetes					
Yes	921 (31)	143±21	76±12*	<0.001	<0.001
No	2071 (69)	138±20	82±12*		
Body Mass Index					
>30	1203 (41)	141±20	80±13	<0.001	0.162
25-30	1032 (35)	140±20	80±12		
<25	679 (23)	136±21	79±12		
RAASi					
Yes	1982 (67)	140±20	81±12	0.376	<0.001
No	967 (33)	139±21	78±12		
Smoking status					
Current	262 (9)	139±19	83±12	0.618	<0.001
Ex-smoker	1207 (41)	140±21	78±12		
Never smoked	1483 (50)	139±20	81±12		
History of atherosclerotic cardiovascular disease					
Yes	503 (17)	142±23	76±13	0.002	<0.001
No	2431 (83)	139±20	81±12		
Educational level					
No qualifications	792/2942 (27)	142±22	77±12	<0.001	<0.001
GCSE	721 (25)	140±21	80±12		
A Levels	221(8)	138±20	80±12		
NVQ	406 (14)	138±21	81±12		
First degree	485 (16)	137±18	82±11		
Higher degree	298 (10)	136±18	81±11		
Other	19 (0.6)	134 (126-149)	77 (67-83)		
Index of Multiple Deprivation Quintiles					
1st	594 (22)	139±21	81±14	0.679	0.342
2nd	518 (19)	138±21	80±12		
3rd	495 (18)	139±21	80±13		
4th	552 (20)	140±20	79±12		
5th	588 (21)	140±20	80±11		
Health Literacy					
SILS >2	130 (4)	139±20	80±14	0.958	0.966
SILS ≤2	2785 (96)	139±20	80±12		
Employment Status					
Working	1010 (34)	135±18	84±11	<0.001	<0.001
Retired	1584 (54)	142±21	76±12		
Unemployed	66 (2)	137 (121-150)	83 (77-90)		
Student	12 (0.4)	125 (119-140)	81 (78-76)		
Other	282 (10)	139±22	84±13		

Values are expressed as mean ± standard deviation or median (interquartile range). Due to rounding percentages may not sum to 100%.

Abbreviations: DBP – diastolic blood pressure, eGFR – estimated glomerular filtration rate, GCSE – general certificate of secondary education, NVQ – national vocational qualification, RAASi – renin angiotensin aldosterone inhibition, SBP – systolic blood pressure, SILS – Single Item Literacy Screener.

Table 2. Proportion of participants with controlled BP

	Diabetes, n=815 n (column%) unless otherwise stated			No Diabetes n=1908 n (column%) unless otherwise stated			Total n (%)
Albuminuria status	A1 n=140	A2 n=251	A3 n=424	A1 n=498	A2 n=641	A3 n=769	n=2723
Mean BP							
Systolic	134±18	140±21	149±21	134±19	137±20	141±20	139±20
Diastolic	72±11	75±11	79±13	79±11	81±12	84±12	80±12
BP Controlled (KDIGO 2012 target)*							
Yes	55 (39.3)	64 (25.4)	58 (13.6)	308 (61.8)	166 (25.9)	143 (18.6)	794 (29.2)
No	85 (60.7)	187 (74.5)	366 (86.3)	190 (38.2)	475 (74.1)	626 (81.4)	1929 (70.8)
BP Controlled (KDIGO 2021 target)**							
Yes	31 (22.1)	38 (15.0)	26 (6.1)	111 (22.3)	118 (18.4)	96 (12.5)	420 (15.4)
No	109 (77.9)	214 (84.9)	398 (93.9)	387 (77.7)	523 (81.6)	673 (87.5)	2304 (84.6)
BP controlled (NICE target)***							
Albuminuria status	A1 n=140	A2 n=251	A3 n=424	ACR<70 n=1353		ACR≥70 n=555	n=2723
Yes	55 (39.3)	64 (25.4)	58 (13.6)	766 (56.6)		93 (16.8)	1036 (38.0)
No	85 (60.7)	187 (74.5)	366 (86.3)	587 (43.4)		462 (83.2)	1687 (62.0)

*KDIGO 2012 <140/90mmHg, unless high risk ACR >30mg/g or diabetes then <130/80mmHg

**KDIGO 2021 - <120mmHg systolic

***NICE <140/90mmHg without diabetes, <130/80mmHg with diabetes or ACR ≥70mg/mmol

Tuesday 6th June 12:15 – 13:15

Track L3 – CKD 3

Poster: 281
Submission: 346

On the accuracy of the Kidney Failure Risk Equations

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Introduction: The accuracy of the Kidney Failure Risk Equations (KFRE) is based on the Receiver Operating Characteristic (ROC) curve, Area Under the ROC Curve (AUC), and Harrell's C-statistic, but these metrics do not fully describe a predictive model. We examined the predictive power of the 4-variable KFRE described in [1] and considered the limitations of ROC curves and C-statistics.

Methods: We used data from the UK's NURTuRE CKD cohort with outcomes for 2651 CKD patients. Mean follow up time was 1251 days (std dev 176). Baseline characteristics:

age, mean (SD)	male sex	eGFR, mL/min/1.73m^2, Mean (SD)	uACR, mg/g, median (IQR)
65 (14)	59%	33 (12)	230 (864)

179 patients had reached ESKD (defined as initiation of dialysis or kidney transplantation) at follow up. We computed:

* C-statistic -- proportion of patient pairs in which KFRE assigns higher risk score to the patient closer to ESKD.

* AUC for 2-year discrimination -- probability that a randomly chosen positive patient is assigned a higher risk score than a randomly chosen negative patient.

* Average precision for 2-year discrimination -- precision is the proportion of positive patients among all patients classified as positive by KFRE.

Results: The C-statistic was 0.89 and AUC for 2-year discrimination 0.91, both corroborating [1]. The C-statistic on the subset of 179 patients with known time to ESKD was 0.64; the average precision for 2-year discrimination was 0.35. These latter metrics were not reported in [1].

Discussion: We believe the higher C-statistic for the full dataset is because many patients had not reached ESKD at follow-up. The C-statistic is computed by counting patient pairs that the model orders correctly for time to ESKD. Since most pairs include a patient who reached ESKD before follow-up and one who did not, the C-statistic overestimates the KFREs ability to order pairs for which time to ESKD is

known. For the subset of patients whose time to ESKD is known, the C-statistic is only 0.64. In other words, the KFRE cannot be used reliably to sort NURTuRE patients by time to ESKD.

The AUC is the probability that a randomly chosen positive patient would be assigned a larger risk score than a randomly chosen negative patient. Since most such pairs can be easily sorted for time to ESKD, this metric would turn out well, even with a rough estimate of CKD progression.

In contrast, precision measures the probability that a patient will reach ESKD within 2 years, given that he/she is predicted to by the KFRE. If the KFRE is to be used to predict progression to ESKD, precision is important. In NURTuRE the average precision of the 4-variable KFRE for 2-year discrimination was 0.35. A precision of 0.35 in this case means that only 35% of patients predicted to reach ESKD within 2 years will actually do so. The precision needed for a clinical prediction depends on what medical intervention may follow.

1. Tangri, Navdeep, et al. "A predictive model for progression of chronic kidney disease to kidney failure." Jama 305.15 (2011): 1553-1559.

Tuesday 6th June 12:15 – 13:15

Track L3 – CKD 3

Poster: 282
Submission: 367

Body Composition and Multimorbidity in Patients with Chronic Kidney Disease

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Introduction: It is well recognised that multimorbidity is prevalent in patients with chronic kidney disease (CKD). This can be attributed to multiple health risk factors including obesity, which is on the rise. The relationship between multimorbidity and body composition in patients with CKD remains understudied. We aim to examine the correlation between measures of body composition and multimorbidity in CKD patients.

Methods : We conducted a cross sectional study of 42 patients with pre-dialysis (?) CKD stage 3-5 recruited from renal outpatients. Body composition was measured by bioimpedance analysis using the InBody770 body composition analyser. Patients' demographic and morbidity data were collected, and multimorbidity was assessed using Cambridge multimorbidity score based on the 20 conditions version of the score.

Results : The mean age of the sample was 59±16 years, the mean BMI was 29.9±6.5 and the mean body fat percentage was 35.8±10.9%. The mean skeletal muscle mass was 28.9±7.6 kg, and there was no statistically significant difference between skeletal muscle mass in CKD stage 3, stage 4 and stage 5 (P = 0.16) . Whole body phase angle declined with more advanced CKD stages (P=0.008) Figure 1. In patients with an eGFR less than 30mls/min (CKD4 and CKD5) multimorbidity correlated with body fat percentage (r = 0.69, P= 0.017), visceral fat area (r=0.6, P=0.0480) and fat mass index (r=0.62, P=0.04). There was also a strong negative correlation between multimorbidity and whole body phase angle in patients with CKD4 and CKD5 (r=-0.81, P=0.002).

In a univariate linear regression analysis visceral fat area predicted multimorbidity in patient with eGFR less than 30mls/min (β = 0.6 , P=0.048). Similarly, serum albumin predicted multimorbidity (β = -0.48, P= 0.007) and whole body phase angle (β = -0.61, P<0.001) in this patient population.

In a multivariable regression analysis only whole body phase angle independently predicted multimorbidity (adjusted R2 for the whole model = 0.47) table 1.

Discussion : The degree of visceral adiposity seems to be associated with multimorbidity in patients with advanced CKD. Whole body phase angle declined with more advanced CKD stages. Moreover, whole phase body angle is an independent predictor of multimorbidity in patients with advanced CKD. Phase angle may be an indicator of cell membrane function and further research is required to delineate the mechanisms behind the reduced phase angle in CKD patients.

Figure 1 Boxplot of whole body phase angle and CKD

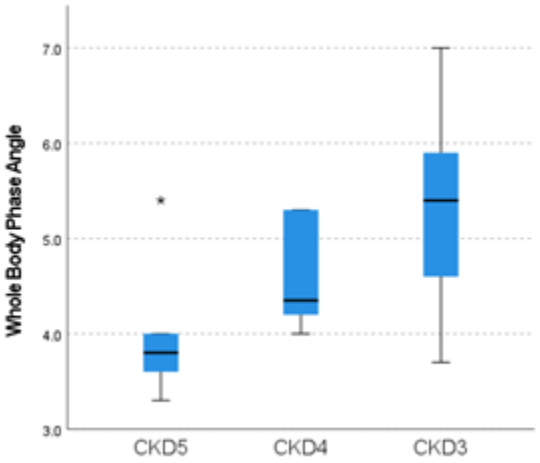

Table 1 Multivariable regression analysis

Predictors	Beta	Standard Error	P
Albumin	-0.103	0.078	0.196
Visceral Fat area	0.005	0.003	0.122
Whole body Phase angle	-0.8	0.274	0.007

Tuesday 6th June 12:15 – 13:15

Track L3 – CKD 3

Poster: 283
Submission: 371

Hyaluronan (HA)- Dependent Regulation of Vascular Smooth Muscle Cell Phenotype And Vascular Calcification in Peritoneal Dialysis patients.

Miss Shrea Roy, Dr Irina Grigorieva

Cardiff University, Cardiff

Background: Vascular calcification strongly predicts cardiovascular mortality, is highly prevalent in patients with end-stage kidney disease, including in PD, and has no effective therapy. The trans-differentiation of vascular smooth muscle cells (VSMC) to an osteoblastic phenotype within the arterial wall is central to the pathogenesis of vascular calcification. Previous work has shown that the extracellular matrix glycosaminoglycan hyaluronan (HA) is a critical regulator of cell phenotype in cancer biology, stem cell biology, and epithelial-mesenchymal transition. Previous studies have shown that increased expression of HA is demonstrated in non-CKD-related vascular calcification. However, the role of HA in regulating VSMC phenotype and osteogenic differentiation has not been previously explored.

Hypothesis and aims: My project aims to investigate the hypothesis that alterations in HA promote osteoblastic differentiation of VSMCs during pathological vascular calcification and will investigate the role of inflammatory cytokines prevalent in PD patients in driving this process.

Results: We have established an in vitro model of VSMC-to-osteoblast differentiation and shown that VSMCs (primary human) stimulated with osteogenic medium (containing ascorbic acid 2 phosphate, glycerol 2 phosphate, sodium orthophosphate, and dexamethasone) develop increased calcium deposition (Alizarin Red staining, Absorbance assay), increased RunX2 expression (RT-qPCR), alkaline phosphatase (RT-qPCR) and increased osteopontin expression (RT-qPCR) following 14-21 days. Although there was no attenuated expression of the VSMC marker alpha-smooth muscle actin (alpha-SMA) (RT-qPCR and immunofluorescence), marked morphological changes were demonstrated by microscopy. We further investigated the effects of HA on osteoblastic differentiation and demonstrated that HA was present in the newly forming long matrices, which were similar to previously described HA cables. HA cables have been previously known to be associated with pro-inflammatory states. VSMC to osteogenic differentiation was associated with marked downregulation of all genes associated with HA generation (HAS1, HAS2, HAS3, HYAL1, HYAL2, CD44, RHAMM, TSG-6, VCAN), which suggests that HA is important for maintaining a VSMC phenotype in blood vessels. We evaluated the effects of pro-inflammatory cytokines (TGFB1 and IL6) and these also promoted VSMC to osteogenic differentiation and also promoted significant alterations in HA matrix and downregulation of genes associated with HA generation (HAS1, HAS2, HAS3, HYAL1, HYAL2, CD44, RHAMM, TSG-6, VCAN). We investigated a causal link between these markers and VSMC differentiation to identify potential targets to prevent/reverse osteogenic differentiation. By knocking down HAS3 there was increased expression of RunX2, alkaline phosphatase and osteopontin (by RT-qPCR) at day 7. There was an increased expression of RunX2, alkaline phosphatase and osteopontin (by RT-qPCR) using a chemical inhibitor 4MU on VSMC-osteogenic differentiation following 14-21 days. I investigated the effects of HA degradation (using Hyaluronidase

treatment) on VSMC-osteogenic differentiation, there was attenuation of RunX2, alkaline phosphatase, and osteopontin (by RT-qPCR) following day 14-21.

Conclusion: VSMC to osteogenic differentiation is associated with marked alterations in HA matrices and associated gene expression suggesting that maintenance of HA matrices is critical to maintaining healthy, non-osteoblastic differentiation of VSMCs in arteries. I will also investigate the in vivo relevance of these in vitro targets of these findings in a suitable animal model of CKD-related vascular calcification

Tuesday 6th June 12:15 – 13:15

Track L3 – CKD 3

Poster: 284
Submission: 380

Assessing Digital Poverty and PREM survey awareness in Chronic Kidney Disease patients receiving dialysis at a hospital in the North East region.

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Introduction: The Digital Poverty Alliance defines digital poverty as the inability to fully interact with the online world, when, where, and how an individual needs to. Digital poverty makes patients unable to engage in their care as fully as they want. Digital health resources can improve patients' ability to engage in discussions about their care, support them in self-care and empower them. As advancements are made in online resources and care systems, it becomes increasingly important that patients are helped to gain digital literacy.

The Kidney PREM is a national annual survey of kidney patients. The primary purpose is to help renal unit teams understand how patients feel about their care experience, show where improvements can be made, and give the UKRR a national picture of people's care experience.

It is essential to assess the degree of digital exclusion in the population and adjust interventions accordingly and accurately. The lack of understanding about the PREM survey and poor knowledge of digital tools could significantly impact kidney disease prevention, progression and outcome.

Methodology: A study was conducted using a questionnaire that had been culturally adapted and modified. In addition, a descriptive observational study was carried out at South Tyneside and Sunderland NHS Foundation Trust from October to November 2022 on 103 patients attending dialysis and outpatients in the hospital's Nephrology Department.

Among 103 self-administered questionnaires sent to outpatients, and dialysis patients, 103 responses (100%) were analysed. The objective of the study was to determine 1) Digital Accessibility; 2) Whether the participants had a smartphone or a tablet; 3) Access to the internet at home; 4) The Capability of the individuals to perform a search using a standard search engine; 5) Awareness about the PREM survey; 6) Post-survey satisfaction score.

Results: A majority of 62% (n = 64) had a smartphone or a tablet, and 72% (n = 74) had access to the internet at home. A majority of the individuals who had access to the internet at home, 81% (n = 60), could perform a search using a standard search engine. Among the respondents who did not have access to the internet at home, 31% (n = 9) were interested in learning how to use the internet with appropriate facilitation. Regarding PREM survey awareness, 80% (n = 82) were unaware of the PREM survey. Per our PREM survey results, the transport was the most common issue patients reported.

Discussion: There is a digital divide among patients that can lead to poorer health outcomes; this divide must be filled. Digital poverty will likely become a barrier to healthcare as more systems and resources go online, and patients mustn't be excluded because of this. Based on our findings, the UK PREM survey advertisement campaign requires improvement as 80% of patients were not aware of the survey and so valuable feedback could have been missed.

We were the best in the region on PREM survey returns, and we will repeat the digital poverty study next year with PREM survey data.

Tuesday 6th June 12:15 – 13:15

Track L3 – CKD 3

Poster: 285
Submission: 381

The potential impact of incorporating the Kidney Failure Risk Equation into the decision to refer patients with chronic kidney disease from primary to secondary care

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Introduction: Most adults with CKD are managed predominantly in primary care, with more input from secondary care typically required as disease progresses. In 2021, the National Institute for Health and Care Excellence (NICE) guidelines updated recommendations on referral to secondary care. The estimated Glomerular Filtration Rate (eGFR) threshold of <30 mL/min/1.73 m2 was replaced by a 5-year risk of renal replacement therapy (RRT) of >5%, measured using the 4-variable Kidney Failure Risk Equation (KFRE). Our aim was to review CKD referrals by GPs prior to the implementation of these guidelines in North Central London (NCL) and to model the potential impact of the new guidance on referral numbers.

Method: Data on patients referred virtually from General Practices in Barnet, Camden, and Islington to the Royal Free Hospital integrated CKD service via the EMIS web platform between April and June 2022 were audited. Patients had consented to data sharing as part of the referral process. Each record was assessed to see if key parameters, including urine albumin: creatinine ratio (uACR), eGFR, blood pressure and HbA1c were available to nephrologists at referral and whether these were up to date (defined by having these completed within 1 year from referral). 5-year KFRE data was calculated where possible for each patient according to their latest eGFR and urinary ACR result on record. The proportion of patients who met the 2014 NICE referral criterion of an eGFR <30 ml/min/1.73m^2 but did not have a 5-year risk of RRT of > 5% was calculated and vice versa.

Results: 269 patients were included in this analysis. 150 (55.8%) patients were male, and the average age was 73.8 years. 267 (99.3%) had up to date eGFRs and 200 (74.3%) had up to date uACRs at the time of referral. We were able to calculate KFRE for 215 (79.9%) patients based on either up to date or previously available historical data (when up to date parameters were missing). KFRE was not calculated for the remaining 54 patients as either their eGFR was ≥60 (and therefore KFRE was not indicated), or they did not have eGFR and/or uACR recorded at any time. There were 90 patients who had an eGFR of <30 from which 20 (22.2%) did not have a 5-year risk of RRT of >5%. Conversely, there were 86 (40.0%) patients who had a 5-year risk of RRT of >5% from which 22 (25.6%) did not have an eGFR <30.

Discussion: Approximately a quarter of patients could not be risk stratified using KFRE based on up to date uACRs. There was a smaller proportion of patients overall who had an eGFR <30 who did not meet the updated 5-year risk of RRT of >5% than vice versa suggesting using the KFRE may lead to a slight increase in the number CKD patients referred by GPs in NCL.

Tuesday 6th June 12:15 – 13:15

Track L3 – CKD 3

Poster: 286
Submission: 400

Impact of a nurse-led rapid access service on patient outcomes in a regional renal centre.

Miss Toni Clough, Mrs Vicky Sutch, Professor Darren Green, Dr Aine DeBhalis, Professor Smeeta Sinha, Professor Helen Hurst, Dr Dimitrios Poulikakos, Professor Philip Kalra, Dr James Tollitt

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Introduction : The COVID-19 pandemic has led to necessary changes in hospital-based healthcare delivery. A Rapid Access Service (RAS) facilitates timely and flexible assessments of patients with multi-faceted benefits: prevent hospitalisation, support early discharges, reduce clinic overbooking and on-call team reliance, improve time to be seen for new referrals.

We developed a bespoke Renal RAS staffed by specialist nurses (1.2WTE), more than doubling patient throughput. The specialist nurses provide consistent approaches and information to promote self-care strategies to individuals, in particular blood pressure (BP) and fluid management.. Here we review the impact of the RAS and describe the patients and their outcomes over a 12 month period.

Methods: We examined the indications for patient referrals to RAS over the 12 month period July 2021 – June 2022. A review of the electronic patient records (EPR) for all patients seen was undertaken with categorisation of referral indication and associated outcomes. Outcomes included; change in blood pressure, weight change if overloaded, time to readiness for renal biopsy.

Results **:** 339 unique patients were seen over 12 months with a mean 3.6 visits per patient over 4-6 week period. The most frequent primary reasons for referral were as follows :

Reason for referral	**Number**	**Percentage**
Fluid Overload	56	16.5
Blood pressure control	85	25.0
Fluid & Blood pressure control	22	6.5
Drop in renal function (including AKI)	70	20.1
Early review post ward discharge	72	21.2
Electrolyte monitoring	21	6.2
Other reasons (UTI, intravenous therapy, medicines review)	13	3.8

34 patients were seen to optimise condition to facilitate renal biopsy (BP control and/or fluid reduction). 3 patients eventually did not require a biopsy, but 28 of the remaining 31 patients (90%) had a successful outpatient biopsy, with an average BP reduction from 167/78 to 122/74mmHg.

In all there were 78 patients treated for fluid overload. The mean weight loss during RAS care was 7.5kg.

RAS was not used as a BP optimisation clinic (i.e. to facilitate achievement of a blood pressure of <130/80mmHg), and most referrals for blood pressure management were due to hypertensive urgency or pre-biopsy optimisation. However, in the 107 of hypertensive patients seen in RAS improvement to Systolic BP (SBP) <130mmHg was achieved in 48%. 72% of these achieving SPB of <140mmHg.

Of the 21 patients referred for electrolyte monitoring, 2 required admission (hypocalcaemia). 12 were referred with hyperkalaemia: all were managed without hospitalisation.

Discussion : This study demonstrates the benefit of a nurse-led RAS to help reduce acute hospitalisation, assist safer early ward discharge, and to enable a large number of patients requiring kidney biopsy to successfully undergo this procedure as an outpatient. Although a formal health economic evaluation has not been undertaken, the value of the RAS appears self-evident.

Tuesday 6th June 12:15 – 13:15

Track L4 – CKD 4

Poster: 287
Submission: 405

Profibrotic Transglutaminase 2 is externalised by urinary vesicles and facilitates extracellular vesicles uptake by recipient cells

Dr Maria Pia Savoca[1], Dr Elisa Tonoli[1], Prof Dimitris Goumenus[2], Dr Philip Watson[3], Prof Timothy S Johnson[3,4], Prof Elisabetta AM Verderio[1,5]

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Introduction: Increased externalization and activity of the crosslinking enzyme transglutaminase 2 (TG2) is linked with fibrosis progression in CKD. The mechanism of TG2 externalization via extracellular vesicles (EVs) was reported in the rodent UUO experimental model and in humans in pools of small urinary EVs (uEVs) from stage 3-4 CKD (Furini et al., JASN 2018). In this study, we have characterised the biological activity of EVs-TG2, in particular its calcium-dependent transamidation and hypothesised a novel role for EVs-TG2 in tuning EVs uptake by recipient cells.

Methods: Clinical urine samples were obtained by informed consent from the Sheffield Kidney Institute CKD Biorepository. Urinary EVs were isolated by serial centrifugation and characterised by Western blotting, Nanoparticle Tracking Analysis (Zetaview, Particle Metrix) and transmission electron microscopy. EVs-TG2 was identified by enzyme activity assay, immune electron microscopy (IEM) (JEOL-JEM-2100Plus) and single uEVs marker quantification (Exoview R200, Nanoview). Mouse embryonic fibroblasts MEFTG2^{WT} and MEFTG2^{KO} were generated from a TG2-KO mouse model.

Results: Small uEVs isolated from Hypertensive Nephropathy samples were stratified according to eGFR rate of loss as stable (<1.2 ml/min/year, pool, n=10) and progressive (>4 ml/min/year, pool, n=10). There were increased levels of TG2 antigen and significantly higher transamidase activity in the CKD progressive pool compared to the CKD stable pool ($p \leq 0.0011$). TG activity was detected in intact uEVs and total uEVs lysate, suggesting the presence of TG2 on the uEVs-surface, as confirmed by IEM and single uEV quantification. To understand the role of TG2 in vesicular uptake by recipient cells, small EVs isolated from MEFTG2^{WT} and MEFTG2^{KO} conditioned medium were specifically labelled with PKH67 lipophilic dye. EVs-TG2^{WT} uptake by MEFTG2^{WT} was significantly higher than that of EVs-TG2^{KO} ($p<0.0001$) when measured by fluorescence imaging. EVs-TG2^{WT} entered the cell cytosol as shown by diffused distribution of PKH67. On the contrary, EVs-TG2^{KO} led to a slight punctuate fluorescence in the recipient cells. Interestingly, the uptake of EVs-TG2^{WT} was higher by MEFTG2^{WT} than MEFTG2^{KO} suggesting an additional role for cell surface TG2 in EVs-internalisation. Moreover, EVs-TG2^{WT} led to the visualisation of in situ TG2 cross-linking on the surface and inside MEFTG2^{KO}, confirming that EVs transfer TG2 biological

activity in recipient cells. Sdc4, a heparan sulfate receptor displayed by mouse dermal fibroblasts ($MDFSdc4^{WT}$), significantly increased the overall uptake of EVs-$TG2^{WT}$ and less of EVs-$TG2^{KO}$ ($p<0.0001$) compared to $MDFSdc4^{KO}$, suggesting that uEVs-TG2 interacts with Sdc4 at the recipient cell-surface. Moreover, in the fibronectin extracellular matrix (ECM), EVs isolated from $MEFTG2^{WT}$ better adhered to the ECM than EVs from $MEFTG2^{KO}$ ($p=0.0238$), suggesting that EVs-TG2 could affect EVs-migration and adhesion. To identify cell-surface targets of EVs-TG2 modification, $MEFTG2^{KO}$ were incubated with EVs-$TG2^{WT}$ and control EVs-$TG2^{KO}$ in the presence of the biotinylated TG2 amine-substrate cavaderine, and the biotinylated substrates were revealed by mass spectrometry. Desmoplakin, vinculin, fibronectin and collagen-alpha2(I) chain emerged as cell-surface/ECM proteins modified by EVs-$TG2^{WT}$ and not/significantly less by EVs-$TG2^{KO}$.

Discussion: These data suggest for the first time that protein cross-linking mediated by EVs-TG2 may participate in vesicles spreading, anchoring and uptake by recipient cells.

Tuesday 6th June 12:15 – 13:15

Track L4 – CKD 4

Poster: 288
Submission: 418

Review of SGLT2 inhibitor prescribing in patients attending a single centre renal outpatient clinic.

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Introduction: The NICE technology appraisal on SGLT2 inhibitor prescribing in chronic kidney disease (CKD) was published on 9th March 2022. This followed DAPA-CKD trial, which showed SGLT2 inhibitors delayed the progression of CKD, regardless of diabetic status. We studied the proportion of eligible patients under follow-up at a hospital renal department prescribed Dapagliflozin. Our objectives were:

1. To assess local SGLT2 inhibitor use among patients with Type 2 diabetes and CKD with proteinuria in a tertiary teaching hospital in the UK.
2. To assess the use of renin angiotensin system inhibition (RASi) in these patients.

Methods: A list of patients who met the inclusion criteria, defined as eGFR 25-75mL/min/1.73m2 either with type 2 diabetes (T2DM), or non-diabetic with proteinuria (urine albumin creatinine ratio (ACR) ≥22.6 mg/mmol, or protein creatinine ratio (PCR) ≥32 mg/mmol if no ACR measurement) were identified from our digital renal database, EMED. Exclusion criteria included type 1 diabetes, patients receiving active immunosuppression for immunological renal disease, renal transplant patients or those living with end-stage renal disease. Patient records were examined to determine if they have been established on RASi and whether or not Dapagliflozin has been prescribed, recommended or contraindicated.

Results: 1724 patients were under active renal follow-up at the main hospital renal outpatient clinic with eGFR 25-75 ml/min/1.73m2 since March 2022, 76.8% patients were non-diabetic, 23.2% patients were diabetic (n=46 Type 1, n=354 Type 2). 671 patients (38.9%) were eligible for Dapagliflozin. Of the 671 patients – 354 had T2DM (52.8%), 313 were non-diabetic. 360 patients (53.7%) were on maximum tolerated ACE/ARB, 311 patients (46.3%) were not. Of the eligible patients, only 100 (15%) were prescribed Dapagliflozin according to prescription information on the renal database, this represented 47 (13.3%) of eligible T2DM patients and 53 (16.7%) of non-diabetic patients. 12 of the diabetic patients were on an alternative SGLT2i, 16.7% on treatment overall. Reasons for not prescribing include progression to advanced CKD, increased risk of infection and patient preference. In 7% patients SGLT2i were recommended but not yet started.

Discussion: Despite overwhelming evidence of the benefits of SGLT2i therapy, the prescription rate is low, particularly among patients most likely to benefit from cardiorenal protective effects. Interestingly, although SGLT2i are an established treatment for T2DM, prescribing was no better in eligible T2DM patients than in non-diabetic patients. This could reflect a lower emphasis on starting SGLT2i in previous

local primary care Type 2 diabetes management guidelines. In addition, historically there has been a tendency to avoid this group of drugs in patients with established CKD due to lower diabetic effect.

This baseline audit suggests that early uptake of dapagliflozin in our patient population has been low and that further work is needed to promote the use of these important drugs in eligible patients attending renal clinics as well as in the wider primary care population. Our data suggest that there may be a reticence to prescribe, even amongst renal physicians and we need to investigate the barriers to prescribing.

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Track L4 – CKD 4

Poster: 289
Submission: 421

Single cell RNA sequencing of myeloid cells in murine models of acute kidney injury and renal fibrosis, identifies transcription factor MAF as a mechanistic target

Dr Bnar Talabani, Dr Chia-te Liao, Dr Yueh-An Lu, Dr Sumukh Deshpande, Dr Irina Grigorieva, Dr Mark Gurney, Dr Robert Andrews, Professor Donald Fraser, Professor Philip Taylor

Cardiff University, Cardiff

Introduction: Acute Kidney Injury (AKI) is a well-recognised risk factor for chronic kidney disease (CKD), but the mechanism remains unknown. It is proposed that bone marrow derived macrophages can determine outcome following AKI. However, resident macrophages in the kidney are thought to play little part in this. Single Cell RNA Sequencing (scRNAseq) provides unparalleled opportunities to uncover heterogeneity in macrophage responses and provide new mechanistic understanding in AKI and CKD. We have performed scRNASeq of myeloid cells at specific timepoints mimicking human disease pathology in models of AKI and renal fibrosis.

Methods: Aristolochic acid was used to induce renal injury and fibrosis in male C57BL/6 mice. Kidneys were harvested from three mice at each time point mimicking important disease states in AKI and CKD. Using a cell sorting strategy, CD45+ cells were isolated from whole kidneys and libraries prepared on the 10X Genomics platform. ScRNASeq was performed using the Illumina NextSeq 550 System. Genome mapping was conducted using Cellranger and zUMIs and downstream expression analysis of myeloid cells, was carried out using the R package, Seurat. Following this analysis, transcription factor MAF was identified as a mechanistic target and a knockout mouse model was subsequently used to assess the degree of renal fibrosis in mice deficient in MAF in myeloid cells, versus wild-type mice.

Results: 21,734 CD45+ Cells were sequenced in total. Analysis of gene expression profiles delineated transcriptomic profiles in distinct sub-clusters of macrophages specific to the recovery and non-recovery state, following injury. Resident macrophages demonstrated dynamic transcriptomic signatures in response to injury and inflammation. MAF is a transcription factor that is thought to aid macrophage maturation and differentiation to an anti-inflammatory phenotye. Knock-out experiments of transcription MAF in myeloid cells in mice, demonstrated a higher degree of renal fibrosis in the renal cortex.

Conclusion: ScRNASeq has enabled unbiased profiling of gene expression in AKI-CKD at single cell resolution. We have identified heterogenous macrophage clusters, important in recovery and non recovery, following renal injury. We have demonstrated that MAF, a transcription factor expressed predominantly by resident macrophages, may play a vital role in the development of renal fibrosis following renal insult.

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Track L4 – CKD 4

Poster: 290
Submission: 424

Activation of TBK1, a protein associated with neurodegeneration, is altered in the podocyte in diabetes

Miss Holly Stowell-Connolly[1], Dr Abigail Lay[2,1], Dr Jenny Hurcombe[1], Dr Mark Graham[1], Miss Lulwah Alshamali[1], Professor Gavin Welsh[1], Professor Richard Coward[1]

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Introduction: Glomerular podocytes are structurally, morphologically, and biochemically similar to neurons, despite different bodily and organ location, and germ line origin. Additionally, neuronal degeneration, diabetes and chronic kidney disease (CKD) are linked, as evidenced by a three-fold increase in the likelihood of developing dementia in patients with renal failure (RF) or proteinuria. There is also a known link between diabetes, dementia and renal dysfunction. We therefore hypothesized that common molecular pathways contributing to disease progression in both cell types were present and investigated this.

Methods: Transcriptomic and proteomic analysis determined differential podocyte expression of genes known to be involved in neuronal degeneration, specifically in conditions related to diabetes. Conditionally immortalized human podocytes (cihPods) were grown in basal or diabetic conditions (DC) (physiologically high concentrations of insulin, glucose, TNF-α, and IL-6). This data was bioinformatically analysed and targets validated using qRT-PCR, western blotting (WB), and immunofluorescence (IF). Targets were investigated further by viral overexpression or short hairpin knockdown and functional studies.

Results: Transcript- and proteomic analysis determined a molecule called Tank-binding kinase 1 (TBK1) was significantly increased in human and mouse podocytes at mRNA and protein level when grown in DC ($p<0.05$). This protein has previously been linked to motor neurone disease. TBK1 expression was unchanged in glomerular endothelial or proximal tubular cells under DC. IF also indicated increased podocyte TBK1 phosphorylation at S172. pTBK1 S172 translocated to the nucleus where it colocalizes with SUMO and PML, suggesting sequestration at PML-nuclear bodies in response to an insulin- and IL-6-rich environment. Alterations in TBK1 expression within cihPods resulted in aberrant cell growth, as demonstrated by increased cellular and nuclear area, abnormal actin dynamics and cellular motility. Early work indicates this is not a result of re-entry of the cell cycle or abnormal programmed cell death, instead as a result of increased FAK signaling.

Discussion: TBK1 activation is increased in cihPods grown in DC, with a novel sequestration in podocyte nuclei. Genetic manipulation of TBK1 expression causes detrimental aberrant actin fibre growth, cell survival and motility. Currently we are modelling TBK1 in drosophila nephrocytes to further elucidate its molecular role in this cell type.

Tuesday 6th June 12:15 – 13:15

Track L4 – CKD 4

Poster: 291
Submission: 432

Title: Is there a need for standardised outcomes in pharmacist-led interventions in CKD? A systematic review of randomised controlled trials

Mr Ashkon Ardavani[1,2], Dr. Ffion Curtis[1,2], Professor Kamlesh Khunti[1,2], Dr. Thomas Wilkinson[1,2]

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Introduction: People living with chronic kidney disease (CKD) have a high prevalence of polypharmacy. Polypharmacy presents a significant burden and the risk of inappropriate prescribing in people with CKD is a cause for concern due to age-related changes associated with pharmacodynamics (e.g., increased sensitivity towards adverse drug events) and pharmacokinetics (e.g., reduced renal excretion). Strategies for the successful management of CKD include controlling cardiovascular risk factors, lifestyle modifications, and treatment of comorbidities, complications, and symptoms. There is an ever-increasing role of pharmacists in managing CKD, from medication reviews, optimising risk factors to patient education. However, currently, there is a lack of quality data on the impact of pharmacists in CKD management; this partly due to the wide range of variable outcomes used in studies and a lack of standardised outcome reporting. In a preliminary analysis of a large ongoing review, we explored the range of outcomes used in pharmacist-led research in CKD.

Methods: A systematic review of randomised controlled trials (RCTs) of interventions in a CKD population with significant pharmacist input was conducted. Literature searches were conducted in the following databases: MEDLINE, Scopus, and Web of Science. Databases were searched until January 2022. Data was extracted pertaining to clinical (e.g., mortality), economic (e.g., healthcare-associated costs), and humanistic (e.g., quality of life (QoL)) outcomes.

Results: 36 RCTs with 40,258 participants were included. Most studies were conducted in the USA (19/36), whilst one was conducted in the UK. Of these, 14/36 (39%) were exclusively conducted in people on dialysis, eight were exclusively performed in kidney transplant recipients, 13 in those with non-dialysis dependent CKD, and one study in a mixed cohort. The interventions delivered by pharmacists were heterogenous and included medicine reconciliation, patient counselling, medicine optimisation, and dose adjustment. A wide range of outcomes were reported including blood pressure, CKD progression, QoL, and patient satisfaction. The most frequently reported outcome was blood pressure, which was used as an endpoint in 11/36 (31%) studies. There was significant heterogeneity in the measures and methods used for the outcomes reported. For example, in 9/36 studies (25%) where medication adherence was assessed, four separate outcome measures were used: variations of the Morisky Medication Scale (MMS) (5/9), pharmacy refill records (2/9), Basel Assessment of Adherence to Immunosuppressive Medication Scale (BAASIS) (1/9), and a comparison of the quantity of medications prescribed with those present in containers (1/9).

Discussion: Nephrology is well adept in the use of standardised core outcome sets (COS) (e.g., the SONG initiative), yet such COS may not be appropriate to more specialist interventions where different or more relevant outcomes may be needed. The plethora of outcome measures identified in our review suggests a better standardisation of reporting is needed to facilitate the consolidation of pharmacy research in the area and further support for the role of the pharmacist in CKD management.

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Track L4 – CKD 4

Poster: 292
Submission: 435

Can BMP-7 prevent Ischaemia reperfusion injury-induced renal damage in an in vivo IRI model?

Dr Irina Grigorieva[1], Miss Aeliya Zaidi[1,2], Miss Charloette Brown[2], Mr Tahawar Rana[2], Dr Gilda Pino-Chavez[1], Mr Rafael Chavez[2], Dr Robert Steadman[1], Mr Usman Khalid[2,1], Dr Soma Meran[1]

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Introduction: Ischaemia reperfusion injury (IRI) is a major cause of acute kidney injury (AKI) and subsequent renal fibrosis in native kidneys and delayed graft function (DGF) and subsequent poor graft survival in transplanted kidneys. One of the hallmarks of fibrosis is extracellular matrix (ECM) expansion. Hyaluronan (HA) is a glycosaminoglycan found in the ECM and is an important regulator of cell function. HA demonstrates increased expression in the renal cortex in progressive renal damage and its expression correlates with renal outcomes. HA is produced by 3 different isoforms, HAS1, HAS2, and HAS3. In vitro data has shown that HAS2 is profibrotic whereas HAS1 may have antifibrotic properties. Bone Morphogenic Protein 7 (BMP-7), an osteogenic protein with anti-fibrotic properties, has been shown to reverse TGF-b1-induced myofibroblast differentiation and prevent renal fibrosis. The aim of this study was to test the effects of BMP-7 on modulating HA expression and localization in acute and chronic kidney injury.

Methods: Adult male Lewis rats were injected with BMP-7 (250mg/kg) or PBS control (n=6 each) pre-op, 1d, 7d, and 14d postop. At day 0, a midline laparotomy was performed, and the pedicles of both kidneys were clamped for 45mins to induce IRI. Kidney tissue was retrieved at 28d. Paraffin blocks were made and sectioned for H&E and immunohistochemistry. RNA was extracted from kidney tissue for RT-qPCR analyses of kidney injury/fibrosis markers. Blood was taken pre-op and at 28d for measurement of serum creatinine. Histology scores were done by an independent pathologist.

Results: IRI led to marked damage with key markers of inflammation and fibrosis being significantly raised at 28d, and evidence of renal fibrosis within both the renal cortex and medulla. The tubulointerstitial fibrosis scores were reduced in the BMP7 treatment group at day 28 suggesting an attenuated fibrotic response. No differences were observed in the overall tubular damage, tubular regeneration, and inflammation scores between the control and treatment animals. Masson Trichrome staining revealed reduced collagen deposition in the perivascular matrix and reduced perivascular inflammation in BMP7-treated animals. Staining of hyaluronan in the cortical interstitium was observed to be similar between the two groups, however, there was differential expression of HA Synthase isoforms Has1 and Has2 between the two groups. Elevated Has1 expression was observed in IRI+BMP7 groups. Furthermore, expression of the pro-fibrotic HAS2 was attenuated in the IRI+BM7 group. These findings suggest that the protective effect of BMP7 may be mediated by reduced expression of the pro-fibrotic HAS2 and increased expression of HAS1.

Conclusion: BMP-7, as utilized in this rat IRI model, conferred an attenuated fibrotic response and reduced perivascular inflammation and was associated with altered hyaluronan matrices and differential HAS isoform expression, confirming previous in vitro studies on the specific anti/pro-fibrotic effects of the HAS genes.

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Track L4 – CKD 4

Poster: 293
Submission: 443

Elucidating the function of a novel Arginase 1+ monocyte-macrophage population in driving fibrosis in kidney disease models.

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Kidney disease represents a global health burden of increasing prevalence. The common pathway in all progressive kidney disease is fibrosis, where normal functioning tissue is replaced by scar tissue. Macrophages are a major cellular component of the renal mononuclear phagocyte system, with roles in defence against infection, renal injury, and repair. They can be injurious or may mediate repair by scavenging cell debris, degrading excess extracellular matrix and by secreting factors that may promote regeneration of injured tissue. Using single-cell RNA sequencing we have previously identifed novel myeloid subsets in the murine reversible, unilateral ureteric obstruction (UUO), an acute non-functional model of kidney fibrosis and repair[1]. Amongst the subsets, a population of cells was identified exclusively in acute injury (2 days post-UUO); they transcriptomically align to monocytes but express Arginase 1 (Arg1), and many pro-inflammatory and pro-fibrotic genes.

We hypothesise that this novel $Arg1^{+}$ population contributes to fibrosis deposition in progressive kidney disease. To first determine the phenotype of these cells as injury develops, mice underwent sham, UUO or ischemia reperfusion injury (IRI) surgery. They were then culled at different points over a 7-day time-course, with kidneys harvested for analyses. Analysis of intra-renal inflammation revealed persistent recruitment of $Ly6C^{hi}$ monocytes transitioning to pro-fibrotic inflammatory macrophages in injured kidneys in both models. The presence of the $CD45^{+}CD11b^{+}Arg1^{+}$ population was validated in both models; at later timepoints Arg1 protein could be detected on cells which were $F4/80^{hi}MHCII^{+}CD206^{+}$. Kidney tissue was also analysed by immunofluorescence for spatial analysis of where the $Arg1^{+}$ cells sit within the tissue.

To define the origin of $Arg1^{+}$ cells, we used transgenic Ccr2-CreERT2-TdTomato mice that enable tracking of monocyte ($Ccr2^{+}$) derivatives in a tamoxifen-inducible manner. Ccr2-CreERT2-TdTomato mice were dosed with tamoxifen via gavage prior to UUO surgery and culled at day-7 post-surgery. We observed that at day-7 post-UUO, ~ 40% of $Arg1^{+}$ cells were TdTomato positive, indicating that monocytes were the source of the Arg1+ cells at this timepoint. The $Arg1^{+}TdTomato^{+}$ cells were $MHCII^{hi}CD206^{hi}$, whereas the $Arg1^{+}TdTomato^{+}$ cells were $MHCII^{lo}$ $CD206^{lo}$.

Lastly, to determine the function of Arg1 in monocyte-macrophage populations in kidney injury we have generated Ccr2-CreERT2-TdTomato x $Arg1^{fl/fl}$ and iCD64Cre x $Arg1^{fl/fl}$ and subjected them to UUO surgery.

In conclusion, $Arg1^{+}$ cells increase across the time course and display different markers depending on the point of injury process. In late injury, Arg1 expression was identified in infiltrating monocytes

transitioning to macrophages and in resident macrophages. Ultimately, genetic deletion of Arg1 in these populations will determine the role of the $Arg1^{+}$ monocyte-macrophage subset in clinically relevant models of kidney disease. This has the potential to lead to the development of novel therapeutics to limit fibrosis or enhance repair to halt progression of disease.

1. Conway et al., JASN, 2020; 31.

Tuesday 6th June 12:15 – 13:15

Track L4 – CKD 4

Poster: 294
Submission: 455

Comprehensive transcriptomics and proteomics of the rat sub-total nephrectomy SNx model of fibrosis for identification of translatable CKD biomarkers

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Introduction: Rat sub-total nephrectomy (SNx) is a functional model of chronic kidney disease (CKD), where the main pathological driver is glomerular hypertension. Renal function can be monitored through proteinuria and serum creatinine as in the patient, and therefore provides a translational model for the identification of functionally relevant mechanistic CKD biomarkers. Comprehensive transcriptomics and proteomics analyses on the rat SNx model were performed to identify biomarkers from plasma and urine that correlate with both kidney disease and functional kidney loss.

Methods: Two independent rat SNx models were completed at two independent locations. When rats reached predetermined levels of disease (serum creatinine >2-fold increase, and proteinuria >3-5-fold increase over sham-operated) plasma, urine and kidneys were collected. Kidneys were subjected to fibrosis index scoring, SWATH proteomics and bulk RNA-sequencing transcriptomics (RNA-seq), with SWATH also performed on plasma and urine. The omics data were normalized and analysed by PCA and Limma differential gene or protein expression followed by determination of intersecting up- and down-regulated proteins passing FDR adjusted p-value threshold of $p<0.05$ in all the datasets. Gene ontology analysis of intersecting proteins between datasets were performed to gain a comprehensive view of the biological processes, molecular functions, and cellular components which were dysregulated in the rat SNx models. Potential CKD markers were identified by determining the proteins that were up- or down-regulated in the rats having reached the pre-defined disease thresholds versus control rats in all the analyses.

Results: The two rat SNx studies lead to the generation of animal models which took 7.5-16.5 weeks to reach the thresholds and displayed variable degrees of fibrosis. RNA-seq and SWATH proteomics demonstrated that significant dysregulation of proteins involved in regulating fibrosis, metabolomic and immune response pathways occurred in the rat SNx model compared to sham-operated rats. Gene ontology analysis of the intersecting genes and proteins in the kidney and urine but not plasma demonstrated commonality between animal cohorts that had reached the kidney disease thresholds. Only six up-regulated and seven down-regulated proteins were detected in the kidney

transcriptomics and proteomics, and urine proteomics analysis of the rat SNx studies. Of the six up-regulated proteins Lumican and Col3A1 were identified as potential CKD biomarkers.

Discussion: This study is the first direct comparison of transcriptomics and proteomics in a rat SNx model from biofluids and kidney tissues. It provides a comprehensive bioinformatic analysis of differentially regulated proteins in kidney disease that are representative of CKD, is in line with the literature, and can be used as a reference for pre-clinical research of CKD biomarkers. Variability in rat SNx studies was addressed by using serum creatinine and proteinuria thresholds to select timings for biofluid and kidney harvest and therefore it is a suitable model to investigate functional mechanistic CKD biomarkers. We thereby identified several potential mechanistic CKD biomarkers including lumican and Col3A1 whose co-expression has previously been both implicated in fibrosis and detected in human urine.

Tuesday 6th June 12:15 – 13:15

Track L4 – CKD 4

Poster: 295
Submission: 457

Exploring protein cargo and surface charge of urinary extracellular vesicles (uEVs) in the detection of diabetic nephropathy progression

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Introduction: Small or large urinary extracellular vesicles (uEVs) are an attractive source of biomarkers as their cargo reflects renal cell pathophysiology. Physical properties of uEVs such as the zetapotential (the charge that develops at the interface between a vesicle and the liquid) is a less characterized feature. As surface charge of a nanoparticle relates to its stability and tendency to aggregate, changes in zeta potential could mirror the properties of the cells from which they originate and be a sign of a pathological change. We hypothesise that the zetapotential of uEVs varies in CKD and could help stratify patients. In this study, we analysed diabetic nephropathy (DN) progression, in terms of uEVs proteomic changes and uEVs surface charge alterations, which could be correlated with DN or DN progression.

Methods: Cell-free urines were sourced from two biorepositories (Sheffield Kidney Institute, and Patras University Hospital): Stable (n=20,<2 ml/min/year) and progressive (n=20,>5 ml/min/year) DN cohorts, were selected based on rate of eGFR loss; with healthy volunteers (n=20) & type-2 diabetics with no CKD (n=19) control cohorts. Small and large uEVs were isolated, merged and resuspended in RIPA lysis buffer (pH7.2). Following tryptic digestion and purification, equal amounts of uEVs proteins were injected for RP-HPLC-ESI-MS/MS using the SCIEX TripleTOF-6600 mass spectrometer in DIA/SWATH mode. The raw SWATH-files were extracted directly from the human proteome FASTA-file using the DIANN-software algorithm. Differences in size-distribution, concentration and zetapotential between healthy (n=3) and DN (n=6) (small and large uEVs in PBS (pH7.4)) were analysed by nanoparticle tracking analysis (NTA) (ZetaView PMX110).

Results: Quantitative analysis of 238 uEVs proteins (selected as present in 60% of the CKD patients) by DIANN proteomics revealed that 26% were differentially changed in the DN progressive versus DN stable cohort according to limma test (8% with increased and 18% with decreased expression). Among the changed proteins, 29% displayed a cellular origin, the remaining were plasma proteins. NTA showed that

the large uEV had a size of 195±7nm (healthy) and 194±37nm (DN) and the small uEVs of 148±10nm (healthy) and 134±11nm (DN), with no significant difference between healthy and diseased status ($p \geq 0.1$). Within the limits of the NTA, there were no differences either in the small or large uEV concentration between healthy and DN. The zeta potential was significantly more negative in the DN uEVs compared to healthy uEVs ($p=0.02$). The same trend was evident in the large uEVs although below significance ($p=0.09$). When the zeta potential of the stable and progressive uEVs were compared, a trend in more negative zeta-potential was found in the stable cohort compared to the progressive one (in both small and large uEVs) but the difference was not significant ($p \geq 0.1$).

Discussion: Both the protein cargo and the uEVs surface charge (zetapotential) did change in DN compared to healthy uEVs, however work is ongoing to increase the power of the investigation. To our knowledge, this is the first time that uEVs zetapotential and proteome are being correlated to DN progression.

Tuesday 6th June 12:15 – 13:15

Track L4 – CKD 4

Poster: 296
Submission: 475

Setting up a Virtual Kidney Clinic

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Introduction: Chronic Kidney Disease (CKD) prevalence is increasing. A key strategy of the renal GIRFT report was to modernise delivery of renal outpatient care. Similarly, the NHS Long term plan identifies digital and remote delivery of healthcare as an important direction of travel for outpatient service development

Methods: In partnership with DrDoctor "Assessments" platform, our department developed an asynchronous virtual review clinic for patients with CKD and hypertension. Patients have their blood tests performed locally. Two weeks prior to their virtual review they are sent a link on their mobile phone which requires them to input their home blood pressure (x3) and their weight into an online portal. They are also asked 3 questions with space for free text answers; Have you had any new health diagnoses in the last 6 months?, have you been hospitalised in the last 6 months?, have you had any new concerns about your kidney disease? The reviewing clinician has access to GP records and hub and spoke hospital electronic health records. After remote review, the clinician sends a message via the DrDoctor platform to the patient answering simple queries directly and advising them of the next virtual kidney clinic follow up. When and if required the patient can be transferred back to telephone or face to face follow up. Inclusion criteria for the SVKC were 1) stable and optimally treated kidney disease, 2) not suitable for discharge to primary care 3) access to smartphone and internet.

Results: Our initial pilot project between July 2021 and January 2023 demonstrated a 60% reduction in clinician time taken to review a patient (6 minutes per patient versus 15). A total of 31 patients were reviewed over the pilot project. 26 patients participated, 13 underwent one virtual kidney clinic appointment, 7 underwent 2 appointments, 6 underwent 3 appointments. Therefore, a total of 45 virtual clinic appointments were attended. Demographic and kidney disease severity for the patients who attended the SVKC are included in Table 1. Only 1 patient needed transfer back for a traditional clinic review on clinical grounds. 79% of patients thought that the virtual clinic allowed them to ask questions related to kidney disease and treatments, 76% thought it a better use of their time than face to face and telephone appointments. The average score given by the patients was 5.24/7 with 7 being the best experience it could be.

Discussion: Our pilot project demonstrates that a virtual kidney clinic model is a safe and efficient use of clinician and patient time. It is acceptable to most patients. Further work to avoid duplication of recording clinic outcomes and enhancement of digital platforms to have a bidirectional relationship with PAS could improve their functionality and further improve efficiency savings

Table 1: Demographics and clinical data for participating pilot patients

Median Age	62
Race	93% Caucasian, 7% Asian
Median eGFR	42mLs/min/1.73m2

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Track L5 – CKD 5

Poster: 297
Submission: 487

Pregnancy and renal outcomes in women with chronic kidney disease: a population study

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Introduction: Women with CKD stages 3-5 are at higher risk of adverse pregnancy outcomes, including preterm delivery and low birthweight and progression of kidney disease. However, data describing outcomes of women with less severe kidney disease are limited, and few compare with women that have normal renal function. Furthermore, most studies report cohorts recruited from specialist clinics and may not be representative. This study aimed to describe pregnancy outcomes in a UK population cohort according to pre-conception eGFR < 90 ml/min/1.73m^2 compared with women with eGFR ≥90 ml/min/1.73m^2.

Methods: Routinely collected pregnancy data from three NHS Trust hospitals in Kent (UK) between 2010 and 2020 were extracted with Research Ethics Committee approval (19/LO/1242 and 18/SC/0158). Local laboratory and clinical data were linked to identify women with eGFR measured within two years of conception. Women without preconception creatinine were excluded from analysis. Baseline characteristics were described and comparisons between eGFR and adverse pregnancy and renal outcomes were tested.

Results: A total of 14,243 pregnancies with confirmed pre-pregnancy creatinine were included, of which 1,405/14,243 (9.9%) had CKD stages 1-4 (stage 1: 221/14,243 (1.6%), stage 2: 1,170/14,243 (8.2%), stage 3: 12/14,243 (0.1%), stage 4: 2/14,243 (0.01%) (Table 1). Women with pre-pregnancy eGFR 60-89 ml/min/1.73m^2 (stage 2) were significantly older at conception than women without CKD (eGFR ≥90 ml/min/1.73m^2) but there were no significant differences in live birth rates, small for gestational age, gestation at delivery, and preterm birth. In pregnancies with CKD (1,405, stages 1-4), pre-pregnancy eGFR was weakly correlated with birthweight (r_s = 0.05, p = 0.05), and gestational age (r_s = 0.06, p = 0.05).

Discussion: To our knowledge, this is the largest population cohort to describe pregnancy outcomes between women with eGFR 60-89 ml/min/1.73m^2 compared with eGFR ≥90 ml/min/1.73m^2. Women with eGFR 60-89 ml/min/1.73m^2 did not have worse renal or pregnancy outcomes compared to eGFR ≥90 ml/min/1.73m^2. Limitations include lack of proteinuria data and details of structural CKD (Class 1 CKD), and only one eGFR measurement prior to pregnancy may have led to some women with temporary reduction in function being included in the cohort. Overall, the findings suggest that women with eGFR 60-89 ml/min/1.73m^2 should not be discouraged from pregnancy.

Table 1. Summary of pregnancy outcomes according to pre-conception eGFR

	eGFR >90 (N = 12852)	eGFR > 90 ml/min/1.73m2 with proteinuria (N = 221)	eGFR 60-89 ml/min/1.73m2 (N = 1170)	eGFR £59 ml/min/1.73m2) (N = 14)
Age at conception (mean (SD))	27.5 (5.5)	27.7 (5.9)	30.8 (5.4)	28.4 (6.4)
Live birth (%)	10,226 (99.5)	208 (99.5)	956 (99.7)	11 (100.0)
Gestation at delivery (days) (median [IQR])	278 [271, 284]	274 [265, 281]	277 [271, 284]	278 [270.5, 283]
Birthweight (mean (SD))	3385 (706)	3355 (653)	3368 (615)	3073 (663)
Preterm birth <34 weeks (%)	241 (2.3)	6 (2.9)	19 (2.0)	0 (0.0)
Small for gestational age 3rd centile (%)	128 (1.4)	2 (1.2)	16 (1.8)	0 (0.0)

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Track L5 – CKD 5

Poster: 298
Submission: 498

Optimising Care for Patients with Chronic Kidney Disease in an Integrated Care System: Evaluation of the Black Country and West Birmingham CKD Project Pilot

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Introduction: New models of care for patients living with chronic kidney disease (CKD) in the UK are urgently required, to support early identification and timely intervention, which can reduce the risk of patients going on to develop serious cardiovascular disease and kidney failure. The current evidence-base is insufficient to support an optimum 'integrated CKD care" pathway however and the 'Black Country and West Birmingham (BCWB) CKD Project Pilot' was launched in October 2021 to help address this unmet need.

Methods: 6 primary care networks (PCNs) were recruited to the pilot (300,000 registered patients). Interventions included 'case-finding', to identify patients with uncoded and high-risk CKD from primary care electronic health records (EHR). Funding was offered to support review of identified patients. CKD education was provided by nephrologists. Virtual CKD clinics were set-up, enhanced by specialist access to primary care EHR. A CKD dashboard was developed to allow regular data extraction, relevant to testing of high-risk patient groups for CKD, coding of patients with biochemical evidence of CKD and management of patients on the CKD register. At pilot completion, 18 participating clinicians (3 nephrologists, 9 GPs, 4 pharmacists, 2 nurses) took part in evaluation interviews. Thematic analysis of transcripts allowed identification of key barriers and facilitators to embedding these interventions within routine clinical practice.

Results: Baseline data demonstrated that only 59% of patients with biochemical evidence of CKD were coded in EHRs, ranging from 46-72% across studied PCNs. Not all PCNs were able to complete patient reviews. Despite this, overall coding improved to 69% by October 2022 and 1306 potentially "missed" cases of CKD were newly identified. Rates of annual urine ACR testing for patients on diabetes and CKD registers remained poor however, 49% and 33% respectively. Minimal improvements were observed in the proportion of patients on the CKD register achieving recommended BP targets, receiving statin therapy or RAAS inhibitors and/or SGLT2 inhibitors when indicated. 233 referrals were sent to the virtual CKD clinics. Median time to response was 4 days and only 20% required conversion to traditional face-to-face outpatient review.

Interviewed clinicians emphasised the importance of education to raise awareness about CKD across primary care. Members of the multi-professional team felt confident to undertake CKD reviews, provided they received appropriate training and resources. Rapid access to specialist opinon via the virtual clinic was appreciated. Lack of time was cited as the main barrier to widespread implementation.

Limiting the number of case-finding searches and encouraging incentivisation of 'better CKD care' by commissioners were suggested as possible solutions. Patient education resources were requested and liaison with laboratories to explore automated kidney failure risk equation (KFRE) reporting was also suggested.

Discussion: This pilot has demonstrated significant improvements in CKD coding following implementation of case-finding searches with positive feedback from primary care clinicians regarding the virtual CKD clinic and CKD education sessions. This must now be supplemented through development and commissioning of pathways that will also support regular review and optimisation of care for patients once they are placed on the CKD register.

Tuesday 6th June 12:15 – 13:15

Track L5 – CKD 5

Poster: 299
Submission: 499

The Development of an Integrated Community Nephrology, Multi-Disciplinary Team for the Management of Acute and Chronic Renal Disease in the Community

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Introduction: The Walsall Together clinical and operational leads constructed a collaborative initiative between nephrology and community services. Driven to provide multi-agency, patient-focused care. The aim of the community nephrology MDT service is to identify and optimally manage individuals with acute nephrological presentations and optimally manage individuals with secondary complications of chronic kidney disease (CKD) at home, while maximally utilising outpatient community services to prevent hospital admissions.

Methods: Nephrology and community teams, including rapid-response, complex-case management, enhanced-care and frailty teams devised a MDT service for individuals with either community-acquired acute kidney injury (AKI) or complications of CKD. The MDT can consist of; a nephrologist, community-CKD nurse, a member from each of the above teams, a community pharmacist and an MDT coordinator. Patients are identified from the MDT attendee's caseload, from the community heart failure and the community geriatrician patient cohort.

A weekly MDT meeting is held on Microsoft Teams, this allows for efficient working across a large geographical area. The MDT coordinator is essential for the efficient performance of the community nephrology MDT. They are responsible for: organising meetings, producing minutes, requesting laboratory investigations (including urine album in creatinine ratio), chasing results from clinical investigations and finally ensuring that the actions generated from the MDT are completed.

The community pharmacist is an independent prescriber and immediately actions any medication changes. The community teams consist of advanced clinical practitioners or band 7/above nurse prescribers.

All clinical staff perform home visits and fully utilise outpatient services including ambulatory-care-unit services for medical assessment, urgent imaging and intravenous electrolyte replacement. The medical-day-case unit services for the administration of blood transfusions. The community outpatient access team services for intravenous iron therapy and antibiotic therapy.

Results: Currently, the community nephrology MDT is actively managing over 60 patients. This excludes patients who have been successfully managed and discharged from the community MDT service. The

multimorbid, patient cohort with recurrent hospital admissions appear to have benefited the most. A reduction and/or cessation is noted, in hospital admissions after the introduction of interventions from the community nephrology MDT. The service allows the nephrology team to easily monitor and manage housebound, individuals with CKD. This reduces the number of admissions related to secondary complications of CKD. Furthermore, by managing acute illness in the community, the service reduces the number of individuals admitted to hospital with community acquired AKI. Finally, in the unfortunate event of terminal, irreversible pathology, the MDT service allows for advanced care planning and referral to community palliative care services.

Discussion: The Walsall Together collaboration has demonstrated that utilising a multi-agency approach to managing acute and chronic renal disease, can result in a reduction in hospital admissions. Furthermore, the cooperative multi-speciality approach, has led to improved monitoring and management of housebound individuals with CKD.

Tuesday 6th June 12:15 – 13:15

Track L5 – CKD 5

Poster: 300
Submission: 500

Evaluating sodium-glucose co-transporter-2 (SGLT-2) inhibitor prescribing in the management of patients with chronic kidney disease (CKD) and type 2 diabetes mellitus (T2DM) as per NICE guidelines.

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Background**:** Sodium-glucose co-transporter-2 (SGLT-2) inhibitors were initially developed for the management of type 2 diabetes mellitus (T2DM). Results from large placebo-controlled clinical outcome trials have now highlighted efficacy of SGLT-2 inhibitors in reducing the risk of CKD progression[1,2]. NICE CKD guidelines now recommend use of SGLT-2 inhibitors alongside standard of care in those patients with T2DM[3]. This has subsequently extended SGLT-2 inhibitor licensing highlighting the importance of wider multi-disciplinary team practise awareness. The aim of this audit was to assess the level of implementation of updated NICE guidelines in patients under a specialist CKD clinic in Birmingham.

Method**:** A database of renal diabetics under a specialist CKD clinic in May 2022 was generated via the trust electronic patient record system. Patients with a recorded diagnosis of T2DM and estimated glomerular filtration rate (eGFR) >25ml/min (current UK regulatory licensing for SGLT-2 inhibitor use) were included. Parameters of renal function (urine albumin: creatinine ratio (uACR) and eGFR) as well as medication histories were retrospectively collected for 158 patients and analysed using descriptive statistics.

Results**:** Results demonstrated 19% (n=43) of 143 patients with an accessible drug history were prescribed an SGLT-2 inhibitor. Less than half (44%) of those prescribed standard of care (ACEI/ARB) with a uACR >30mg/mmol (n=34) were prescribed an SGLT-2 inhibitor as per NICE recommendations. The prescribing of SGLT-2 inhibitors in patients at different stages of CKD was noted except in those with eGFR <30ml/min.

Discussion: Results suggest a number of patients with T2DM are not prescribed an SGLT-2 inhibitor as per NICE recommendations for CKD management. Whilst considering sample size limitation as well as possible contraindications relevant to SGLT-2 inhibitor treatment, these findings may reflect the recent update to NICE guidelines and delayed dissemination of information between multi-disciplinary teams around extended SGLT-2 inhibitor licensing. Glycaemic control is less effective in later stages of CKD however, trials have demonstrated the independent role of SGLT-2 inhibitors in reducing the risk of CKD progression irrespective of their attenuated ability to lower glucose in reduced kidney function[1,2]. It is imperative patients not currently prescribed an SGLT-2 inhibitor are reviewed for treatment eligibility and any contraindications. Results of this study were fed back to the local renal and diabetes team with

the recommendation for development of clear guidelines for use of SGLT-2 inhibitors in all eligible patients in order to achieve maximum healthcare benefits. In addition, there are ongoing discussions with primary care.

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Track L5 – CKD 5

Poster: 301
Submission: 581

The impact of PKD1 mutation type on renal function decline in autosomal dominant polycystic kidney disease: a longitudinal study

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The impact of PKD1 mutation type on renal function decline in autosomal dominant polycystic kidney disease: a longitudinal study

Introduction: Autosomal dominant polycystic kidney disease (ADPKD) is a genetic disorder characterized by progressive cyst formation in the kidneys, leading to kidney function decline and eventually renal failure. The gold standard method to monitor disease progression is total kidney volume (TKV), however, it is labor and financial intensive and is not feasible to be done per each visit. Therefore, we aimed to investigate if the rate of estimated glomerular filtration rate (eGFR) decline can be used to distinguish between ADPKD patient groups based on mutation type, specifically truncating vs. non-truncating PKD1 mutations. This study is important as it may help clinicians to identify patients who are at higher risk of rapid disease progression and thus may require earlier intervention.

Methods: We included a total of 43 ADPKD patients diagnosed clinically and genetically, who were followed for an average of 6.1 years (SD 3.3 years). Creatinine, eGFR, and urea readings were recorded in each follow-up visit to the outpatient clinic. We used a generalized additive mixed model (GAMM) to analyze unbalanced longitudinal data, where there were multiple visits for each individual at different time intervals. The relationship between kidney function and mutation type was assessed in a generalized linear mixed model, adjusted for sex, age at visit, and birth year. The rate of decline (per year) in eGFR across mutation types was examined in three ways, and all models were estimated using the Restricted Maximum Likelihood (REML) method.

Results: Our analysis showed that the rate of eGFR decline per year was significantly higher in patients with PKD1 truncating mutations compared with non-truncated PKD1 mutations (4.7 vs. 3.5, p value <0.001).

Conclusion: Our study suggests that the type of PKD1 mutation may have an impact on the rate of eGFR decline in ADPKD patients. Specifically, patients with PKD1 truncating mutations appear to have a more rapid decline in kidney function compared with those with non-truncated PKD1 mutations. This information may be useful in identifying patients who require more aggressive monitoring and intervention to slow the progression of their disease. Further studies with larger sample sizes are needed to validate our findings.

Tuesday 6th June 12:15 – 13:15

Track L5 – CKD 5

Poster: 302
Submission: 615

Prevalence and Factors associated with Renal Hyperparathyroidism among Dialysis-requiring patients

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Introduction: Renal hyperparathyroidism, a known CKD complication, is associated with increased parathyroid hormone levels from calcium, phosphate, and Vitamin D imbalances. It is 12-54% prevalent worldwide and associated with significant mortality and morbidity. This study aimed to determine the local prevalence and the factors associated with it among dialysis patients.

Methods: A cross-sectional study was conducted wherein all ESRD patients aged 19-75 years old and on maintenance dialysis >3months were included. The mean intact parathyroid hormone (iPTH), Vitamin D, ionized calcium, phosphorus and alkaline phosphatase were recorded. Correlation of age, gender, pre-dialysis co-morbidities, dialysis vintage and frequency were determined using spearman rank correlation coefficient, chi-square test and regression analysis.

Results: A total of 240 chronic dialysis patients in our unit were identified. Out of the 240 patients, 168 patients were included. There were 147 patients with elevated iPTH, giving an 87.5% prevalence. Age was negatively correlated with iPTH (r=-0.212, p=0.006, 95%CI -0.352,-0.062) and as they age, their iPTH is predicted to decrease by 15.195pg/mL (p=<0.01). Dialysis vintage had positive correlation with iPTH (r=0.369, p=<0.01, 95%CI 0.227,0.512) and the longer they were on dialysis, their predicted iPTH will be higher by 93.637pg/mL (p=<0.01). Dialysis frequency was positively correlated with iPTH (r=0.19, p=0.016, 95%CI 0.036,0.344) and the more frequent their sessions were, their predicted iPTH will increase by 353.508 pg/mL (p=<0.012). Three pre-dialysis co-morbidities showed positive correlation with iPTH and their presence can increase the iPTH significantly {hypertensive nephrosclerosis: x2=9.44; p=0.024, diabetic kidney disease: x2=19; p=<0.01, chronic glomerulonephritis: x2=12.680; p=<0.01}.

Conclusion: The 87% prevalence rate supported the high prevalence world-wide. Factors identified were age, presence of pre-dialysis co-morbidities, longer dialysis vintage, and frequent dialysis sessions (3x a week). Shorter dialysis interval stimulates parathyroid gland from increased blood flow triggered during dialysis and altered calcium handling by the kidneys, subsequently leading to hormone secretion.

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Track L5 – CKD

Poster: 304
Submission: 647

Engaging patients and professionals in the shift from research to practice. How can a multidimensional self-management behaviour scale be used to support kidney patients on haemodialysis in the UK?

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Introduction**:** In response to an identified gap, a scale to measure patient engagement in self-management was developed in a mixed methods study conducted between 2018 and 2020. The scale defined self-management in its widest sense, rather than restricting the items to the dialysis process. The 26-item scale was validated using a heterogeneous sample of haemodialysis patients attending in-patient, satellite, as well as home dialysis settings1. The tool aims to provide an assessment of the support needs of people reliant on dialysis, to facilitate their engagement in self-managing their condition to the extent to which they wish to. Support needs include psychosocial as well as the traditionally clinical.

This second study was conducted to explore the perceived utility of the scale and the barriers, facilitators, and potential strategies for implementation in clinical practice.

Methods**:** A qualitative design was used, and data were collected from a total of 27 participants; 19 healthcare professionals and eight service users from four kidney centres via three interviews and ten focus groups conducted between 4th July and 26th August 2022. As Covid-19 posed a significant risk, data collection was online using Zoom software or via telephone (2/3 interviews). Seven of the focus groups were dyadic, and a further three groups involved three or more participants. Data was video and audio-recorded and anonymised transcripts entered into NVivo 12.

Reflexive Thematic Analysis (RTA)[1] was used in an approach that was both inductive and deductive. Using both techniques can provide a more comprehensive view to barriers and the implementation context more broadly (Bonner et al, 2021). The Consolidated Framework for Implementation Research (CFIR) framework was used to guide the deductive coding. The CFIR is relevant to healthcare settings and useful for assessing the context into which you intend to implement.

[1] Braun & Clarke (2012, 2013, 2014, 2020) six-phase process

Results**:** Four main themes were identified that describe the context within which staff and patients interact and how self-management is understood and engaged in (table 1). Common sub-themes that run throughout the narrative are resource - mainly referred to in terms of lack of time – and intention.

Table 1: Themes generated from the Reflexive Thematic Analysis

Themes	Subthemes	Coding frequency
1. The wider context	1.1 Lack of time.	94
	1.2 Current intention to provide psychosocial support.	93
	1.3 Resource and capacity, including workforce gaps.	52
	1.4 Opportunities to improve adherence.	27
	1.5 Impact of Covid-19 and fragmentation of support.	26
	1.6 Rigidity of the system.	16
2. Shared understanding	2.1 Does this make sense?	60
	2.2 Trust and rapport.	57
	2.3 How are you now?	49
	2.4 Shared decision making.	32
3. Self-management as medical, moral, and marginal	3.1 Self-management defined through a medical lens or according to medical priority.	97
	3.2 Beyond the doctors and nurses	57
4. Disease, treatment, and life workload; psychosocial and physical capacity	4.1 Underserved groups.	39
	4.2 Still processing.	33
	4.3 Treatment burden.	31
	4.4 Service context.	28

Discussion**:** The capacity for patients and staff to engage in discussions about all aspects of self-management (specifically psychosocial), gauge participation, or identify support needs, is low. Lack of resource (time but also pathways and specialist staff) influences perceptions, intentions, and commitment to these activities. Kidney care has, by necessity, been focussed on the medical paradigm but attempts to make a shift to assessing psychosocial engagement, support needs, and care as an essential part of service delivery are evident in the narrative. Within a system under pressure, self-management is viewed in the narrowest sense and responsibility for broader engagement is deferred to willing nurses and patients.

The self-management scale may be a mechanism for identifying need and better supporting engagement in self-management. However, implementation into routine clinical practice requires further work to establish its utility and role, and the extent to which the changes required to implement align with the goals, commitment and capacity of patients, staff, and services.

References**:** 1. Munro Wild, H L. 2021. Development and validation of a multidimensional self-management scale for use with people with chronic kidney disease on haemodialysis in the UK. UKKW 4-7th October, Online.

Tuesday 6th June 12:15 – 13:15

Track L5 – CKD 5

Poster: 305
Submission: 648

UK survey of patient perspectives on the impact of anaemia associated with chronic kidney disease

Miss Jemma Reast[1], Ms Catherine Clair[2], Ms Jennifer Kent[2], Miss Emma Lambert[1], Mr Mandeep Moore[2], Miss Sophie Pittaway[1], Mr Pete Revell[3], Professor James Burton[4]

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Introduction**:** Anaemia is a complication of chronic kidney disease (CKD) that is associated with poor clinical outcomes. Current treatment strategies include administration of intravenous iron, regular injections of erythropoietin (EPO), or blood transfusions, each with their own benefits and drawbacks. On behalf of GSK and the National Kidney Federation (NKF), Ipsos conducted an online survey to understand the patient experience of anaemia management in CKD.

Methods**:** Adults (≥18 years) living with CKD and their caregivers living in the UK were eligible to participate and were recruited through the NKF newsletter (monthly circulation: 8000). Questions were asked on: experience with CKD, knowledge and treatment of anaemia, experience of anaemia symptoms and EPO treatment, and treatment administration route. The survey took place between October 2022–January 2023. Except when stated otherwise, results represent pooled data from patients and caregivers.

Results**:** Overall, 101 participants (90 patients, 11 caregivers) completed the survey; 48% of respondents were aged 51–70 years and 59% female. In total, 34% were at stage 5 CKD and 58% reported high blood pressure or type 1 diabetes. Most participants (87%) reported ≥1 current or previous symptom (from a pre-determined list) consistent with anaemia, most commonly feeling very tired (67%), weakness/lack of strength (59%), cold hands and feet (50%) and difficulty sleeping (50%). Living with these symptoms was reported to have an impact on lifestyle (64%) and psychological/emotional well-being (45%). Despite 87% reporting ≥1 anaemia symptom, only 58% reported experiencing anaemia as a CKD complication; of those, 20% did not recall being told anything about anaemia. Of the 42% who did not report experiencing anaemia as a CKD complication, 26% reported they had received anaemia treatment. Intravenous iron (54%) and EPO (54%) were common anaemia treatments, while 17% had received blood transfusions. A substantial proportion (41%) of the 49 respondents who received EPO injections reported having either missed or experienced a delay in receiving their injection; only 50% of the 32 respondents who had received EPO injections at home reported receiving training via show and tell, or injecting themselves with nurse assistance (**Figure**). Of those who had received this training (n=16), 31% reported feeling at least somewhat uncomfortable self-administering afterwards. Importantly, when

asked about modality preference, 61% of the 49 who had received EPO injections selected a modality other than injections, or expressed no preference for anaemia treatment administration route.

Discussion**:** In line with the literature, survey participants reported symptoms consistent with anaemia and substantial impacts on lifestyle and emotional well-being. Most respondents received treatment for anaemia, but one quarter of those did not recall being told about the condition, suggesting a disconnect between what patients are told and what they recall. A notable proportion of those receiving EPO injections missed doses. There is an opportunity to improve patient and HCP education around anaemia of CKD and associated treatments in line with a shared care approach. Notably, almost half of participants who had received EPO injections would prefer a different anaemia treatment modality, suggesting oral treatments would be a welcome alternative.

Figure 1. Experience of participants with CKD receiving EPO injections for anaemia

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Track L5 – CKD 5

Poster: 306
Submission: 650

Our Experience in the Maltese Islands - A Review of Our Local Adult Cystinuria Cohort

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Introduction: Cystinuria is a rare, autosomal recessive disorder that results in the defective renal reabsorption of the freely-filtered amino acid cystine. Consequent urinary supersaturation of cystine leads to the nephrolithiasis.

The goal of therapy is to achieve a low urinary concentration (ideally <250mg/L) and maintain an environment which increases its solubility (alkaline pH, high urine volume). Our aim is to audit the local adult cystinuria population in the Maltese Islands to see if these crucial parameters are being monitored and the impact on the health services.

Methods: The presence of cystine crystals on urine microscopy and/or kidney stones containing 100% cystine is diagnostic for cystinuria. We identified a total of 61 adult cystinuria patients by looking at all the urine microscopy and renal calculi analysis tests from the previous decade.

These patients' laboratory results, including 24-hour urine volume, urinalysis, cystine concentrations (in mg/L), from the years 2021-2022 were documented. These results were obtained from the Pathology Department in Mater Dei Hospital, Malta. Admissions to A&E with renal colic and surgical interventions for the stones were noted.

Results: In the years 2021-2022, 20 patients (32.8%) provided at least one 24-hour urine volume sample to the Pathology Department. The mean and median volumes were 2.65L and 2.35L respectively. The cystine concentration was measured at least once in 18 patients (29.5%) with mean and median results of 274 and 254mg/L respectively. A Nephrologist was seen at Out-Patients at least once in 45 patients. The mean and median urine pHs were 6.9 and 6.75 respectively. 24 patients (39.3%) presented to A&E with renal colic and/or required surgical intervention.

Conclusion: This study confirms this cohort's significant impact on health services. Less than a third had documented 24-hour urine volumes and cystine concentrations. Moreover, target urine pHs, 24-hour urine volumes and urinary cystine concentrations are currently not being met.

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Track M1 – Epidemiology, Public Health, Health Inequities 1

Poster: 309
Submission: 101

Consistency of alerts generated by, and implementation of, the NHS England AKI detection algorithm in English laboratories

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NHS England requires embedding an acute kidney injury (AKI) detection algorithm in laboratory information management systems (LIMSs), based on definitions of change in serum creatinine (SCr) proposed by Kidney Diseases: Improving Global Outcomes (KDIGO) consensus criteria. Notification of an AKI alert is (1) sent to the requesting clinician and (2) submitted to the UK Renal Registry (UKRR), which uses these data to report on the AKI burden in England and research. This study aimed to compare the reliability of the algorithm's syntax as implemented within laboratories across England.

Code was written to simulate the algorithm's syntax. This central code was executed within data comprising local laboratory alerts as well as SCr results from 15 months before and 15 months after the alert submitted by laboratories to the UKRR. AKI alert stage 0/1/2/3 were produced. Thirty-seven out of 190 laboratories submit high quality alert and before and after alert data based on completeness. Local laboratory-generated alerts and centrally derived alerts were compared using inter-rater agreement methods (Gwet's AC1) at laboratory and LIMS levels. Pairs of laboratory/ central alerts were penalised if their disagreement was more extreme as AKI is ordered according to severity. Since the UKRR only receives AKI stage 1/2/3 alerts, AKI stage 0 (i.e., no AKI) was assumed if the algorithm was active and no alert was received for a particular SCr result. Exploratory analyses were used to investigate agreement consistency over time, across baseline SCr, age, and using complete (non-missing) alert and SCr data.

SCr results available for analysis after exclusions was 9,096,667 from 29 laboratories (475,634 patients; median age 72 years, 47% female) from algorithm activation (1 December 2014) to data extraction (30 September 2020). The median baseline SCr was 76 µmol/L (IQR 54 – 114 µmol) before the alert. Laboratories and the central simulation generated 1,579,633 alerts and 1,646,850 non-zero AKI alerts respectively. Agreement was very high (Gwet's AC1 > 0.81) across all three known (to the UKRR) LIMS providers ranging from 0.97 to 0.98 but 0.17 to 0.98 across individual laboratories. Only 6% of laboratory alerts were generated by the three lowest-performing laboratories. Agreement reduced substantially (Gwet's AC1 0.88) when the baseline SCr was in the highest quartile (median 164 µmol/L), the frequency of AKI 1 was greatest for central compared to local laboratory-generated alerts (18%

versus 15%) but lower for stage 3 alerts (4% versus 9%) for the highest baseline SCr quartile, but was otherwise similar across quintiles of age, per year and for laboratories with no incomplete data.

The alerts reported to the UKRR used to monitor AKI burden and exploited by registry-based trials are reliable except those from a few laboratories. However, there is potentially an underestimation of alerts because only those with laboratory-generated AKI are submitted to the UKRR and only high-quality data were used in this analysis. In addition, further scrutiny is required in a few poor-performing laboratories and people with pre-existing CKD as worsening CKD may be misclassified as AKI or suppressed by laboratories.

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Track M1 – Epidemiology, Public Health, Health Inequities 1

Poster: 310
Submission: 124

Understanding how gender impacts access to kidney transplantation

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Introduction: The existing literature shows that gender/sex disparity is emerging as a major problem in access to kidney transplantation. Sex and gender are terms that are often used interchangeably but they are in fact two different concepts. While sex refers to the biological aspects of an individual as determined by their anatomy, gender is a social construction relating to behaviours and attributes based on labels of masculinity and femininity. The objective of this qualitative study was to explore, using a phenomenological approach, i) how women and men with kidney failure, waiting or not for a transplant, perceive the barriers in the path leading to kidney transplantation, ii) how they adapt to overcome these barriers while navigating the healthcare system, and iii) how their interaction with the healthcare system may differ.

Methods: Semi-structured intensive interviews, conducted remotely between 12th July and 27th September 2021 in England, involved six participants, three men and three women aged > 18 years. Two of the women, after the initial coding, were re-contacted in February 2022 for a further interview to allow a better definition of some concepts. An interpretative phenomenological analysis, using semio-pragmatic coding, was used to identify key phenomenological themes.

Results: Five main themes were identified: 1) communication with the health care staff, 2) the importance of befriending patients with the same condition and life experience, 3) the relationship between care pathways and family, 4) the need to feel in control and independent about treatments, and finally 5) the value of trust towards the health care system and staff (table 1).

The results of this research suggest that the perceived barriers for people with kidney failure in accessing kidney transplantation are not different between women and men and the interaction with the health care system per se is not particularly marred by beliefs about gender roles. However, women and men show differences in the strategies they use to cope with the difficulties they encounter. Possible gender differences also have been highlighted in the acceptance of living donor transplantation.

Discussion: An interventional service mechanism, providing counselling and/or referral information, for individualised care is needed. This includes attention to the individual's social context, particularly the family, and a joint up approach between renal psychologists, nephrologists and surgeons to tailor pathways to organ transplant waitlisting. Any intervention should consider gender differences in preferences and adaptation strategies adopted by individuals. Additionally, evaluation and monitoring of communication models adopted in renal services are necessary to ensure that decision-making processes are shared between clinicians and patients.

For future research and even policy planning, it is necessary that data on gender inequalities in access to kidney transplantation are collected routinely. More research is also needed to investigate a possible greater reluctance by women in accepting living donor transplantation compared to cadaveric transplantation.

Table 1: examples of quotes for each of the five phenomenological themes.

Themes	Example of quotes	
Communication with the health care staff	'I do not know if it is to do with education. I think [that] more middle class educated people are more likely to get a live transplant. I am not entirely sure why, but I think healthcare professionals have to change that. I think access and knowledge is a bit unfair. You *(referring to herself as a patient)* get the expectation [that] you will have to read up everything and you will know, and you will be comfortable *(referring to the printed informational materials that are given to patients at the end of meetings/visits and the literature)*'. (Female)	'Generally, I do not think there is enough support for long-term in-hospital dialysis patients … Patients talk to doctors differently than how they do each other. When you *(referring to himself as a patient)* go to see a renal consultant you need to have your 'medical brain' active, you need to know your medications. My consultant trusts me but it is on the patient to make the consultant understands'. (Male).
The importance of befriending with other patients with a similar condition and/or life experience	'I understand that some patients go to the hospital *(referring to have dialysis in hospital unit)* as maybe that is the only socialising they can do. They can see friends from dialysis. You do become friend with people. I have lost a few friends from the dialysis unit. I lost young friends, old friends, it can be tricky sometime. I remember when I did my first session [of dialysis] at home after being in a satellite [unit], I did not know what to do with myself…' (Male)	'… Prior to starting dialysis, like and year or so, I had stopped working in London and started working at home, working by myself at home all day. So, I made the decision of joining virtual communities, not related to kidney disease, good work online communities. Then, once I started dialysis, I continued to have three monthly appointments at my home therapies clinic and in that time I thought it was a good time to maybe know people who understand, maybe not on a personal level, but who understand things like that *(referring to the experience of having dialysis)* … when I have started to be more connected with other people in my position, I felt well ... So, just me with these people having even five minutes conversations, it is so nice and that is what keeps me going with well. I never really felt the need to go somewhere to have this, I already feel connected *(referring to using remote interactions)*' (Female).
The relationship between care pathways and family	'There are things about donor to consider, they are going from someone with two kidneys to someone with one kidney. Then, other things are about the recovery [after the intervention]. Somebody giving you the kidney needs to go through all of that for you! What if fails? That person was giving you something that has been rejected. My husband offered once and a friend, I got two brothers, but to be honest I feel I never had any real conversation with all of them'. (Female).	'I have been on dialysis since I was 11, when you get kidney failure you have to accept it! My mother gave me the kidney for my first transplant … now I do home nocturnal dialysis and I am on the [waiting] list [for transplant] … M. *(his wife)* asked about to donate me a kidney but she is my last resource. I said "I don't want to put you *(referring to his wife)* and our family at risk" … I would rather stay on dialysis and having a beautiful family'(Male).
The need to feel in control and have independence over treatments	'I have recently changed to nocturnal dialysis, and it seems that my blood tests are better now. So, I have started eating again things that I had to actively avoided for 17 years, which is nice! … Around my 16 I lost my kidney *(transplant received from his mother),* I lost control so I asked: "can I have some involvement with my treatment?" I found that was the best route to me…I felt I could get back a little bit of control that I lost.' (Male)	'I have opted for peritoneal dialysis if it comes to that. My creatinine is relatively stable, and my urea fluctuates. I want to work, and I want to self-manage … self-management can offer me to continue to travel a lot, and I can do that if I am on peritoneal dialysis! … This is about quality of life, it is about doing the things that are important to you.' (Female).
The value of trust towards the health care system and staff	'My renal consultant wanted me listed [on the transplant waiting list] sooner rather than later and not to wait until I was dialysed. I have opted for cadaveric donor, and I am happy with my choice, but I don't want my head around the idea you need a renal transplant because [that] is something you cannot see. It is not something you can put your finger on, I am just getting a little bit tired, yeah that's it! The pathway [to access transplant] has been very interesting. I saw maybe five different surgeons and every single surgeon was catastrophising about different outcomes [of the transplant]. I think they were looking for any excuse not to do me, I am very stoical!' (Female).	'Well, I understand my circumstances from my past, [they] have caused my antibodies to be higher than they should be, as I had a lot of blood transfusions and things like that. Because of complications in my past, I am aware that they (the transplant centre) need to find a good kidney match. I have been waiting for a very specific kidney for so long now! Hopefully it will come along one day but dialysis is not as bad as people think, as long as you will be into adapt and to learn you can get along with it.' (Male).

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Track M1 – Epidemiology, Public Health, Health Inequities 1

Poster: 311
Submission: 165

Lower estimated glomerular filtration rate is associated with improved survival in patients with kidney cancer who received targeted systemic anti-cancer therapy: A single centre retrospective analysis

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Introduction: Treatment with vascular endothelial growth factor signalling pathway inhibitors (VSPI) and immune checkpoint inhibitors (ICI) has transformed outcomes in advanced renal cancer. However, a significant proportion of people with renal cancer have co-existing chronic kidney disease (CKD) and concerns persist about the usage of these agents in patients with CKD. We sought to analyse the effect of reduced kidney function on the survival of patients with renal cancer treated with VSPI or ICI.

Methods: We used linked data between the ChemoCare and NHS West of Scotland SafeHaven databases (data collection spanning 2008–2020), to identify adults from the Greater Glasgow and Clyde Health board who had received either a VSPI or ICI as an anti-cancer therapy. We included participants with two available serum creatinine values (at least 3 months apart) before the date of initiation of treatment.

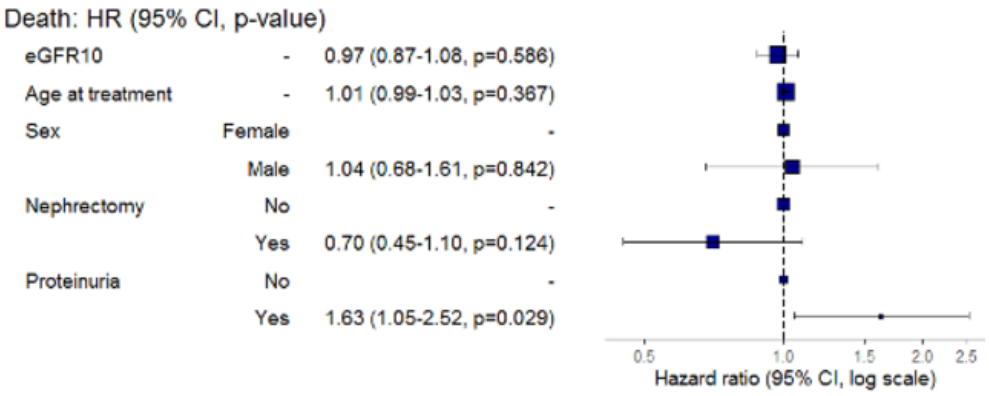
The estimated glomerular filtration rate (eGFR) was calculated using CKD-EPI (2009), the average eGFR was included in the analyses. Proteinuria was defined as any positive urine albumin: creatinine (>3mg/mmol) or protein:creatinine (>15mg/mmol) ratio before treatment. Factors associated with all-cause mortality were analysed using Cox proportional hazards models with R Software.

Results: We identified 349 patients with renal cancer who received at least one cycle of ICI and/or VSPI. Sufficient serum creatinine results were available for analysis in 337 of these patients. The average age at first treatment was 63.0 (IQR 55-71) years old, 62.5% were male and proteinuria results were recorded in 125 patients. Nephrectomy prior to treatment was recorded in 149 patients. Over a median follow-up of 335 days (IQR 131 days – 840 days), 281 patients died (Table 1).

Table 1: Mortality of patients with Renal Cancer by average eGFR, age at treatment, sex, and history of prior nephrectomy or proteinuria

Dependent: Mortality		Died	Alive	Total	p
Average eGFR	Median (IQR)	74.5 (37.2)	65.9 (26.2)	72.2 (36.2)	0.056
Age at treatment	Median (IQR)	63.0 (16.0)	63.0 (13.8)	63.0 (16.0)	0.950
Sex	Female	112 (39.9)	16 (28.6)	128 (38.0)	0.150
	Male	169 (60.1)	40 (71.4)	209 (62.0)	
Nephrectomy	No	160 (56.9)	12 (21.4)	172 (51.0)	<0.001
	Yes	121 (43.1)	44 (78.6)	165 (49.0)	
Proteinuria	No	62 (62.0)	13 (56.5)	75 (61.0)	0.804
	Yes	38 (38.0)	10 (43.5)	48 (39.0)	

On univariable analysis, lower eGFR (p = <0.001) and prior nephrectomy (p= <0.001) were associated with a higher hazards of death. Age (p = 0.356) and sex (p = 0.315) were not associated with higher hazards of death. After adjustment for age, sex and prior nephrectomy, lower eGFR was associated with lower hazards of death (per 10mL/min/1.73m2 decline in eGFR: HR 0.91, CI 0.84-0.97, p= 0.007). In a sensitivity analysis in people who had complete eGFR and proteinuria data available, the presence of proteinuria was associated with greater hazards of death (HR 1.63, CI 1.05-2.12, p= 0.029) after adjustment for age, sex, eGFR and nephrectomy (Figure 1).



Discussion: A lower average eGFR before treatment was associated with reduced hazards of death. This appears not to be fully explained by the association of prior nephrectomy with better cancer outcomes. This suggests that other factors may contribute to these discrepancies, such as underlying selection bias of patients for treatment, or bias from the marker used to estimate GFR in this group of patients. The presence of proteinuria was potentially associated with an increased hazards of death, although quantification of proteinuria was performed on a low proportion of the cohort.

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Track M1 – Epidemiology, Public Health, Health Inequities 1

Poster: 312
Submission: 173

Identification of patients with undergoing kidney replacement therapy in primary and secondary care data - a validation study using OpenSAFELY and the UK Renal Registry

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Introduction: People requiring kidney replacement therapy (KRT), are at high risk of severe outcomes following COVID-19 infection. It is imperative that patients receiving KRT are correctly identified to ensure timely interventions such as vaccination and anti-viral treatment. In this study we used complete population data from the UK Renal Registry (UKRR) to validate the codes used to identify patients on KRT in the OpenSAFELY platform, a linked source of English primary care and hospitalisation data.

Methods: With the approval of NHS England, data on incident (starting KRT during 2020) and prevalent (on KRT at the end of 2020) cohorts of adult and paediatric patients on KRT in the UKRR were linked to primary and secondary care data from over 17 million patients in England using the OpenSAFELY platform. Existing primary care codelists were used to identify people on KRT in primary care, separating dialysis and transplant. Additional codelists were developed for diagnoses and procedures identifying people on KRT in secondary care. The three data sources were compared for incident and prevalent patients for 2020, taking UKRR as the gold standard.

Results: Of the 19 million people alive and registered with an OpenSAFELY-TPP practice at the start of 2020, 22,815 were on KRT according to UKRR data, compared to 26,750 in primary care data and 32,465 in secondary care data (Figure 1). Primary and secondary care codelists were very sensitive for capturing the UKRR prevalent cohort (91% and 92% respectively), but much lower for the incident cohort (52% and 68%). Positive predictive value was lower (78% for primary care and 65% for secondary care), particularly for dialysis (54% for primary care and 49% for secondary care). Sensitivity decreased with age and deprivation in primary care, but the converse was true in secondary care (Figure 2). Agreement was lower in children with only 30% featuring in all three datasets. Most prevalent KRT patients missed in primary care were on dialysis (89%), while most missed in secondary care had a kidney transplant (77%). Only half of the incident dialysis patients in the UKRR had a KRT code within the 3 months before or after the KRT start date.

Discussion: Codes used in primary and secondary care only miss a small proportion of prevalent KRT patients by the gold standard UKRR data. However, they also incorrectly capture many patients not on KRT in the UKRR. This is particularly the case for primary and secondary care dialysis codes, which likely capture acute dialysis (less than 90 days). Patients starting KRT who become eligible public health interventions may not be identified in a timely manner by primary and secondary care codes, and awareness of this can aid service planning. For future studies using the OpenSAFELY platform, this work has shown that addition of linked UKRR KRT data can improve research quality by facilitating more accurate identification of incident and prevalent KRT cohorts.

Fig 1 Venn diagram showing agreement for a) prevalent cohort for all KRT at the start of 2020 and b) 2020 incident cohort for all KRT (i.e. with KRT recorded in 2020 with no history of KRT prior to that in the respective data source). All n rounded to the nearest 5.

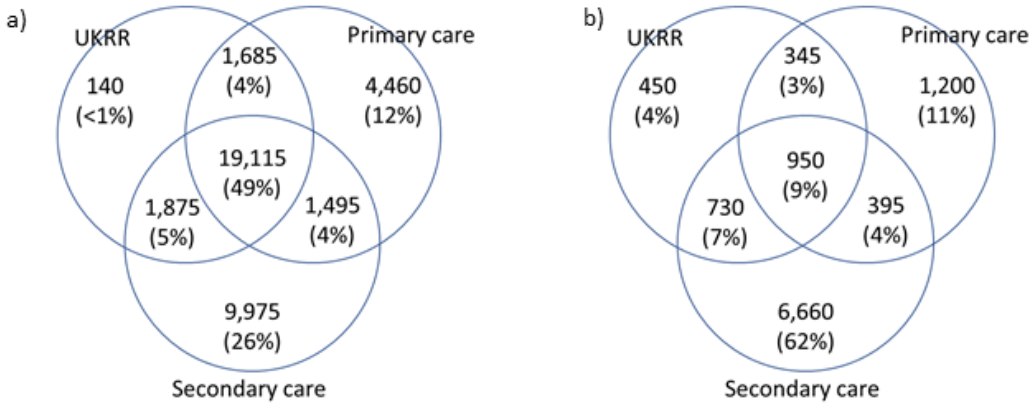
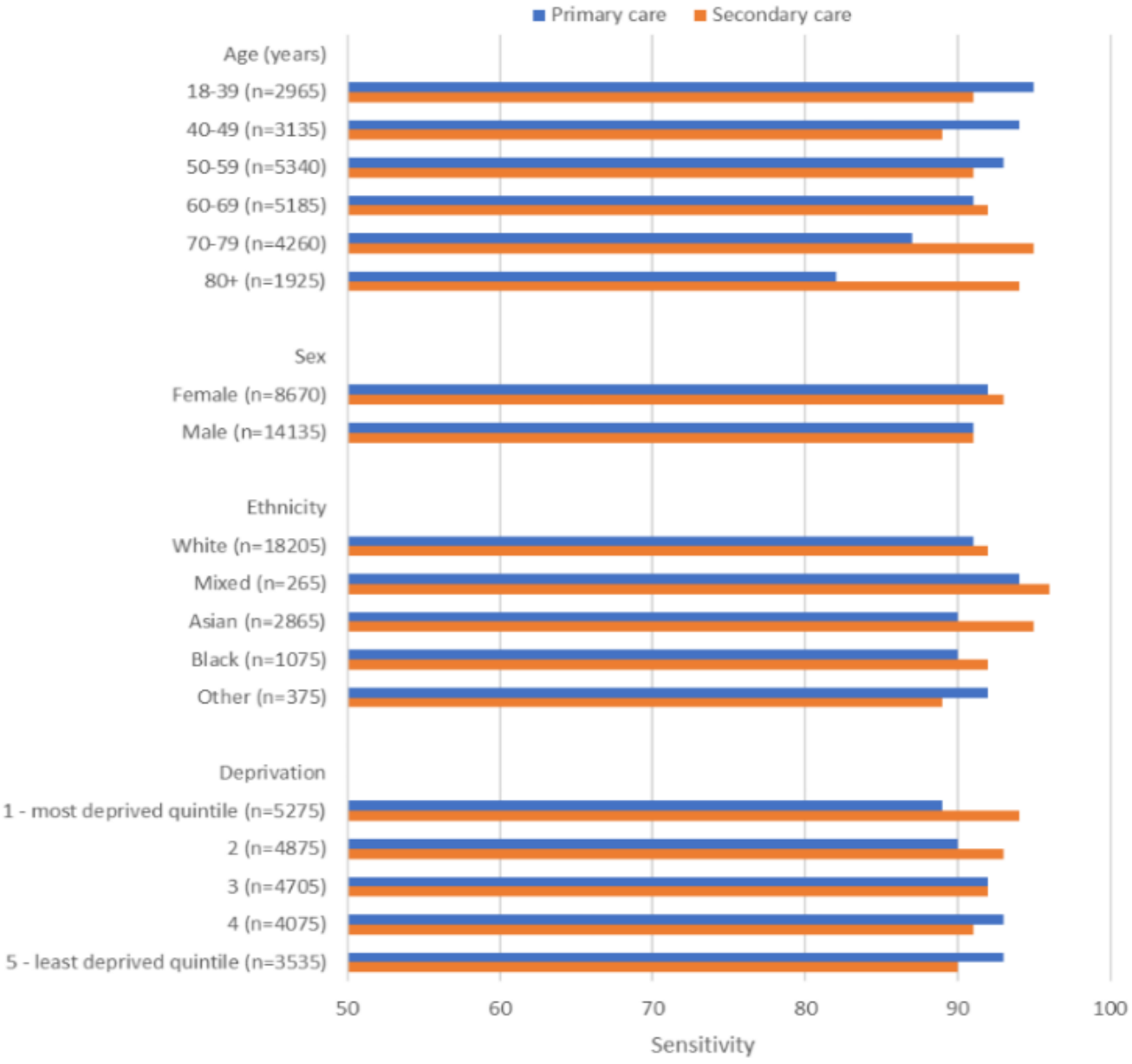


Fig 2 Sensitivity of primary and secondary care codelists for identifying the UKRR prevalent cohort at the start of 2020, by demographic group. N is the UKRR denominator in each group.



Tuesday 6th June 12:15 – 13:15

Track M1 – Epidemiology, Public Health, Health Inequities 1

Poster: 313
Submission: 217

Real world data-driven identification of ANCA vasculitis relapse

Dr Jennifer Scott[1,2], Dr Arthur White[2,3], Dr Cathal Walsh[4], Dr Louis Aslett[5], Dr Matthew Rutherford[6], Dr James Ng[2,3], Dr Conor Judge[7], Dr Kevin Sebastian[1], Prof John Kelleher[8], Ms Julie Power[9], Dr Niall Conlon[10], Dr Sarah Moran[11,1], Dr Raashid Luqmani[12], Dr Peter A. Merkel[13], Prof Vladimír Tesař[14], Dr Zdenka Hrušková[14], Prof Mark A. Little[1,2]

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Introduction: The relapsing-remitting, multi-system pattern of disease in ANCA vasculitis (AAV) results in incremental tissue injury. For those with renal involvement, there is a 9-fold increased risk of end-stage kidney disease after renal relapse. Relapse is defined by the Birmingham Vasculitis Activity Score (BVAS v3) >0, particularly in the clinical trial setting. However, this metric may be missing or incorrectly scored in real world registry data, resulting in incomplete or inaccurate ascertainment of this key outcome. Our aim was the development, internal validation and evaluation of a pragmatic data-driven algorithm to automate the retrospective identification of AAV relapse in real-world data.

Methods: The Rare Kidney Disease (RKD) Registry is a national longitudinal, multi-centre cohort study, including 663 patients with AAV, of whom those with >6 months follow up post diagnosis were eligible for inclusion. We followed five steps to develop and validate the algorithm: 1) independent expert adjudication of encounters using primary medical record information to assign the reference probability of relapse (ground truth), 2) selection of data elements and corresponding value sets using literature review, expert opinion and with a consideration of likely data availability, 3) development of a computable phenotype definition, with an embedded logistic multi-level regression model using

complete case analysis, 4) internal validation, 5) development of additional models (using the same method) to account for combinations of variable missingness (models described in Figure 1). We also developed a Shiny web application to implement the final algorithm, which determines the appropriate model based on available variables, outputting an individualised probability of relapse, with a suggested binary interpretation.

Results: In the first step of the algorithm, encounters with diagnostic histopathology were labelled as relapse. For encounters without histopathological confirmation, we selected five objective data elements to build the model: change in ANCA level, suggestive blood/urine tests, suggestive imaging, immunosuppressive (IS) status at the time of the encounter and the change of this IS in response ('IS response') (Table 1 and Figure 2). Development and validation datasets comprised 1209 and 377 separate encounters, respectively. An optimal cut-point of 0.48 was determined by maximising the F1-Score (0.85) for the complete 5-variable model. Sensitivity and specificity were 0.91 and 0.95 respectively. Performance metrics were stable across fifty random-split resamples. Calibration-in-the-large was satisfied. Where 'IS response' was missing, 'suggestive bloods/urine' (Data Element [DE]2) with at least either 'ANCA level' (DE1) or 'suggestive imaging' (DE3) was required to achieve an accuracy as good as gold standard BVAS (Figure 1).

Conclusions: In settings where accurate BVAS may not be available, this algorithm accurately quantifies the individualised probability of AAV relapse using objective, readily accessible registry data. In addition to our web application, the model can be directly embedded in a registry database. This framework could serve as an exemplar for other relapsing-remitting diseases and for automating the identification of other key outcomes or cohorts in registry data.

Table 1: New data elements with their corresponding value set (i.e. categorical drop-down options) applied to the registry to uniformly summarise patient encounters, with regards to relapse probability.

Data element key	Data element	Value set (Categorical values)
1	Change in ANCA	- 4-fold rise - <4-fold rise - No rise
2	Suggestive bloods/urine tests*	- Suggestive of relapse - Not suggestive
3	Suggestive imaging	- Suggestive of relapse - Not suggestive - No imaging performed
4	Immunosuppressive (IS) status	- Currently on IS - Discontinued within 6 months - Discontinued >6 months
5	IS medication in response to the encounter (IS response)	- Increased - Not increased

*20% rise in creatinine, new haematuria, new proteinuria, CRP >5 mg/L or 20% rise in urine soluble CD163 (to >400 ng/mmol).

Figure 1: The mean of the F1-Score and 95% CI for the 31 rank ordered models, to demonstrate the overall classification accuracy of labelling relapse retrospectively in a registry. The dotted line indicates the value obtained with BVAS in this dataset.

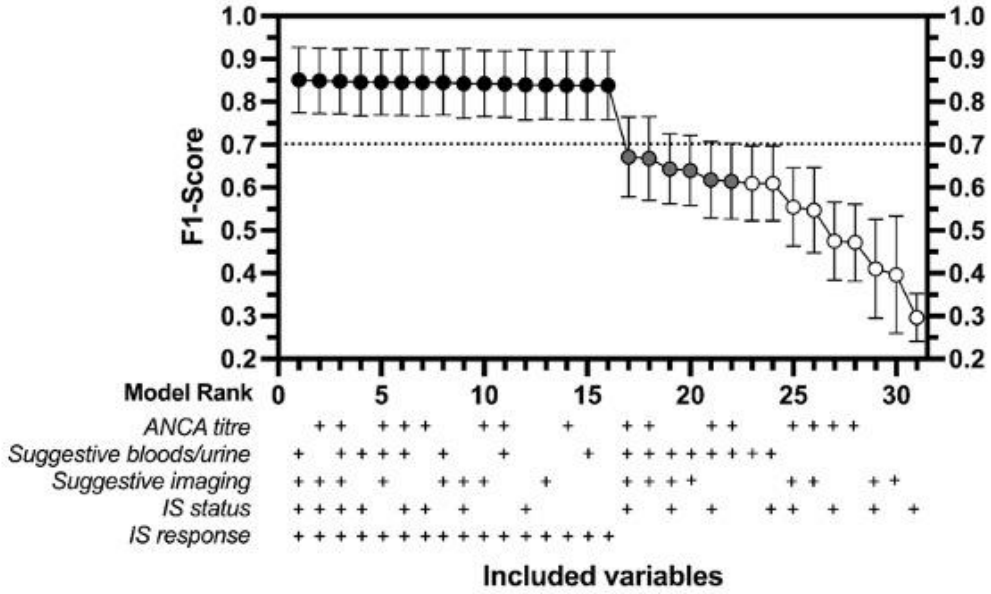
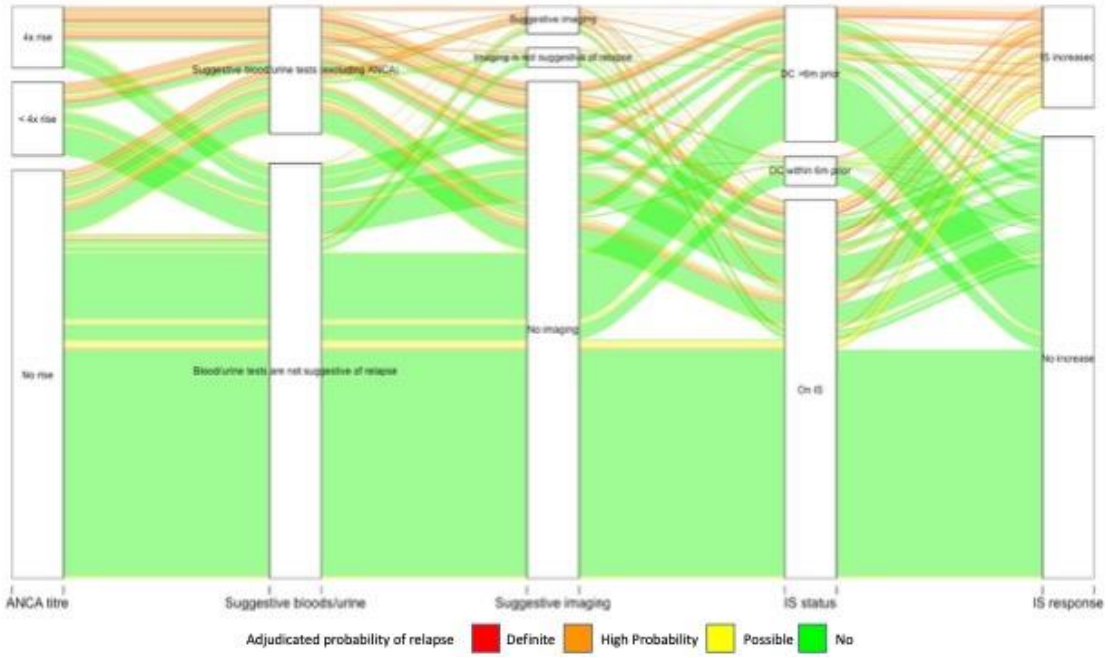
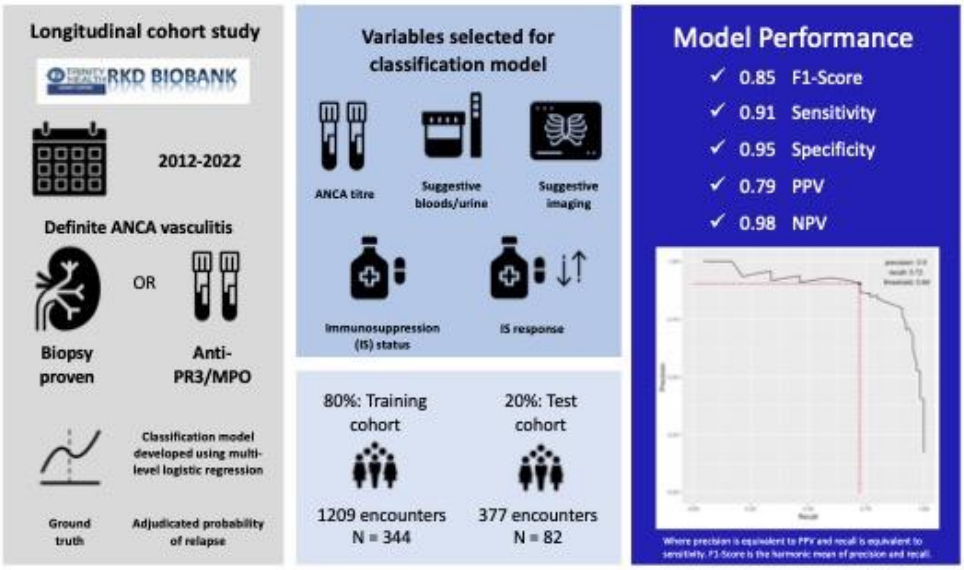


Figure 2: Alluvial plot illustrating the proportion of each summary variable, stratified by the adjudicated probability of relapse



Data-driven identification of ANCA vasculitis relapse in real-world trials



Conclusion: The model performs well at at identification of relapse, using objective, readily-accessible registry data. External validation is the next step to demonstrate generalisability.

J. Scott et al, 2022

Tuesday 6th June 12:15 – 13:15

Track M1 – Epidemiology, Public Health, Health Inequities 1

Poster: 314
Submission: 226

ANCA-associated vasculitis in Ireland: a multi-centre national cohort study

Dr Jennifer Scott[1,2], Dr Eithne Nic an Ríogh[1], Dr Shamma Al Nokhatha[1], Dr Cliona Cowhig[1], Dr Alyssa Verrelli[3], Dr Ted Fitzgerard[1], Dr Arthur White[2,4], Dr Cathal Walsh[5], Dr Louis Aslett[6], Prof Declan DeFreitas[7], Dr Michael R. Clarkson[3], Dr John Holian[8], Prof Matthew D. Griffin[9], Dr Niall Conlon[10], Prof Yvonne O'Meara[11], Dr Liam Casserly[12], Dr Eamonn Molloy[13], Ms Julie Power[14], Dr Sarah Moran[3,1], Prof Mark Little[1,2]

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Introduction: Antineutrophil cytoplasmic antibody (ANCA)-associated vasculitis (AAV) is a rare multisystem autoimmune disease. There is a need for interoperable national registries to enable reporting of real-world long-term outcomes and their predictors in AAV.

Methods: The Irish National Rare Kidney Disease (RKD) registry was founded in 2012. To date, 842 patients with various forms of vasculitis have been recruited across eight nephrology, rheumatology and immunology centres. We focus here on patient- and disease- characteristics, treatment and outcomes of the 397 prospectively recruited patients with AAV.

Results: Median age was 64 years (IQR 55–73), 57.9% were male, 58.9% had microscopic polyangiitis and 85.9% had renal impairment. Cumulative one- and five-year patient survival was 94% and 77% respectively. Median follow-up was 33.5 months (IQR 10.7–52.7). After controlling for age, baseline renal dysfunction ($p = 0.04$) and the burden of adverse events ($p < 0.001$) were independent predictors of death overall. End-stage-kidney-disease (ESKD) occurred in 73 (18.4%) patients; one- and five-year renal survival was 85% and 79% respectively. Baseline severity of renal insufficiency ($p = 0.02$), urine soluble CD163 (usCD163) ($p = 0.002$) and "sclerotic" Berden histological class ($p = 0.001$) were key determinants of ESKD risk.

Conclusions: Long-term outcomes of Irish AAV patients are comparable to other reported series. Our results emphasise the need for personalisation of immunosuppression, to limit treatment toxicity, particularly in those with advanced age and renal insufficiency. Baseline usCD163 is a potential biomarker for ESKD prediction and should be validated in a large independent cohort.

Tuesday 6th June 12:15 – 13:15

Track M1 – Epidemiology, Public Health, Health Inequities 1

Poster: 315
Submission: 274

Ambient heat exposure and eGFR trajectory: A post-hoc analysis of DAPA-CKD trial

Ms Zhiyan Zhang[1], Professor Hiddo Heerspink[2], Professor Glenn Chertow[3], Doctor Ricardo Correa-Rotter[4], Professor Antonio Gasparrini[1], Doctor Niels Jongs[2], Doctor Anna Maria Langkilde[5], Professor John McMurray[6], Doctor Malcolm Mistry[1], Professor Peter Rossing[7], Professor Robert Toto[8], Doctor Priya Vart[2], Professor Dorothea Nitsch[1], Professor David Wheeler[9], Professor Ben Caplin[9]

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Introduction**:** Higher ambient temperatures have been associated with higher rates of admission for kidney stones and acute kidney injury. Occupational heat stress is also a risk factor for impaired kidney function in several rural resource-poor settings. It is unclear if higher ambient heat exposure is associated with a faster loss of kidney function in patients with established, all-cause, chronic kidney disease (CKD). We therefore undertook a post-hoc analysis of the DAPA-CKD trial linking participant data to publicly available climate measurements.

Methods**:** The DAPA-CKD trial randomized 4304 patients with proteinuric CKD (estimated glomerular filtration rate, eGFR, 25-75 mL/min/1.73m^2; urine albumin-to-creatinine ratio, ACR, 23-566 mg/mmol) to dapagliflozin or placebo in addition to standard of care. We examined the association between daily study centre-level ambient heat exposure (defined as a mean heat index, HI, >30; European Centre for Medium-Range Weather Forecasts ERA5 reanalysis dataset) and individual-level change in eGFR using both a linear-mixed effects model and a case-time series approach to address potential unmeasured individual- and centre-level confounding.

Results**:** Climate and eGFR data were available on 3915 (91%) participants across 361 centres in 21 countries. Over a median of 28 months, participants (mean age: 62 years; mean eGFR: 43mL/min/1.73m^2) were followed-up at centres where there was a median of 1 day (interquartile range: 0 to 64 days) with an HI>30. Each 30-day period of HI>30 over the study period was associated with a change in eGFR of -0.7% (95% CI: -1.0% to -0.3%), equivalent to an additional eGFR loss of between 1.2 and 4.0mL/min/1.73m^2 per year in a patient with an eGFR of 45mL/min/1.73m^2 located in a very hot versus temperate environment. Similar estimates were obtained using the case time series approach. This association persisted after adjustment for potential haemoconcentration effects on the day of

testing and further analyses provided no evidence that these findings varied with baseline eGFR, albuminuria or randomised treatment arm (Figure), or by high- versus middle-income country study centre location.

Discussion**:** Higher ambient heat exposure is associated with a more rapid decline in kidney function among patients with CKD. Efforts to mitigate heat exposure should be prospectively tested as part of a comprehensive strategy to slow the progression of kidney disease.

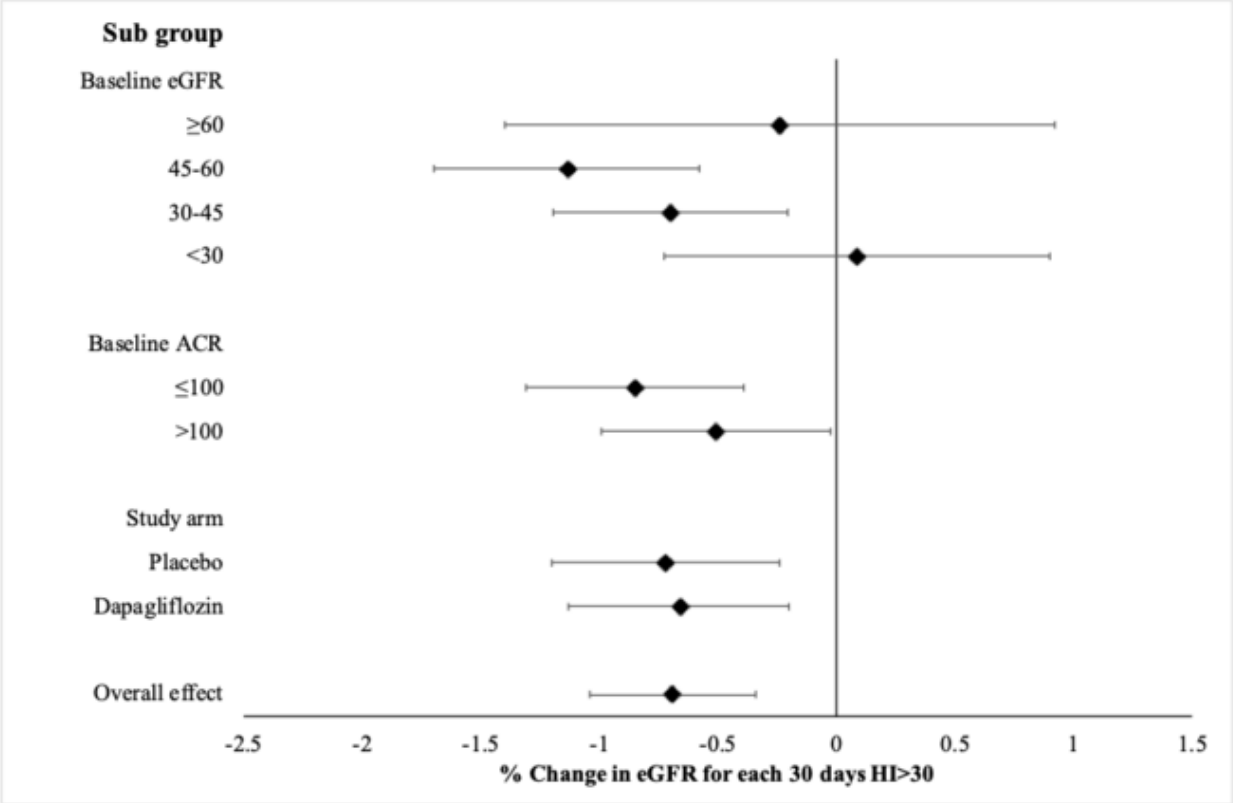

Figure: Association between heat index and change in eGFR in subgroups. Linear mixed model of eGFR measures nested within individual-level random effects nested within centre-level random effects. Model adjusted for the following baseline variables: age; sex; ethnicity; smoking status; diagnosis of diabetes; history of cardiovascular disease; BMI; systolic blood pressure; urinary ACR; eGFR; ACE/ARB use; statin use; diuretic use; DAPA-CKD study arm; and time interactions (reflecting associations with eGFR slope) with age; BMI; systolic BP; eGFR; urinary ACR and DAPA-CKD study arm. Average marginal effects estimates presented for subgroups. Error bars show 95% confidence intervals.

Funding**:** The DAPA-CKD trial was funded by AstraZeneca

Tuesday 6th June 12:15 – 13:15

Track M2 – Epidemiology, Public Health, Health Inequities 2

Poster: 316
Submission: 316

Determining the influence of chromosome Y genetic variation on the onset and progression of diabetic kidney disease

Dr Claire Hill[1], Ms Kerry Anderson[1], Dr Marisa Cañadas Garre[1,2,3,4], Prof Alexander Peter Maxwell[1,5], Prof Amy Jayne McKnight[1]

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Introduction: Diabetic kidney disease (DKD) is a complex disease influenced by both inherited predisposition and environmental risk exposures. Genome-wide association studies (GWAS), exploring autosome and chromosome X genetic variation associated with DKD, have revealed targets for therapeutic and diagnostic development. Nevertheless, these previously identified genetic markers do not fully account for DKD susceptibility, highlighting a 'missing heritability' problem. One factor that may account for part of this 'missing heritability' is chromosome Y (ChrY). ChrY is often excluded from GWAS studies, due to challenging methodologies and more limited resources, and thus it remains largely unexplored. ChrY haplogrouping and the assessment of loss of ChrY (LOY), the most common non-physiological mutation acquired during the lifespan, are two ways to assess ChrY genetic variation. Here we explore these factors in the context of DKD.

Methods: The UK-ROI type-1 diabetes (T1D) cohort, DKD cases (N = 903), end-stage kidney disease (ESKD) cases (N=106), and controls (N=1001) as defined previously[1], was studied. Haplogrouping was performed via yhaplo[2] using 257 phylogenetically informative variants remaining post-QC. Mendelian Randomisation (MR) was performed via TwoSampleMR[3,4], harnessing a previously identified genetic instrument for LOY[5] and a previously published meta-analysis for DKD from the GENIE consortium[6].

Results: Haplogroups (**Figure 1**) were not significantly associated with DKD or ESKD. One of the four R clade markers investigated, L21, was associated with reduced ESKD risk (OR=0.52, 95% CI=0.30-0.88, P=0.01), with statistical significance remaining after Bonferroni correction (0.05/4). MR analysis revealed that genetically predicted LOY was significantly associated with increased DKD risk (P=0.009; **Figure 2**). The MR Egger intercept suggested directional horizontal pleiotropy was not a driver for this result (Intercept = 0.017, SE = 0.035, P=0.64).

Conclusion: This study is the first to assess ChrY haplogroups and LOY in DKD in a European population, highlighting a potential role for ChrY markers in the development of DKD and/or progression to ESKD in

T1D patients. This study reveals a predicted causal association between LOY and increased DKD risk, highlighting potential biomarkers to aid early diagnosis and advance sex-stratified medicine.

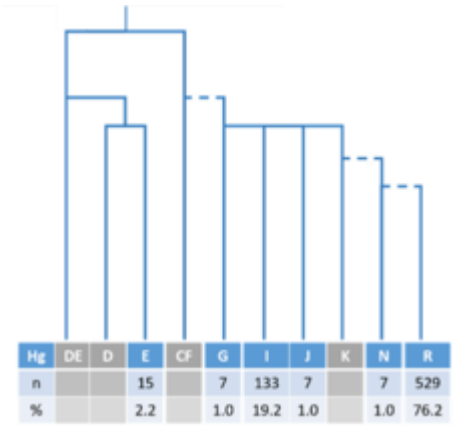
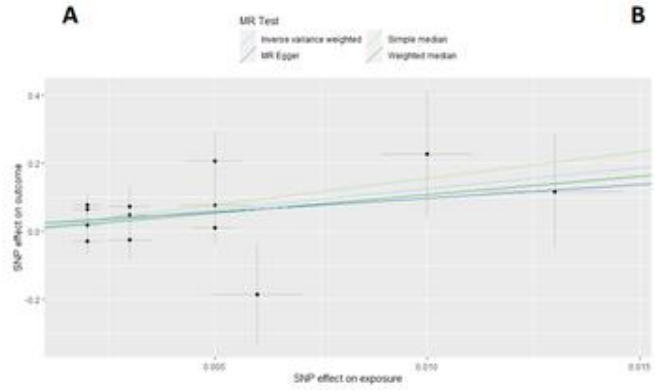


Figure 1 Phylogenetic tree of chromosome Y major clade haplogroups present in the UK-ROI case-control group. Shown are their counts (n) and frequencies (%). Broken lines represent where the tree has been minimised to exclude intermediary branches. Branch length represents the relative age of the haplogroup.



B

Method	N (SNP)	Beta	SE	P-value
Inverse variance weighted	13	12.50	4.77	0.0088
Simple median	13	15.60	6.60	0.0181
Weighted median	13	10.83	6.55	0.0986
MR Egger	13	8.04	10.51	0.4604

Figure 2 A) Mendelain randomisation results revealed the predicted causal association between loss of chromosome Y (exposure) and diabetic kidney disease (outcome). ***B)*** Significant associations were identified using the inverse variance weighted and simple median methods.

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Tuesday 6th June 12:15 – 13:15

Track M2 – Epidemiology, Public Health, Health Inequities 2

Poster: 317
Submission: 323

Long-term complications of gestational diabetes in a large population dataset

Dr. Gabrielle Goldet[1], Dr. Rakesh Dattani[2], Dr. Tahereh Kamalati[3], Mr Zia Ul-Haq[3], Dr. Andrew Frankel[2], Prof. Frederick Tam[2]

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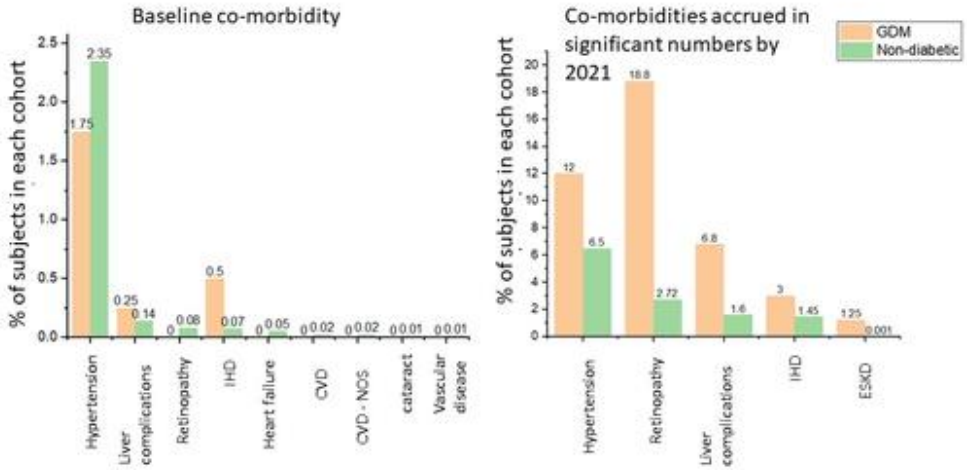
[3]Imperial College Health Partners, London

Introduction: Gestational diabetes mellitus (GDM) is known to be associated with the development of type 2 Diabetes mellitus (T2DM) and possibly other long-term complications. Our aim is to better understand long-term outcomes for women having suffered GDM in the general population.

Methods: Using data from the DISCOVER-NOW dataset, which contains the records of 2.3 million people in Northwest London with linkage of primary and secondary care records, we identified a cohort of 400 subjects coded with GDM between 2010 and 2011 and followed them up through to 2021. Our comparator cohort of pregnant women without a coding for any form of diabetes contains 64, 709 subjects. We then analysed coding for a variety of complications (including Chronic Kidney Disease (CKD), Hypertension, Eye disease, Cerebrovascular disease, Ischaemic heart disease, liver disease, and diabetic foot disease). We also extracted data on baseline demographics.

Results**:** We report basic demographic data on the two distinct groups including age of first pregnancy, ethnicity, Body Mass Index (BMI), and smoking status. Though the two groups of women were broadly similar in terms smoking status, BMIs coded for in the GDM group were notably higher. The average age of first pregnancy in the non-diabetic cohort was 30.3 vs. 31.4 in the GDM cohort. We also report on co-morbidities accrued in the two groups. The most coded-for comorbidity in the non-diabetic cohort in the follow-up period was hypertension, with 4225 (6.5%) subjects coded for it. As expected, progression to T2DM was the most common co-morbidity in the GDM group, occurring in 24.5% of cases vs. 2.5% of non-diabetic cases. Though 48 (12%) did develop hypertension, eye complications were more often coded for, with 75 (18.8%) subjects coded for. Women with GDM also had a relatively high rate of fatty liver disease (6.8%, vs. 1.6% in the non-diabetic cohort).

Discussion: We have demonstrated, from real-world data, the consequences of GDM over a ten-year period, including development of retinopathy, progression to T2DM and liver disease. Given the interplay between GDM, raised BMI and hypertension in our cohort we demonstrate the degree to which this relatively young population is at risk of significant future morbidity with respect to cardiovascular and renal disease. A longer follow up period, will provide further details regarding the conditions which tend to develop over longer time periods such as CKD as well as the overall long term economic, social and personal impact of GDM.


Baseline co-morbidity
% of subjects in each cohort
2.5
2.0
1.5
1.0
0.5
0.0
1.75
2.35
0.25
0.14
0
0.08
0.5
0.07
0
0.05
0
0.02
0
0.02
0
0.01
0
0.01
Hypertension
Liver complications
Retinopathy
IHD
Heart failure
CVD
CVD - NOS
cataract
Vascular disease
Co-morbidities accrued in significant numbers by 2021
GDM
Non-diabetic
% of subjects in each cohort
20
18
16
14
12
10
8
6
4
2
0
12
6.5
18.8
2.72
6.8
1.6
3
1.45
1.25
0.001
Hypertension
Retinopathy
Liver complications
IHD
ESKD

Tuesday 6th June 12:15 – 13:15

Track M2 – Epidemiology, Public Health, Health Inequities 2

Poster: 319
Submission: 425

Native kidney biopsy: a national survey. Indications, diagnoses and outcomes

Dr Emily McQuarrie[1], Dr Samira Bell[2], Ms. Jacqueline Campbell[3], Ms. Chrissie Watters[3], Mr Joe Lakey[3], Dr Wendy Metcalfe[4], Dr Robert Hunter[4], Dr Kate Stevens[1], Dr Jamie Traynor[1], Dr Zoe Cousland[5], Dr Nicola Joss[6], Dr David Walbaum[7], Dr David Kipgen[1], Dr Jana Crosby[1], Dr Michael Kelly[8], Dr Vishal Dey[9], Dr Kate Buck[10], Dr Shona Methven[7], Dr Graham Stewart[2], Dr Kiru Murugan[10], Dr Lorna Henderson[4], Dr Bryan Conway[4], Professor Colin Geddes[1]

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Introduction: Since 2014, all adult native kidney biopsies undertaken in Scotland have been recorded by the Scottish Renal Registry (SRR). We aimed to report current data on indications for kidney biopsy, and outcomes following biopsy including requirement for kidney replacement therapy (KRT) and mortality.

Methods: All 9 adult nephrology centres covering a population of over 5 million people report complete data on all kidney biopsies undertaken to the SRR. This includes indication, age, gender and diagnosis. The SRR collects requirement for KRT and death. Death or KRT at 6 months, 1 year and 2 years from date of first native kidney biopsy in patients with IgAN, MGN or ATIN were recorded.

Results: 5095 native kidney biopsies undertaken in 4702 patients between 01/01/2014 and 31/12/2021 were included. This averages 117.1 biopsies per million population / year. 54.7% were male with mean age 57.2 (SD 17.2) years. 98.2% of kidney biopsies were deemed adequate for diagnosis. Data completeness is over 99%.

The commonest indications for native kidney biopsy were acute kidney injury query cause (AKI - 30.0%), chronically reduced eGFR (CKD) (28.1%) and nephrotic syndrome (19.7%). Overall, the commonest diagnoses made were: IgA nephropathy (IgAN 13.1%), tubulointerstitial nephritis (ATIN 8.5%) and membranous nephropathy (MGN 7.2%). Table 1 shows diagnoses made by biopsy indication.

Indication	Diagnosis 1	Diagnosis 2	Diagnosis 3

AKI query cause	ATIN (18.5%)	Microscopic polyangiitis (11.4%)	IgAN (8.0%)
CKD query cause	IgAN (20.7%)	ATIN (8.9%)	Diabetic nephropathy in type II diabetes (7.2%).
Nephrotic syndrome	MGN (24.7%)	Minimal change nephropathy (20.5%)	Primary focal segmental glomerulosclerosis (13.7%)

Table 1: Three commonest diagnoses made on native kidney biopsy, by indication.

Table 2 shows that at 2 years the mortality rate (figure 1) is highest in patients with MGN (11.4%) and risk of KRT highest in patients with IgAN (10.2%).

Diagnoses	**Outcome at 6 months, biopsies from 2014-2021**	**Outcome at 1 year, biopsies from 2014-2020**	**Outcome at 2 years, biopsies from 2014-2019**
IgA nephropathy	Total: 632 KRT: 35 (5.5%) Death: 29 (4.6%)	Total: 570 KRT: 42 (7.4%) Death: 33 (5.8%)	Total: 541 KRT: 55 (10.2%) Death: 45 (8.3%)
Membranous nephropathy	Total: 370 KRT: 14 (3.8%) Death: 16 (4.3%)	Total: 327 KRT: 13 (4.0%) Death: 30 (9.2%)	Total: 298 KRT: 16 (5.4%) Death: 34 (11.4%)
Tubulointerstitial Nephritis	Total: 507 KRT: 14 (2.8%) Death: 16 (3.2%)	Total: 432 KRT: 20 (4.6%) Death: 18 (4.2%)	Total: 372 KRT: 24 (6.5%) Death: 33 (8.9%)

Table 2: Overall outcomes for commonest diagnoses made on kidney biopsy: number starting KRT or dying within defined time period.

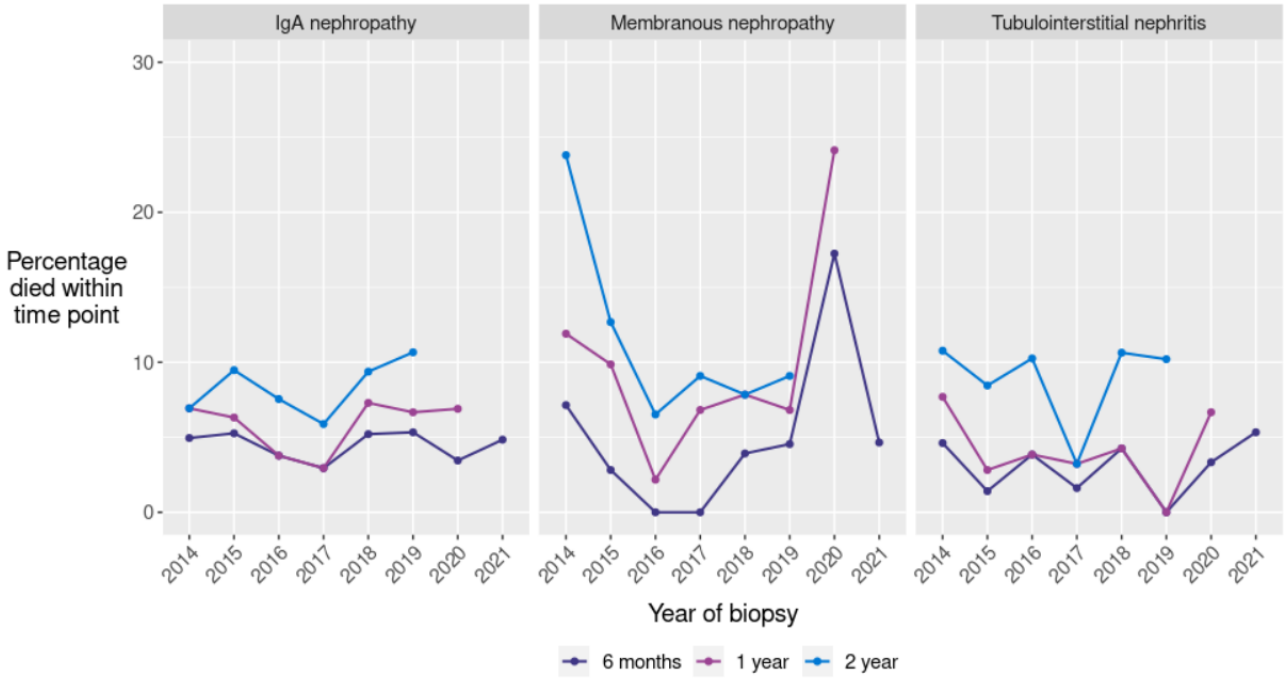

Figure 1: Mortality risk following first kidney biopsy by diagnosis group, 2014-2021

Conclusions**:** In a complete national dataset, AKI is the commonest indication for native kidney biopsy and most commonly leads to a diagnosis of ATIN. IgAN remains the commonest primary glomerulopathy diagnosed on kidney biopsy, with MGN being the most likely diagnosis in patients biopsied for indication of nephrotic syndrome. Kidney and patient survival varies at 2 years depending on diagnosis.

Tuesday 6th June 12:15 – 13:15

Track M2 – Epidemiology, Public Health, Health Inequities 2

Poster: 320
Submission: 454

Development of renal email helpline to improve the interface between primary and secondary care

Dr Catriona Macaulay, Dr Timothy Shipley

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Introduction: Chronic kidney disease (CKD) is a major public health problem, with a considerable proportion of patients with CKD being appropriately managed in primary care. Other types of renal disease (e.g. acute kidney injury) may also present initially to primary care. It is possible for many such patients to be managed without being referred to a renal clinic, however these patient often have complex issues related to their renal disease which require specialist advice or input, and easy access to this for primary care practitioners is extremely important.

For more than 10 years, and prior to the introduction of the NHS eReferral Advice and Guidance system, the local renal team have run an email helpline, designed to take queries from primary care clinical teams on renal issues they may be dealing with. Informal and ad-hoc feedback over the years has suggested that this is a useful and valued resource in our area.

This project aimed to evaluate the email helpline by analysing the nature of these queries, the types of advice that were given and the effect of the advice on outcomes, including preventing outpatient appointments and hospital admissions. We also sought to gather formal feedback on the helpline from the users in the form of an electronic survey.

Methods: 18 months' worth of helpline data was collected retrospectively, taking note of: the type of health professionals that refer; whether the query was relating to a patient under renal follow up; which area the patient resides from; who responded to the query; the subject of the query and whether the interaction prevented an outpatient appointment or admission to hospital.

Helpline data was substantiated by a survey that was sent out to its users to evaluate its usefulness, timeliness of response and what alternative route of action may have been taken had the helpline not been available.

Results: 18 months of data was collected which amounted to approximately 1500 email queries. Data was analysed and full results will be published at time of presentation.

Discussion: The email helpline is a valuable resource that is widely used throughout our area. Evaluation of data shows the helpline is particularly useful in empowering GPs and therefore improving the management of renal patients in primary care. As well as this, early access to renal opinion can help avoid unnecessary outpatient appointments at a time when NHS resources need to be carefully utilised.

Tuesday 6th June 12:15 – 13:15

Track M2 – Epidemiology, Public Health, Health Inequities 2

Poster: 321
Submission: 491

Raising health inequalities up the political agenda

Mrs Neerja Jain, Mrs Alison Railton

Kidney Research UK, Peterborough

Introduction: We strive to make kidney health a priority for all: patients, those at risk of kidney disease, health professionals and public policy makers. This will ensure we are able to detect and diagnose kidney disease earlier, that research evidence is embedded into clinical practice and public policy sooner and that we can open new ways of funding that will accelerate research and deliver benefits sooner for those living with and at risk of kidney disease.

Methods: Our strategic priorities of prevent, protect and treat are underpinned by two cross-cutting programmes: tackling health inequalities (HI) and influencing policy. Colleagues from these areas are working together to exert influence to change policy and practice, thereby pushing kidney disease up the agenda with policymakers and opinion-formers. We do this in a number of ways: becoming members of the Royal College of Physician's Inequalities in Health Alliance (IHA), a collaborative call for a cross-government strategy to reduce HI. We urged the Secretary of State for Health and Social Care to publish the Health Disparities White Paper. We are engaging with the "Core20PLUS5" which is a national NHS England approach to inform action to reduce HI at both national and system level. The approach defines a target population which are most deprived 20% of the national population and identifies '5' focus clinical areas requiring accelerated improvement, including hypertension optimisation - we are focusing here to raise awareness of CKD. We have contributed to a Health Foundation report for Scotland and to the All Party Parliamentary Group on Medical Research inquiry into HI; more recently, we have contributed to the Royal Society of Pharmacy HI report. In the past and currently, we are reaching out to parliamentarians and talking to them about CKD and HI and what this means for their constituents. This is more pertinent than ever, given the inequalities along ethnic and now, more profoundly, socio-economic lines due to the cost of living crisis.

The Health and Social Care Committee launched an inquiry into prevention in January. We will be contributing to the 'call for proposals' which will define the scope of the inquiry. The Committee says it wants to know 'where preventative health care should be by 2030, and how the Government should go about fulfilling that ambition.' We will be putting CKD and its risk factors firmly in that scope.

Results: Never before has our organisation been so proactive in addressing, highlighting, and focusing on policy and practice together to deliver meaningful change. We are raising CKD issues in a plethora of policy arenas and focusing on prevention and management of risk factors particularly among those "most at risk."

Discussion: This is painstaking work in a climate where policy makers have many pressing and competing priorities and reduced budgets. Unfortunately, the white paper will not be published. However, we are

making the case for CKD, linking it with CVD as risk factors and emphasising the adage “prevention is better than cure” – more relevant now with an NHS under unprecedented pressures.

Tuesday 6th June 12:15 – 13:15

Track N1 – Genetic & Rare Diseases 1

Poster: 322
Submission: 093

Evaluating regional experiences and utility of genetic testing within Nephrology Departments - A Renal Genomics Awareness Survey

Dr Simon Williams, Dr Matthew Howse

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Introduction: Inherited kidney diseases, collectively, account for approximately 10% of end stage kidney disease (ESRD). Advances in genomic medicine is providing a greater understanding of what causes illness with genetic testing an integral part of prevention and earlier detection of disease, and promotion of wellbeing.

The most common inherited kidney disease, autosomal dominant polycystic kidney disease (ADPKD), can be diagnosed according to radiological criteria. However, the utility of genetic testing extends beyond diagnostics, aiding understanding disease pathogenesis and prognosis, to guide management. Furthermore, it facilitates reproductive choices, and screening at-risk family members, which may impact live donor transplantation options.

With genetic testing more accessible and improved links between nephrologists and geneticists, the paradigm is shifting, with medical specialities undertaking genetic testing. We aim to assess nephrologist's perceptions and experiences with genetic testing, to develop a regional renal genomic service.

Method: To evaluate current practise of genetic testing within nephrology departments, a renal genomics awareness survey was circulated to nephrology departments in the Northwest region. The survey was created by a nephrology trainee developing an interest in renal genomics and reviewed by a nephrology and genetics consultant prior to circulation to all adult and paediatric nephrology consultants and trainees.

Results: There were 40 survey responses. 65% were unaware of the National Genomic Test Directory with 34% having never organised genomic testing. The most frequently requested genetic test was for cystic kidney disease.

52.5% were not confident at identifying an eligible patient with 70% not confident at consenting a patient for genetic testing, 80% not confident at requesting the appropriate test, and 90% not confident at interpreting results.

Given this lack of confidence, only 18% had access to a genetic testing pathway, 55% having access to a renal genetics MDT, and 23% having access to a renal genetics' clinic.

Proposed resolutions to assist nephrologists in the process, included access to a renal genetics MDT was deemed essential in 47.5% and very important in 47.5%. A dedicated renal genetics clinic was deemed very important for 70% and essential for 22.5%.

Discussion: The survey highlights nephrologists lack of experience undertaking genetic testing and applying the results. Despite the development of renal genomic MDT and clinics, the lack of awareness of these services demonstrates they are underutilised leading to inequity of access to these services.

The development of a renal genomics service regionally is proposed, producing a pathway accessible to all trusts. Embedding these pathways within renal departments, will provide support accessing expert guidance, improving equitable access for patients. The survey identifies clinician concerns and their barriers to testing, with the aim to address these when creating a pathway.

The impact a genetic diagnosis has on a patient, their family and future family planning should not be underestimated. It is vital patients are offered the necessary support from healthcare professionals with necessary expertise. Educating clinicians is key to develop their understanding of renal genomic medicine, with appropriate signposting to educational tools and specialists via a developed pathway, alleviating concerns identified in the survey.

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Track N1 – Genetic & Rare Diseases 1

Poster: 323
Submission: 110

The humanistic burden of rare kidney diseases; understanding the impact of FSGS and IgAN on patients and caregivers study (HONUS): preliminary results for IgAN in the United States

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Introduction : While immunoglobulin A nephropathy (IgAN) has been shown to be associated with significant clinical and economic burden, less is known about the humanistic burden associated with the disease. The HONUS study aims to quantify the humanistic burden of rare kidney diseases, including IgAN.

Methods: HONUS is a multi-national, cross-sectional survey among adult patients, caregivers (care-partners) and parents/care-partners of youth (8–17 years) with focal segmental glomerulosclerosis (FSGS) or IgAN. Information on demographic/clinical characteristics, health-related quality of life (HRQoL, 12-Item Short Form Survey [SF-12]) and disease impact on employment (Work Productivity and Activity Impairment [WPAI]) are being collected. The current analysis focused on information gathered from IgAN adult patients and their care-partners in the US by May 2022. Data were analyzed descriptively.

Results: The analysis included 89 adult IgAN patients. Most of them were Caucasian (88%) and 52% were female, with mean age of 37 years. Most patients (67%) were in CKD stage 3/4, and 3% in end-stage renal disease and had received transplant. Commonly reported comorbidities included hypertension (26%), anemia (22%), and depression (17%). The mean SF-12 physical and mental component scores (PCS, MCS) for patients were 46.7 and 39.3, respectively, lower (reflecting worse HRQoL) than previously published mean scores (MCS and PCS of 50) for the US general population. Employed patients (n=63 [71%]) reported 7% absenteeism, 30% presenteeism, 34% overall work productivity loss, and 39% activity impairment due to IgAN-related reasons. Most of the paired care-partners were the patients' partners (89%), with mean age of 39 years. Among them, the mean SF-12 PCS and MCS were 49.9 and 41.5, respectively. The employed care-partners (n=85 [96%]) reported 12% absenteeism, 32% presenteeism, 39% overall work productivity loss, and 37% activity impairment due to IgAN-related reasons.

Discussion: With US general population estimates as a reference, patients with IgAN experience impaired HRQoL and productivity, which also impacts their care-partner's mental health and productivity.

Tuesday 6th June 12:15 – 13:15

Track N1 – Genetic & Rare Diseases 1

Poster: 324
Submission: 127

The effects of Tolvaptan on kidney function in patients with Autosomal Dominant Polycystic Kidney Disease

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Introduction: The management of autosomal dominant polycystic kidney disease (ADPKD) has significantly changed since 2016, when NICE approved tolvaptan use for ''rapidly progressive (eGFR decline >2.5ml/min/1.73m^2 /year)'' ADPKD in the UK. We started to use tolvaptan in our nurse-led ADPKD clinic at this time. Although the effects of tolvaptan on slowing progression of CKD in the TEMPO 3:4 and REPRISE studies are comparable to other landmark trials in nephrology, there remains a variation in the prescribing of tolvaptan across the UK for reasons that are unclear but may include scepticism of the utility of tolvaptan in a real world setting. In the present study we examine the effect of tolvaptan on renal function in an NHS clinic setting, following the introduction of tolvaptan into our routine clinical practice.

Methods: This is a retrospective cohort study in a single centre. The data (age, gender, eGFR and ACR) was collected via IT informatics. The study included patients with ADPKD who attended the ADPKD clinic between 2012 and 2022 and who met tolvaptan treatment criteria (rapidly progressive eGFR decline). Patients who received tolvaptan for three or more months were considered the treatment group, and patients who received tolvaptan for less than three months or not at all were used as controls. We calculated the change in kidney function (eGFR decline per year) in both groups. We estimated the effects of tolvaptan, compared to the control group, using the 'propensity scoring matching' method. The model was adjusted for age, gender, pre-treatment eGFR decline and ACR. We defined eGFR as at the start of Tolvaptan treatment or the date of indication of tolvaptan in the control group. All analyses were performed using R version 4.0.2 (R Foundation, Vienna, Austria).

Results: There were 373 patients with ADPKD attending clinic during the above period. Of these, 167 patients met Tolvaptan treatment criteria and 117 (52 in treatment group, 67 in control group) patients had more than 3 months follow-up. Patients in the control group either had refused tolvaptan treatment or discontinued tolvpatan within three months. After propensity score generation and 1:1 matching, there were 42 patients in the treatment group and 42 in the control group. The mean age was 46 (43-54) and 49 (40-57) years old in the treatment group and control group respectively. In the treatment group, the change of eGFR decline was from 3.38 (ml/min/1.73m^2/year) to 2.07 (ml/min/1.73m^2/year). In the control group, the change of eGFR decline was from 3.39 (ml/min/1.73m^2/year) to 3.28 (ml/min/1.73m^2/year). The multivariate analysis showed that the effects of tolvaptan on the change of eGFR decline did not reach statistical significance (P=0.204).

Discussion: Although the propensity score-adjusted effect of eGFR decline has not reached statistical significance in this relatively small single centre population (P=0.204), the slowing of eGFR decline observed was comparable to the data in TEMPO 3:4 (from 3.70 to 2.72) and Reprise study (from 3.61 to 2.34). This is reassuring and suggests that the benefits of tolvpatan seen in clinical trials are realised in real life clinical settings.

Tuesday 6th June 12:15 – 13:15

Track N1 – Genetic & Rare Diseases 1

Poster: 325
Submission: 140

Zebra Bodies on Renal Biopsy: Fabry Disease or Not Fabry. A Tale of Two Cases

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Introduction: Zebra bodies are intracellular osmiophilic membrane structures seen on electron microscopy (EM), and are classically found in Fabry disease. This EM finding prompts genetic testing for α-galactosidase A enzyme deficiency to diagnose Fabry disease, and thus consider enzyme replacement therapy. Zebra bodies have also been associated with certain medications, including statins. We present two contrasting cases, both presenting within a year of each other with zebra bodies found in renal biopsy.

Case Scenarios:
Case 1: The first case involves the unexpected finding of zebra bodies that subsequently leads to the diagnosis of Fabry disease. This was an 83 year old lady with type two diabetes, hypertension and ischaemic heart disease. She was presumed to have diabetic or hypertensive nephropathy, however in ruling out alternative causes, was found to have asymptomatic myeloma. Renal biopsy to detect renal amyloidosis instead found zebra bodies on EM. Genetic testing confirmed Fabry disease. She was managed conservatively.

Case 2 : This is contrasted with a case of a patient with zebra bodies on EM who did not have a deficiency in α-galactosidase A. This patient was an 80 year old woman with rapid decline in her renal function following coronary angiography. Renal biopsy showed hypertensive nephropathy on light microscopy, and zebra bodies on EM. She tested negative for Fabry disease. She had previously been on atorvastatin but this had been stopped many years prior. She was not on any other medication that has been associated with this finding.

Conclusion: The two presented cases describe the finding of zebra bodies both due to Fabry disease and alternative causes. Suspecting Fabry disease from renal biopsy should warrant further genetic investigations to confirm the diagnosis. Drug-induced renal phospholipidosis is an important differential diagnosis to be considered in cases with zebra bodies. It is unclear for how long a patient needs to be taking a culprit medication to develop these changes, and whether they may persist many years later. From our findings, it is clear that more research is needed to identify alternative causes of zebra bodies, as these could provide insight into proper diagnosis and new medical therapies for these patients with chronic kidney disease.

Tuesday 6th June 12:15 – 13:15

Track N1 – Genetic & Rare Diseases 1

Poster: 326
Submission: 178

Centre level variation in tolvaptan prescribing for ADPKD in the UK

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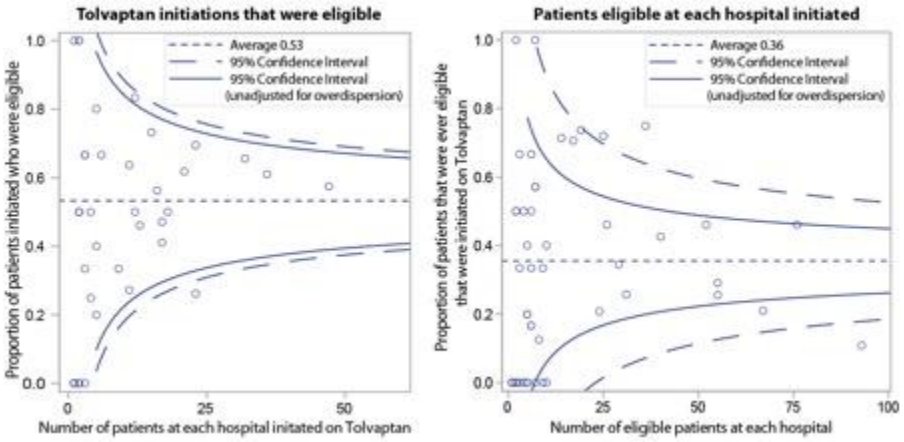
[2]Sheffield Teaching Hospitals NHS Foundation Trust, Sheffield.
[3]The National Registry of Rare Kidney Diseases (RaDaR), Bristol.
[4]School of Health and Related Research (ScHARR), University of Sheffield, Sheffield

Introduction: Autosomal Dominant Polycystic Kidney Disease (ADPKD) is the leading inheritable cause of end-stage renal disease, and treatable with tolvaptan for which there is UK Kidney Association (UKKA) guidance. Existing data suggests geographical differences in tolvaptan usage. Identifying variation in tolvaptan use could lead to improved access to therapy for people with ADPKD and more effective use of resources.

Methods: This retrospective cohort study utilised data from people with ADPKD who consented to inclusion in the National Registry of Rare Kidney Diseases (RaDaR) combined with laboratory data entered manually or from PatientView. Participants were assessed for tolvaptan eligibility using UKKA guidance: 30-90 ml/min/1.73m2 at initiation with an eGFR slope of ≥2.5ml/min/1.73m2 per year for 5 years or ≥5ml/min/1.73m2 over 1 year (change in total kidney size not assessed). For eGFR slope calculations a minimum of 3 measurements were required. Eligibility was assessed from 90 days following the approval of tolvaptan by the National Institute for health and Care Excellence in 2015 to November 2022. Variation was assessed using funnel plots including adjustment for overdispersion (excess variation) where appropriate.

Results: A total of 7938 patients with ADPKD were recruited to RaDaR with 350,000 eGFR samples across 98 centres. 6523 having a PatientView lab feed and 3595 with sufficient laboratory samples to enable calculation of an eGFR slope in the preceding 1- or 5-year periods. 396 patients were started on tolvaptan during the observation period with a mean age of 46, mean eGFR at initiation of 49, 1-year eGFR slope of 4.9 and 5-year eGFR slope of 2.8. Of the 396 initiated on tolvaptan, 246 were eligible according to UKKA recommendations (53%) with a mean age of 45, mean eGFR of 48 and mean 1-year eGFR slope of 6.1. 45% of initiated patients met the 1-year eGFR slope criteria, 33% met the 5-year eGFR slope criteria and 5% met both criteria. The remaining 46% of those initiated on tolvaptan did not meet the criteria with a mean age of 47, mean eGFR of 49 and mean 1-year eGFR slope of 3.4. Only 36% of the 824 patients identified to be eligible for tolvaptan initiation were initiated.

The mean number of eligible patients initiated on tolvaptan per centre was 2.5 (range 0-27); 45 centres had no eligible patients and 37 had fewer than 12 patients. A funnel plot of the proportion of patients initiated on tolvaptan who were eligible at the time of initiation per centre (left) and the proportion of eligible patients at any point that were initiated on tolvaptan per centre (right) are shown.



Discussion: Despite ADPKD being rare, adherence rates for tolvaptan prescribing are similar to medications for more common diseases (30-70%). In order to achieve high access to therapies, physicians may have to start therapies in inappropriate patients. Number of ineligible patients starting tolvaptan has implications considering the significant burden of side effects and risk of hepatotoxicity, while high numbers of eligible patients not initiated on tolvaptan could represent unequal access to this disease modifying therapy.

Tuesday 6th June 12:15 – 13:15

Track N1 – Genetic & Rare Diseases 1

Poster: 327
Submission: 190

Case Series: An Atypical Experience for the West of Scotland

Dr Ciaran Groome, Dr Neal Padmanabhan

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Introduction: Haemolytic uraemic syndrome (HUS) is a disease which affects the kidneys presenting with acute kidney injury (AKI), microangiopathic haemolytic anaemia (MAHA) and thrombocytopenia. In 90% of cases it is precipitated by shiga-toxin producing E coli 1. The remaining 10% of cases have been termed atypical haemolytic uraemic syndrome (aHUS) and complement system overactivation is the underlying mechanism 2. This can take the form of autoantibody production or complement gene mutations 2. Eculizumab has been proven to significantly ameliorate disease progression 3.

Methods. This is a retrospective case series. We extracted data from the west of Scotland renal electronic patient records database Strathclyde Electronic Renal Patient Record ("SERPR") provided by VitalDataClient. We ran a query to identify patients in whom TMA and/or MAHA and/or HUS was inputted as a diagnosis. 363 patients were identified. Filtering for aHUS in the adult population, 22 patients were identified spanning 19 years.

Results: The incidence rate is 0.43/million of the population. 14 patients had either genetic mutations (n=13) or acquired antibodies.

Genetic mutations: C3, n=5; Complement Factor H (CFH) n=5; Complement Factor I (CFI)+CD46 n=1; CFI alone n=1, variants of uncertain significance n=1. One patient with CFH mutation was positive for the nephritic factor; another with CFH mutation had detectable Factor H autoantibodies.

The only acquired patient without a genetic mutation had Factor H autoantibodies.

The mean levels of biochemical markers at presentation are : Haemoglobin, g/L 72; Creatinine, µmol/L 603; Platelet count, × 109/L 89; Lactate dehydrogenase IU/L 1853; and Total Bilirubin, µmol/L 30.

Eculizumab is an available treatment for aHUS utilised in coordination with The National Renal Complement Therapeutics Centre. The table below demonstrates the outcomes of patients with and without genetic defects and/or antibodies, with the number in parenthesis denoting those who received Eculizumab.

Ouctome	Genetic/Acquired	Nil detected
Recovery	2(2)	2(2)
CKD3	3(3)	2

CKD4	1	0
CKD5	1	0
RRT	7(6)*	4(3)**
total	14	8

*4 of the 6 have successfully functioning transplants.

**Of the 3 patients who received Eculizumab, 2 had a brief trial. The third received it after transplantation but the transplant failed.

Discussion: It is clear long term renal outcomes are poor. Furthermore, those for whom transplantation is being considered, it is imperative that Eculizumab is introduced to cover transplantation and is maintained to prevent recurrence. Even in those without RRT requirements, use of the C5 inhibitor is necessary to stabilise and allow for recovery of native function. Clinicians encountering MAHA and TMA in their practice should consider aHUS and liaise with Newcastle promptly otherwise the outcomes can be catastrophic.

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Tuesday 6th June 12:15 – 13:15

Track N1 – Genetic & Rare Diseases 1

Poster: 328
Submission: 197

Characterization of patients with aHUS and triggering/associated events, with and without complement athogenic variants or anti-CFH antibodies: A global aHUS Registry analysis

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[9]Division of Pediatric Nephrology, Heidelberg University Hospital, Heidelberg.
[10]APHP.6, Sorbonne Université, Paris.
[11]Division of Nephrology, The Hospital for Sick Children, Toronto, ON

Atypical hemolytic uremic syndrome (aHUS) is a rare complement-mediated thrombotic microangiopathy (TMA) and can manifest with or without a triggering/associated event. Approximately 50–60% of patients with aHUS present with anti-complement factor H (CFH) autoantibodies or pathogenic variants in genes associated with the complement system. This study, using data from the Global aHUS Registry (NCT01522183), assessed demographics/characteristics at clinical presentation and frequency of aHUS triggering/associated events in patients with or without genetic variants/anti-CFH antibodies.

At the time of analysis (June 01 2022), 1947 patients had been enrolled in the Global aHUS Registry. Patients with one triggering/associated event prior to and up to aHUS onset, and who were within the registry between April 2012–June 2022, were included in this analysis. Patients with an alternative diagnosis established after enrolment were excluded. Patients were stratified as either positive or negative for pathogenic genetic variants and/or anti-CFH antibodies; the most frequently assessed genes included C3, CD46, FH, FI, FB, and THBD.

Patient demographics and characteristics are presented in Table 1. In total, 307 patients met inclusion criteria: 90 (29.3%) were positive and 99 (32.2%) were negative for pathogenic genetic variants/anti-CFH antibodies; 118 (38.4%) had an unknown genetic status. Median age at aHUS onset was 26.8 and 36.5 years in the positive and negative cohorts, respectively. In the negative population, all 99 patients were

tested for pathogenic variants in at least five genes and anti-CFH antibodies, with no variants or antibodies identified. In the positive population, 84 (93.3%) patients had at least one pathogenic variant, while 22 (24.4%) tested positive for anti-CFH antibodies; 16 (17.8%) patients had a pathogenic variant and anti-CFH antibodies. Positive patients were more frequently female and were typically younger at aHUS onset than negative patients, with a greater proportion of pediatric (<18 years) patients. Incident trigger type and TMA frequency were comparable between pathogenic variant/anti-CFH antibody positive and negative patients, with similar estimated glomerular filtration rates (eGFR) at aHUS onset, similar numbers of subsequent TMAs, and similar proportions of patients experiencing extra-renal manifestations. The most common triggering/associated events (Table 2) were pregnancy (19/90, 21.1%), acute infection (15/90, 16.7%), and aHUS occurring ≤30 days from birth (12/90, 13.3%) in the positive cohort, and malignancy (26/99, 26.3%), pregnancy (16/99, 16.2%), and acute infection (15/99, 15.2%) in the negative cohort.

The similarities in trigger type, TMA frequency, clinical presentation and severity may arise from the presence of an unknown pathogenic variant, or less well-established pathogenic mechanism, in negative patients. Younger patients with a triggering/associated event were more likely to present with pathogenic variants/anti-CFH antibodies; these patients may be at higher risk of developing aHUS earlier due to both genetic predisposition and a subsequent triggering/associated event. Longer intervals between triggering/associated event and aHUS onset may be explained by the presence of subclinical/undetected disease following the initial triggering/associated event. These findings reiterate that triggering/associated events do not exclude concurrent pathogenic variants and/or anti-CFH antibodies in patients with aHUS.

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Track N1 – Genetic & Rare Diseases 1

Poster: 329
Submission: 216

The National Registry of Rare Kidney Diseases (RaDaR): cross-sectional analyses of 25,817 adults and children with rare kidney diseases in the UK

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Introduction: Rare kidney diseases make a significant contribution to the burden of kidney disease in the UK and globally; at least 10% of adults and over 50% of children receiving renal replacement therapy (RRT) have a rare disease. Due to small patient numbers, rare kidney disorders are frequently poorly characterized, lacking published data describing the determinants and distribution of these diseases. The National Registry of Rare Kidney Diseases (RaDaR), set up in 2010, was designed to collect longitudinal disease and treatment related data from patients with rare kidney diseases across the UK. To our knowledge, RaDaR is the largest rare kidney disease registry in the world. Here, we present the clinical demographics and renal function of 25,817 prevalent patients with rare kidney diseases in the UK.

Methods: RaDaR recruits patients into 29 Rare Disease Groups (RDGs). These may be a single disease entity or a group of renal diagnoses. RaDaR is linked with the UK Renal Registry for data on RRT initiation and renal IT systems for laboratory data. We performed and have presented complete case analyses. Baseline characteristics are presented as frequencies (%) for categorical data and medians and IQR for non-normally distributed continuous data. Chi-square or Fishers exact tests were used to compare categorical variables. Patient ethnicity is self-reported. RaDaR does not collect individual level socioeconomic status (SES) data. Instead, patient postcodes were used to derive Index of Multiple Deprivation (IMD) scores as an area level measure of SES.

Results: 25,817 RaDaR recruits from 108 NHS sites across England (n=91), Scotland (n=9), Wales (n=3) and Northern Ireland (n=5) (Figure 1) were included in the analysis, including 1908 children (<18 years), and 23909 adults (Table 1). The predominant kidney diseases in adults recruited to RaDaR were Autosomal Dominant Polycystic Kidney Disease (29%), Vasculitis (16%) and IgA nephropathy (16%), compared to Idiopathic nephrotic syndrome (44%), Vasculitis (11%) and Alport Syndrome (6%) in the paediatric cohort. Many patients in RaDaR were receiving RRT (39%), and this proportion varied by RDG; only 7/144 (2%) of patients with cystinuria had reached ESKD compared to 70% of patients with cystinosis. Most paediatric patients had eGFR results >60ml/ min/1.73m2 (71% CKD stages G1-G2 vs 32% adults). More children with rare kidney diseases were from Asian backgrounds than adult patients

(17% vs 8%, p<0.0001). Children from White, Asian, and Other ethnicities were more likely to be from the most deprived IMD quintile compared to adults.

Discussion: RaDaR patient numbers and demographics are useful in assessing the feasibility of clinical trials in certain rare kidney diseases. We have identified differences in ethnicity and social deprivation between adult and paediatric RaDaR populations; further RaDaR analyses will be targeted at understanding whether these disparities are associated with differing outcomes.

Figure 1: Map of recruitment to RaDaR

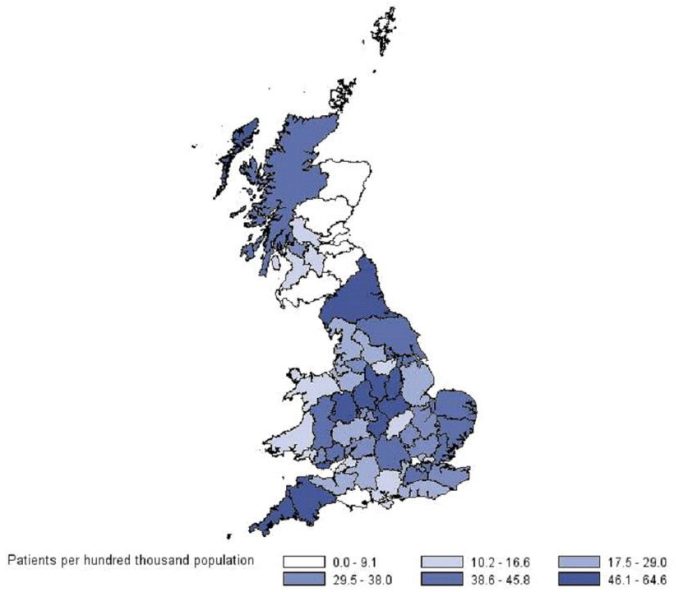

Table 1: Individuals recruited to RaDaR, stratified by Rare Disease Group and age on July 25th 2022

	Paediatric		Adults	
	n	(%)	n	(%)
All RaDaR	1908	(7.4)	23909	(92.6)
Autosomal dominant polycystic kidney disease	119	(1.7)	6993	(98.3)
Autosomal dominant tubulointerstitial kidney disease	≤6	NR*	190**	(>97.0)
Atypical haemolytic uraemic syndrome	89	(32.2)	187	(67.8)
Alport Syndrome-Female	55	(16.3)	283	(83.7)
Alport Syndrome- Male	60	(14.5)	355	(85.5)
Thin basement membrane nephropathy	≤6	NR	110	(>96.0)
Autosomal recessive polycystic kidney disease/ nephronophthisis	71	(33.0)	144	(67.0)
IgA nephropathy	40	(1.1)	3756	(98.9)
Idiopathic Nephrotic Syndrome	844	(21.5)	3073	(78.5)
Membranous Nephropathy	≤6	NR	2050	(>99.0)
Monoclonal gammopathy of renal significance	≤6	NR	145	(>97.0)
Membranoproliferative glomerulonephritis and dense deposit disease	63	(6.8)	869	(93.2)
Pregnancy	≤6	NR	680	(>99.0)
Renal Cancer Inherited	10	(8.8)	103	(91.2)
Retroperitoneal Fibrosis	0	(0.0)	111	(100.0)
Shiga toxin associated Haemolytic Uraemic Syndrome	110	(65.9)	57	(34.1)
Tuberous Sclerosis	43	(17.8)	199	(82.2)
Vasculitis	208	(5.2)	3789	(94.8)
Cystinuria	28	(6.1)	432	(93.9)
Cystinosis	54	(37.5)	90	(62.5)
Hyperoxaluria	25	(21.7)	90	(78.3)
Tubulopathies	76	(18.7)	331	(81.3)

*NR - Not Reported; cells with fewer than 7 patients not reported due to risk of re-identification
**Where a cell is not reported due to small numbers, corresponding cell values are rounded to the nearest 5

Tuesday 6th June 12:15 – 13:15

Track N1 – Genetic & Rare Diseases 1

Poster: 330
Submission: 268

Evaluating the efficacy of tolvaptan at preserving renal function – a single centre experience

Dr Simon Williams, Dr Shahed Ahmed, Dr Matthew Howse

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Introduction: Following the TEMPO study, tolvaptan was approved by NICE for use in autosomal dominant polycystic kidney disease (ADPKD), in chronic kidney disease (CKD) stage 2 or 3. Recently, the number of patients commenced on tolvaptan has grown. However, there are high discontinuation rates due to polyuria and polydipsia.

This retrospective analysis of patients on tolvaptan within a single centre nephrology department, assessed whether the benefits of tolvaptan are reproduced in our population. On timelining eGFR in our patients, we look to identify optimum timing of tolvaptan initiation, balancing against exposing patients to challenging adverse effects.

Method: We identified all patients with ADPKD commenced on tolvaptan in a tertiary ADPKD clinic. All patients currently on tolvaptan were included and their eGFR's were time lined to assess change in eGFR from baseline at 6 months, 12 months, 18 months, 2 years, and 3 years.

Patients on tolvaptan for under 6 months were excluded. We reviewed reasons for all patients who discontinued tolvaptan.

Data was collected from the ADPKD clinic database, clinic letters, and blood results.

Results: 54 patients commenced tolvaptan between 2017-2022 via our ADPKD clinic. 26 were currently on tolvaptan with an eGFR range of 35-88 ml/min/1.73m on initiation, and average eGFR of 55. 1-year post initiation average eGFR was 52, 18 months post initiation average eGFR 53, 2-years post initiation average eGFR 51, 3 years post initiation average eGFR was 46.

16 patients discontinued, 7 due to polyuria, 4 due to progression to CKD 4, 4 due to deranged liver function tests and 1 due to deep vein thrombosis. The remainder were non-compliant or relocated.

On analysis of CKD 2 patients (n=9) at initiation of tolvaptan, average baseline eGFR was 73, with change in average eGFR over 3 years follow-up was -1 with average eGFR 3 years post initiation of 72.

On analysis of CKD 3A patients (n=7) at initiation, average baseline eGFR was 54, with change in average eGFR over 3 years follow-up was -9 with average eGFR 3 years post initiation 45.

On analysis of CKD 3B patients (n=10) at initiation, average baseline eGFR was 39, with change in average eGFR over 3 years follow-up was -4 with average eGFR 3 years post initiation 35.

Discussion: Our analysis demonstrates a slowing in decline of eGFR in patients taking tolvaptan, with the greatest benefit in preserving renal function seen in patients with a higher eGFR at initiation. This justifies early initiation of tolvaptan and exposing patients with higher eGFR to the demanding aquaretic adverse effects.

ADPKD is associated with interfamilial and intrafamilial variability, which can be explained by its genetic heterogeneity, therefore it remains unclear if the patients commenced on tolvaptan early would have shown disease progression without tolvaptan. Ongoing timelining of the renal function is vital for continued assessment of the benefits of tolvaptan.

With advances in genetic medicine, identification of new mutations and greater accessibility of whole genome sequencing locally, it is hoped that greater genetic and molecular understanding of ADPKD will guide future management.

Tuesday 6th June 12:15 – 13:15

Track N2 – Genetic & Rare Diseases 2

Poster: 331
Submission: 281

Complications and Treatment of Hypercalciuria in Familial Hyperkalaemic Hypertension (FHHt)

MD, PhD candidate Viola D'Ambrosio[1,2], Ms Olivia McKnight[3], BMBCh, PhD Candidate Elizabeth R. Wan[2], Professor Robert Speller[3], Professor Robert Moss[3], PhD Keith Siew[2], MD, PhD Stephen B. Walsh[2]

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[2]UCL, Department of Renal Medicine, London.
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Introduction: Hypertension is frequently associated with hypercalciuria, nephrolithiasis and low bone mineral density. Familial Hyperkalaemic Hypertension (FHHt) causes hypercalciuria, although complications of this are not reported.

Methods: We examined a cohort of 9 patients with genetically confirmed FHHt. Biochemical, radiological, and clinical data was obtained in patients before and after thiazide treatment. All patients gave informed consent. The study had ethics committee approval (REC 05/Q0508/6). Data were compared using paired t tests or Wilcoxon paired rank tests.

Results: 5 of the 9 patients were female (median age 41.7 years). The genetic diagnosis was confirmed in all patients, 5 patients had variants in KLHL3, 3 patients had variants of WNK4, and one had a variant of WNK1.

Pre-treatment potassium was high (median 5.6 IQR 5.2-6.2 mmol/L). Pre-treatment calcium was in the normal range (2.34 IQR 2.29-2.38 mmol/L). There was significant hypercalciuria with a raised urinary calcium/creatinine ratio (0.69 IQR 0.41-1.13). However, PTH (4 IQR 3.95-4.35 pmol/L), phosphate (1.15 IQR 1.25mmol/L) and alkaline phosphatase (57 IQR 45-84 mmol/L) were all in the normal range.

Thiazide treatment significantly reduced hypercalciuria (calcium/creatinine ratio 0.15 IQR 0.05-0.29 p=0.04) as well as the serum potassium (3.9 IQR 3.5-4.4 mmol/L p=0.0167).

Patients also developed complications of hypercalciuria. 3 patients had kidney stones demonstrated on cross-sectional imaging. One of these patients (male, 30 years old) had DXA criteria for osteoporosis (T score Femoral neck -1.5, lumbar spine -2.4).

Conclusions: This is the first case series to demonstrate complications of hypercalciuria (i.e. kidney stones) in patients with FHHt. We demonstrate that thiazide treatment normalises urinary calcium excretion. Thiazide treatment may have clinical utility in FHHt even if hypertension or hyperkalaemia are not problematic in order to avoid the complications of hypercalciuria.

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Track N2 – Genetic & Rare Diseases 2

Poster: 332
Submission: 300

ANKHD1 is an RNA-binding protein controlling mRNA processing under stress conditions, with implications for Polycystic Kidney Disease.

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Background**:** Ankyrin repeat and single KH domain-containing protein 1 (ANKHD1) is a ubiquitously expressed RNA binding protein (RBP). It is composed of two stretches of ankyrin repeats, that mediate protein-protein interactions, and one KH domain, that mediates RNA binding. ANKHD1 has been demonstrated to be overexpressed in various cancer types, including renal cell carcinoma (RCC). It drives uncontrolled cellular proliferation in RCC. Furthermore, at a clinical level, increased expression of ANKHD1 is associated more aggressive tumour growth and decreased patient survival rates. We hypothesise that ANKHD1 has a role in Autosomal Dominant Polycystic Kidney Disease (ADPKD), a devastating genetic condition that resembles cancer. ADPKD manifests with bilateral renal cysts and leads to renal failure. Mechanistically disease is linked with excessive proliferation of the tubular epithelial cells. Our lab has shown that ANKHD1 is highly expressed in the polycystic kidney and controls proliferation. Yet the mechanisms involved, including its binding partners, are unknown and the focus of my PhD.

Methods**:** A recombinant FLAG-tagged full-length ANKHD1 protein was made, alongside a deletion construct that lacked the RNA binding domain. Proteins were produced in HEK293T cells, and their identifies were validated using DNA sequencing, western blotting, and immunofluorescence with specific anti-ANKHD1 and anti-FLAG antibodies. Using affinity purification, ANKHD1 was pulled down using FLAG-beads and its purity validated using Coomassie stained SDS-gels. To identify the protein partners of ANKHD1, affinity-purified protein was combined with mass spectrometry (MS), and these protein binding partners were validated using co-immunoprecipitation experiments, followed by western blotting. Bioinformatics analysis was performed using Biogrid database to further analysis the function, localisation, and expression of ANKHD1's protein partners.

Results**:** Full-length and deletion constructs of the human ANKHD1 protein were successfully expressed. Biogrid analysis revealed that ANKHD1 interacts with 173 proteins, including the Proliferating cell nuclear antigen (PCNA) and HSPA8. PCNA is a protein involved in DNA replication, DNA repair and chromatin remodelling, and HSPA8 is a molecular chaperone and folding catalyst with increased expression when cells undergo heat stress. ANKHD1 was shown to interact with PCNA and HSPA8 in renal epithelial cells. The interaction of ANKHD1 with PCNA and HSPA8 required the ankyrin repeats but not the KH RNA-binding domain. ANKHD1 was also demonstrated to not bind with beta-actin, histone H3 or vinculin, emphasising the specificity of interaction. Pathway analysis of the entire ANKHD1 interactome predicts that ANKHD1 functions in the control of mRNA processing in cellular stress.

Conclusion**:** ANKHD1 was successfully expressed and pulled down, allowing for the identification of its protein partners via mass-spectrometry (IP-MS) and co-immunoprecipitation assays. ANKHD1 was shown to interact with PCNA, a protein frequently increased in ADPKD, and HSPA8. Bioinformatics analysis demonstrated a role for ANKHD1 in controlling mRNA processing, especially during cellular stress. Future experiments will elucidate the ANKHD1 interactome and provide a map of the RNA binding proteins that operate in the kidney. Taken together, combining large dataset analysis with experimentation provides a powerful strategy for deciphering the functions of proteins with previously unknown roles in disease.

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Track N2 – Genetic & Rare Diseases 2

Poster: 333
Submission: 349

Improving the pathway for renal genomics testing in Salford and the North West of England.

Dr Joshua Storrar[1], Dr Simon Williams[2], Professor Smeeta Sinha[1]

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[2]Royal Liverpool Hospital, Liverpool

Introduction: There is increasing availability of genomic tests for nephrology patients, but there are a number of barriers (educational, logistical and workforce) preventing wider uptake. Nephrologists typically receive no formal education in genomics and so significant upskilling is required of the existing workforce. There is also a need for genomics education for trainees. Finally, even once genomic tests have been requested, the turnaround time can be greater than 6 months due to workforce related issues with test analysis and interpretation.

Methods: We established the current process for genomic testing at Salford. This involved plotting the patient pathway from referral to potential genomic testing and informing the patient of the result. It is important to note that there was no formal pathway established prior to the beginning of this project. The process map was constructed by talking to nephrologists working at Salford and also to geneticists based at Manchester Foundation Trust (MFT). We are also contributing to a wider programme of work in the North West of England which is aiming to standardise genomic testing.

Results: The genomic testing process map for Salford can be seen in figure 1. Currently there is no renal genetics clinic. Patients are referred into nephrology services via their GP, or patients with suspected genetic conditions may already be known to nephrology services. They undergo routine nephrology workup which may or may not involve a kidney biopsy. Should these tests be inconclusive or potentially point to a genetic diagnosis then advice is sought via a local MDT +/- the renal genetics clinic at MFT. Following this, genomic tests are requested and sent off after appropriate consent and patient education. Results are relayed via email to the referring clinician and subsequently discussed with the patient. Complexities can be discussed at a regional online MDT or if specialist evaluation is required cases can be referred to the genetics clinic at MFT.

Discussion: NHS England and Genomics England have recently called for genetic testing to be streamlined into general medicine[1]. We have mapped the current process from referral to completion of genomic testing at our centre. There are several areas which have been identified as opportunities for improving the pathway. These include identifying those patients who have a higher likelihood of an underlying genetic diagnosis (lower age, positive family history, extra renal features, cysts on USS)[2] so that genomic testing can be considered early in the workup process, and educating clinicians in how to select the appropriate test, and what needs to be discussed with the patient to ensure adequate consent. We are currently undertaking several projects in relation to these points including providing education to consultant nephrologists and piloting a renal genetics clinic.

References:

1. A strategy for embedding genomics in the NHS over the next 5 years. NHS England. October 2022.
2. Cocchi E, Nestor JG, Gharavi AG. Clinical Genetic Screening in Adult Patients with Kidney Disease. Clin J Am Soc Nephrol. 2020 Oct 7;15(10):1497-1510.

Figure 1. Salford genetic testing pathway

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Track N2 – Genetic & Rare Diseases 2

Poster: 334
Submission: 420

Developing and embedding a renal genomic service – a single centre experience

Dr Simon Williams, Dr Matthew Howse, Dr Shahed Ahmed

Liverpool University Hospitals NHS Foundation Trust, Liverpool

Introduction: NHS England's ambition is to embed the use of genomic medicine across the NHS, providing a world leading and equitable service available across the United Kingdom. Since the 100,000 genomes project, availability of genetic testing for inherited renal disease has increased.

Collectively, inherited kidney disease account for 5-10% of cases of end stage renal disease (ESRD), with genetic testing providing a precise diagnosis potentially altering management. It may aid prognostication guiding renal replacement therapy including screening family members for live donor transplantation. Access to psychological support via genetic counsellor's is vital and allows advise on family planning including referrals for pre-implantation genetic testing.

We aim to develop a renal genomic service, increasing availability of genetic testing for our population aligned with the aims of NHS England.

Method: Utilising the monthly polycystic kidney disease clinic (PCKD), we began undertaking genetic testing. Patients were reviewed for indications for testing according to the National Genomic Test Directory for Rare and Inherited Disease, with eligible patients offered testing.

Testing was undertaken by two existing renal consultants and a registrar appointed as a clinical fellow developing an interest in renal genomics. As experience developed, patients with other inherited kidney disease were invited to clinic to discuss genetic testing.

Six months after recruiting the clinical fellow, we evaluated the performance of the clinic. The number of genetic tests arranged over the past 7 years was assessed. Patient clinic letters were reviewed to ensure patients met the eligibility criteria, and results analysed to evaluate positive results and ensure appropriate patients are referred.

Results: Twenty-five tests were completed between 2015-2023, Eighteen were arranged in 2022, including the period post recruiting a clinical fellow.

The most frequent age groups for testing were between 21-50 years, with 3 tests in 21–30-year-olds, 9 in 31-40-year-olds and 7 in 41–50-year-olds. The most common test was for cystic kidney disease with twenty tests, two for haematuria, and one each for steroid resistant nephrotic syndrome, atypical haemolytic uraemic syndrome and congenital anomalies of the kidney and urinary tract.

Twelve results have been received. 75% showed a mutation explaining the patient's phenotype, one variation of unknown significance, and two with no mutation identified. One of these negative tests provided valuable information that guided future management.

Discussion: Utilising the existing PCKD clinic provided access to a pool of patients with inherited kidney disease for assessment for genetic testing. The clinic structure allowed longer appointments, with time to discuss genetic testing, and consent patients.

Recruiting a clinical fellow developing an interest in renal genomics has shown a marked increase in testing numbers, with most tests results affecting patients' management.

We demonstrated, on a small scale, transitioning PCKD clinic to a renal genomics clinic is achievable. However further expansion, to allow equitable access to all renal patients who could benefit from genetic testing, will require increased resources, clinic time, and training. This will require expansive collaboration with clinical geneticists and laboratories via a robust renal genomics pathway.

Tuesday 6th June 12:15 – 13:15

Track N2 – Genetic & Rare Diseases 2

Poster: 335
Submission: 426

Identifying Novel Therapies for Cystinuria Using Genetic Tools

Mr Mohammed Dakhakhini, Professor Richard Coward, Professor Gavin Welsh

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Introduction: Cystinuria is a rare inherited recurrent renal stone disorder that causes chronic and end-stage renal disease. It effects 1 in 2000 people in the UK. Even though drug treatment is available (penicillamine, alkalinising agents, captopril) these do not cure the condition and have agonising side-effects such as: weight gain, excessive fatigue, loss of taste, nephrotic syndrome, all of which lead to poor quality of life. New therapeutic approaches are needed to treat this condition without causing major side-effects. Cystinuria is caused by a mutation in one or both cystine channels of b0,+AT or rBAT which are encoded by SLC7A9 or SLC3A1 genes, respectively in the proximal renal tubular cell (PTC). Having these mutations leads to mis-localization of functioning b0,+AT and rBAT proteins away from the plasma membrane of the PTC. This research hypothesizes that repurposing established drug compounds (LOPAC 1280) to re-direct b0,+AT and rBAT proteins back into the plasma membrane could be a new and improved therapeutic approach for this condition.

Methods: Human proximal tubule epithelium cells (PTEC) were used to investigate the localisation of fluorescently tagged b0,+AT and rBAT proteins in wild-type and four mutated cell lines: p. Met467Thr, p. Thr216Met, p. Gly458Arg, and p. Asn254Thr using various imaging systems. Primary investigation was carried out using Widefield Fluorescence Microscopy for imaging. Follow-up investigations were done using Confocal Microscopy and co-localisation analysis of obtained data. Findings were then confirmed by Total Internal Reflection Fluorescence (TIRF) Microscopy. Currently, the INCELL computer driven analyser is being used to optimise testing for LOPAC 1280 in wild-type and mutated cell-lines.

Results: Our studies have revealed that: (1), both b0,+AT and rBAT proteins were found to be trafficked together. (2), in the wild-type cell line, both proteins were located at the plasma membrane. (3) in all four mutated cell lines, both proteins were mostly trapped in the ER. Morphological changes of PTEC were supportive of the co-localisation studies.

Discussion: The outcomes of the localisation investigation shows that both b0,+AT and rBAT proteins were mostly trapped in the ER in all four mutants in contrary to what was found in wild-type cell line. These findings allow testing of LOPAC 1280 drugs using INCELL analyser to show their efficacy in re-locating b0,+AT and rBAT proteins back to the plasma membrane. This is currently progressing. We hope to identify novel therapies to rescue mistrafficked BAT and/or rBAT back to the plasma membrane of PTC which may be informed by specific genetics. This could be a truly personalised medicine approach to treating this debilitating metabolic stone disease

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Track N2 – Genetic & Rare Diseases 2

Poster: 336
Submission: 495

APOL1 genotype prevalence and its effect on eGFR in a tertiary UK cohort

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Introduction: APOL1 high-risk genotypes have been associated with kidney disease and a higher rate of kidney function decline in people with non-diabetic chronic kidney disease (CKD) of recent African ancestry. Despite the significant impact of APOL1 on kidney health, most studies on this topic have been conducted in the United States. There is limited information available on the prevalence and effect of APOL1 genotypes on kidney function in the United Kingdom.

Methods: This retrospective study compared the prevalence and effect on estimated Glomerular Filtration Rate (eGFR) between APOL1 high-risk genotypes (G1/G1, G1/G2, G2/G2) and low-risk genotypes (G0/G0, G1/G0, G2/G0) in a London tertiary centre. Black patients living with CKD had APOL1 genotyping if they met the following criteria: no diabetes, age 18-60, not on renal replacement therapy and urine protein: creatinine ratio (uPCR) >10mg/mmol. Hypertension was defined as presence on clinic letter problem list. eGFR was calculated using CKD-EPI 2009 equation without ethnicity adjustment. eGFR change was defined using the coefficient of the regression line for all outpatient eGFR results available, expressed as ml/min/year. We compared the average change in eGFR over time between high- and low-risk genotype participants, adjusted for covariates, using linear regression.

Results: Among 64 participants (Table 1), 33 (52%) had high-risk APOL1 risk genotypes and 31 (48%) had low-risk genotypes. Median follow-up time was 3 years (IQR 1, 8). Mean (SD) high-risk APOL1 genotype eGFR change was -5 (5) ml/min/year and low-risk -0.6 (9) ml/min/yr. Univariate regression of high-risk genotype was associated with a -4ml/min/year change in eGFR compared to low-risk genotype (95% CI -7 to -0.6). After adjustment for age, sex, hypertension and baseline uPCR, high-risk genotype was associated with a -3 ml/min/year greater rate of eGFR change than low-risk genotype (95% CI -7 to 0.6).

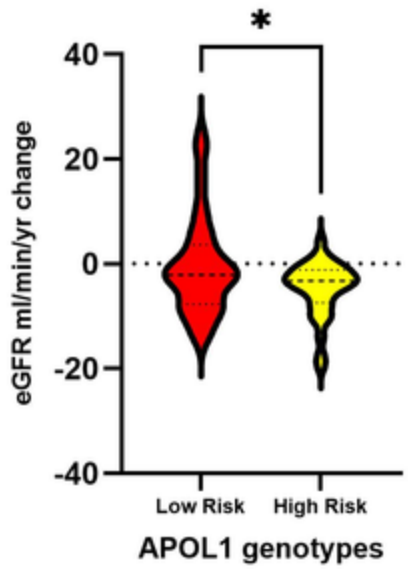
Discussion: The APOL1 high risk genotype was highly prevalent in our local cohort, presented to clinic earlier and had a higher rate of kidney function decline over time. These findings are relevant to patient counselling, outpatient monitoring or targeted therapies.

Table 1: Baseline characteristics of cohort

	APOL1 High risk (n=33)	APOL1 Low risk (n=31)	p value
Median age at first renal clinic visit(yr) (IQR)	40 (31.2, 48.2)	43 (35.7-51.3)	0.38
Male- n(%)	15(46%)	19(61%)	0.21

HTN- n(%)	24(73)	27 (87)	0.15
Median baseline uPCR (mg/mmol) (IQR)	147 (79, 248)	42 (16, 248)	0.01
Median baseline eGFR (ml/min) (IQR)	52 (41, 66)	50 (36, 63)	0.50
Renal biopsy- n(%)	18 (55)	8 (26)	0.02

Figure 1 : Violin plot of eGFRml/min/year change according high- and low-risk APOL1 genotypes



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Track N2 – Genetic & Rare Diseases 2

Poster: 337
Submission: 502

An approach to reducing unwarranted variation in patient care by improving access to genetic testing, diagnosis, and support in the South West Thames Region

Dr Nicholas M.P. Annear[1,2], Dr Frances V. Elmslie[1,2], Dr Rebecca J. Suckling[3,1]

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[3]Epsom & St Helier NHS Trust, London

Introduction: Access to genetic testing for inherited kidney diseases has historically been hampered by organisational challenges and funding limitations. This has led to a large cohort of patients with known heritable kidney diseases, but with no identified genetic cause, where the state of the art might otherwise allow access to diagnostic genetic tests, and thence access medications that may modify their condition, and be offered information where appropriate, on pre-implantation genetic testing for monogenic disorders (PGT-M). Despite the advent of the National genomic test directory, access to genetic testing remains geographically biased toward large tertiary referral centres across the UK, leading to unwarranted variations in care. Barriers to genetic testing locally include clinician confidence and familiarity with testing pathways. To reduce variability of access to testing, we sought to create a clear, clinician-led pathway for genetic testing for cystic kidney diseases, supported by readily accessible support, and regular multi-disciplinary team meetings to discuss results and facilitate care beyond genetic testing.

Methods: All renal genetic testing in the region has hitherto been accessed through an established Inherited Kidney Diseases Clinic: dedicated teaching sessions were set up locally for all colleagues on the renal team to train and support genetic testing for patients with cystic kidney disease locally. A monitored renal genetics email was set up to support collation and completion of request forms triggering testing; A multi-disciplinary network meeting to support result interpretation, and build familiarity with regard testing and results analysis. A new pathway to support genetic testing for cystic kidney diseases began on 6/5/2022. Referrals for renal genetic testing were analysed prior and subsequent to this for comparison.

Results: In the year between 6/5/2021-5/5/2022, 70 genetic tests were undertaken; 46/70 (66%) of genetic tests undertaken were for cystic kidney disease; 0/65 (0%) were undertaken by their local clinician. Between 6/5/2022-31/1/2023, 65 patients have undertaken genetic testing – 54/65 (83%) were for cystic kidney diseases; 9/65 (14%) were tested by their local clinician.

Referral numbers between to the Inherited kidney diseases clinic have increased from an average of 4/month (48/year) in the year between 6/5/2021-5/5/2022, to around 7/month (84/year), with the appointment wait-time currently 6 months.

The inaugural virtual Renal Genetics MDT was well-attended by a Clinical Scientist, Genetics Counsellors, Renal specialist nurses, Consultants and trainees from both partner trusts.

Discussion: The advent of the National genomic testing directory enabled funded access to genetic testing for all patients in the UK meeting appropriate criteria. This alone has left many barriers to accessing genetic testing: through focused educational initiatives, supporting a dedicated genetic testing pathway for cystic kidney diseases, including an MDT meeting to promote quality assurance, we have improved clinician familiarity and engagement with genetic testing for cystic kidney diseases, reducing the wait time for genetic testing. There has been an increased referral rate to the inherited kidney diseases clinic, but with improved familiarity and confidence with genetic testing using the pathway, we envisage clinicians will access all renal genetic testing pathways, enabling the specialty clinic to focus on complex cases.

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Track N2 – Genetic & Rare Diseases 2

Poster: 338
Submission: 504

Clinical and Genetic Spectra of Autosomal Dominant Tubulointerstitial Kidney Disease due to UMOD mutations (ADTKD-UMOD) in the UK

Dr Holly Mabillard[1,2], Dr Eric Olinger[2], Professor John Sayer[1,2]

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Introduction: Autosomal Dominant Tubulointerstitial Kidney Disease (ADTKD) is the third most common cause of genetic kidney disease accounting for around 2% of the UK's End Stage Kidney Disease (ESKD) cohort. Mutations in the *UMOD* gene are the leading cause of ADTKD in the UK (ADTKD-*UMOD*). ADTKD is frequently under-recognised despite often large multi-generational families being affected. Modern molecular testing strategies and formation of national rare disease registries are helping us better understand and recognise this inherited kidney disease for which treatments are desperately needed. Here we describe the clinical and genetic spectra of our UK cohort.

Methods: We analysed the UK's National Registry for Rare Kidney Diseases (RaDaR), individuals identified through Genomics England and the hospital patient records of our local ADTKD-*UMOD* cohort to define the genetic and clinical characteristics of ADTKD-*UMOD* seen across the UK.

Results: 137 patients had a documented *UMOD* mutation of which mutation type was known in 132 (96%). In total, there were 29 different *UMOD* mutations across the cohort. 70 patients (53%) had the specific p.Val93_Gly97delinsAlaAlaSerCys Indel mutation unique to the UK. 1 of the 28 mutations was a deletion (Ser91del) and the remaining were missense changes. This deletion was the second most common mutation seen in the cohort (7.5%). One patient had a homozygous *UMOD* mutation (p.Cys120Tyr). Gout was present in 28/137 (20%) and the median age of end stage kidney disease (ESKD) was 51 for the entire cohort. Median age of ESKD was higher (age = 55) for those with the p.Val93_Gly97delinsAlaAlaSerCys Indel mutation in comparison to those with other mutations (median age of ESKD = 49).

Discussion**:** ADTKD-UMOD is an important cause of ESKD amongst UK patients with chronic kidney disease and its clinical and genetic architecture are unique to the UK due to a high prevalence of the specific p.Val93_Gly97delinsAlaAlaSerCys Indel mutation.

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Track P1 – Glomerulonephritis & Vasculitis 1

Poster: 339
Submission: 048

Intra-renal high-grade B cell lymphoma in a lady on long-term immunosuppression for ANCA vasculitis

Dr Maria Angela Gauci

LTHT, Leeds

ANCA vasculitis is a rare relapsing-remitting systemic disease which can affect multiple organ systems. Both the systemic inflammatory process of the disease and the high intensity immunosuppressive therapy used are associated with a high morbidity and mortality.

We describe a case of a 72 year-old lady with a history of MPO vasculitis diagnosed in 2014. After having received 10 cycles of intravenous cyclophosphamide, she was put on maintenance therapy with azathioprine. She remained seropositive all throughout her disease course and was thus kept on low dose azathioprine, which continued up until her presentation with a rapidly progressive AKI and weight loss in 2022. A CT scan of the trunk revealed the presence of bilateral large kidneys, but no suspicious neoplastic lesions or lymphadenopathy.

A preliminary diagnosis of ANCA vasculitis relapse was thus made, and 3 doses of intravenous methylprednisolone were administered while the renal biopsy result was awaited. To the authors' surprise, the biopsy revealed the presence of a dense lymphocytic infiltration of CD45 and CD20 positive lymphocytes consistent with high grade B cell lymphoma. No necrotising lesions/ crescents were seen. Immediate haematological opinion was sought, and chemotherapy (R-CHOP) was initiated.

Lymphomatous infiltration of kidney parenchyma in patients with diffuse large B cell lymphoma has often been reported in the literature. Its occurrence without radiological evidence of lymphadenopathy or hepatosplenomegaly is rare and often not suspected, until a diagnosis is made on renal biopsy. Even though a relapse of ANCA vasculitis is the first diagnosis that one should think about in such patients, this case highlights that other rare causes such as lymphoma should also be suspected, especially in the presence of longterm immunosuppression and large kidneys on imaging.

Longterm azathioprine therapy is well known to be associated with a high risk for lymphoproliferative disease. The optimal duration of immunosuppression is still unknown, but we need to move away from a 'one size fits all' approach. This case highlights the importance of personalisation of immunosuppressive therapy to the individual, bearing in mind the risks and benefits of longterm immunosuppression.

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Track P1 – Glomerulonephritis & Vasculitis 1

Poster: 340
Submission: 113

Scleritis - a canary in the coalmine for ANCA-associated vasculitis?

Dr Thijs Jansz[1], Mr Pavel Loginovic[2], Dr Andrew Wood[2], Dr Jessica Tyrrell[2], Dr Richard Oram[2]

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Introduction: ANCA-associated vasculitis is a group of rare but potentially life-threatening autoimmune conditions, which includes granulomatosis with polyangiitis (GPA), eosinophilic granulomatosis with polyangiitis (EGPA), and microscopic polyangiitis (MPO). It is characterized by formation of granulomas and inflammation of small vessels, with complications including fulminant pulmonary haemorrhage and rapidly progressive glomerulonephritis. These severe manifestations are often preceded by prodromal symptoms with which patients may present to primary care, such as inflammation of the eyes, joints, and upper airways. However, it is unclear which prodromal symptoms are most strongly associated with the risk of developing ANCA-associated vasculitis.

Methods: We identified cases of prodromal symptoms and ANCA-associated vasculitis using diagnostic codes from primary care records, hospital episode statistics, Death Register records, and self-reported diagnoses in a prospective cohort of participants of UK Biobank who had linkage to primary care records, from 01/01/2000 until 15/09/2020. We excluded participants with ANCA-associated vasculitis diagnosed prior to this period. The prodromal symptoms we investigated included scleritis, sinusitis, hearing loss, ear pain, asthma, joint aches, and rashes. We compared risk of ANCA-associated vasculitis using Cox proportional hazards models, using age as time scale and adjusted for time-fixed covariates (birth cohort, ethnicity, body mass index (BMI), Townsend deprivation index (TDI), and smoking status).

Results: Among 231,232 participants, 127 had a diagnosis of ANCA-associated vasculitis. Their mean age at diagnosis was 62 ±9 years, 48% were male, and 50% had never smoked. The most strongly associated prodromal symptom was scleritis: 4 out of 719 patients with a diagnosis of scleritis received a subsequent diagnosis of ANCA-associated vasculitis (median 0.6, IQR 0.1-2.8 years later), with an adjusted hazard ratio of 13.26 (95% CI 4.89-35.97). Other prodromal symptoms associated with ANCA-associated vasculitis included sinusitis (32 out of 31,245 patients diagnosed with sinusitis received a subsequent diagnosis of ANCA-associated vasculitis, adjusted hazard ratio 2.90, 95% CI 1.92-4.37) and asthma (46 out of 37,978 diagnosed with asthma received a subsequent diagnosis of ANCA-associated vasculitis, adjusted hazard ratio 3.34, 95% CI 2.30-4.84). There was no significant association between other prodromal symptoms (ear pain, hearing loss, joint aches, or rashes) and subsequent ANCA-associated vasculitis.

Conclusions: A diagnosis of scleritis greatly increases the risk of subsequent ANCA-associated vasculitis. This highlights the need for thorough investigation for potential ANCA-associated vasculitis when a diagnosis of scleritis is made.

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Track P1 – Glomerulonephritis & Vasculitis 1

Poster: 341
Submission: 146

Simultaneous development of ANCA vasculitis in two unrelated individuals living in the same household with different timing of presentation

Dr Helena Lee, Dr Sharan Chugani, Dr Timothy Scale

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A woman in her mid 70s presented in late spring of 2022 with symptoms of fatigue and arthralgia as well as grittiness in the eyes and some weight loss which had first been noticed around Christmas 2021. A few months prior to this she had noticed coryzal symptoms.

Following admission, the patient experienced several episodes of seizures, culminating in status epilepticus which required intubation and ventilation and admission to intensive care.

Blood tests on admission demonstrated an acute kidney injury with a creatinine of greater than 600 micromoles/Litre and urea of 35 milimoles/Litre. ANCA serology was positive with a titre of 1:320 in a cytoplasmic (c-ANCA) pattern, and anti-Proteinase 3 (PR3) antibodies were greater than 100Units/millilitre.

A renal biopsy was not done due to the fact that the patient only has a single kidney (she previously had a left nephrectomy for renal cell carcinoma).

Notably the patients' husband had been diagnosed with crescentic glomerulonephritis caused by granulomatosis with polyangiitis with a strongly positive cytoplasmic anti-nuclear cytoplasmic antibody (cANCA) and proteinase-3 (PR3) only a few months prior.

The patient and her husband live in an old house on a farm, where they are on mains water and have had the piping changed in the last 3 years. They do not use any unpasteurised milk and their diet is varied, usually eating supermarket foods. The patient worked as a watch battery fitter and her husbandas a beef cattle farmer.

The patient initially showed some recovery in her renal function, though has continued with haemodialysis. The husband on the other hand has shown good recovery of their renal function with no residual symptoms of vasculitis and continues on oral azathioprine to maintain remission.

The development of the same condition in two unrelated close household contacts is extremely rare outside the context of natural disasters [E]. We have therefore considered whether an environmental exposure common to both cases may be present.
Links between various environmental exposures and ANCA vasculitides have been postulated, with systematic review evidence supporting exposure to silica dust as the strongest risk factor[E]. An

association with natural disasters, vitamin D levels and UV radiation exposure were also demonstrated [E].
Farm exposure and farming as an occupation have both been linked with development of ANCA vasculitis [A,B,D], but there are fewer available studies and disagreement in current published literature [E]. Though they both live on the farm, the patient is not involved in the day to day running of this or care of the livestock. Possible chemical exposure on includes occasional use of pesticide, and worming agents.

References:

A - Are environmental factors important in primary systemic vasculitis?: A case–control study - Lane - 2003 - Arthritis & Rheumatism - Wiley Online Library

B - (PDF) Demographics and environmental factors in Wegener's granulomatosis cluster (researchgate.net)

D - (PDF) Farm Exposure as a Differential Risk Factor in ANCA-Associated Vasculitis (researchgate.net)

E - Environmental risk factors associated with ANCA associated vasculitis: A systematic mapping review - ScienceDirect

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Track P1 – Glomerulonephritis & Vasculitis 1

Poster: 342
Submission: 151

ANCA Vasculitis relapse in patients managed by Sussex Kidney unit in Brighton

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Background : Antineutrophil Cytoplasmic Antibody (ANCA) associated vasculitis (AAV) is a group of diseases that involve small and medium-sized blood vessels. It is the commonest vasculitis type that affects renal blood vessels. It is classified serologically into 2 serological types: PR3- and MPO -ANCA vasculitis. With the advancement in the treatment of ANCA vasculitis, the prognosis has improved from life-threatening to chronic disease with relapse risk. Relapse is still a big problem in the management of AAV. The aim of this study was to identify the incidence, diagnosis and risk factors of relapse among the patients managed in Sussex Kidney Unit in Brighton.

Methods: This study was a retrospective study. Data were collected from the electronic patient records and clinic letters in Sussex Kidney Unit. Data were collected for patients diagnosed between the years 2008 and January 2022. All the patients whose age was > 18 years old with AAV diagnosis were included.

Results : A total of 235 patients were included in the study, 124 (53%) males, and 111(47%)females. Patients of white ethnicity were 214 patients (92%), while non-Caucasian ethnicities were 18 patients (8%). The mean age of patients diagnosed with AAV was 63 years old. Among the patients, 111 patients (47.2%) were diagnosed with the MPO subtype, 123 patients (52.3%) with the PR3 subtype, and there was 1 patient (0.5 %) with positive both MPO and PR3 serology. There were 7 patients (3%) who had dual ANCA and anti-GBM positive serology. Majority of patients in the study, the induction therapy was oral cyclophosphamide and the maintenance therapy with azathioprine, with a smaller number with Rituximab and MMF. There were 46 patients (20%) who had relapsed AAV. PR3 subtypes are associated with a higher relapse rate. About 24 patients (52%) in the relapse patient group, had ANCA-positive serology, while 22 patients (48%) had negative serology 1 year after starting treatment. Twenty-one patients (46%) in the relapsed group had positive serology at end of induction and end of treatment. Pulse Cyclophosphamide, used as induction therapy, was associated with a higher relapse rate (30.4%) among the patients who received it in comparison with oral cyclophosphamide (17.8%). Mycophenolate Mofetil used as maintenance therapy was associated with a higher relapse risk (41.3%) among the patient who received it. The persistence of proteinuria at the end of the first year of treatment was highly correlated to relapse.

Conclusion: PR3 vasculitis serology, type of induction treatment, persistent proteinuria at 1 year of treatment, positive serology at end of induction and at end of treatment had a high risk of vasculitis relapse. A significant increase in proteinuria at the time of relapse was a diagnostic marker of relapse. Early diagnosis and management of vasculitis relapse are important to improve the outcome. We

recommend vigilant monitoring of signs of renal vasculitis relapse with monitoring urine tests every 3 months for proteinuria.

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Track P1 – Glomerulonephritis & Vasculitis 1

Poster: 343
Submission: 181

Digital spatial profiling can be used to study glomerular endothelial cells in IgA nephropathy, indicating phenotypic differences that may relate to complement activity.

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[3]University Hospitals of Leicester NHS Trust, Leicester

Introduction: IgA nephropathy (IgAN) is the most commonly reported primary glomerular disease worldwide; approximately 30% of cases progress to kidney failure 10-20 years from diagnosis. Five histopathological kidney lesions independently predict a poor prognosis in IgAN (MEST-C score)[1]. Published case series highlight the 'endocapillary hypercellularity' (E1) lesion as potentially reversible with systemic immunosuppression, improving clinical outcomes[2,3]. E1 is defined by the obliteration of glomerular capillary lumens by cells that appear to consist of macrophages[4]. Delineating differences in the transcriptomes of glomerular endothelial cells (GEnCs) associated with and without E1 (E0) may highlight avenues for safer therapeutic strategies. GEnC transcriptomes have never been profiled in diseased kidneys before. Here we used digital spatial profiling (DSP) to achieve this.

Methods: DSP was performed on a Nanostring GeoMx platform. Single 5mm sections were collected from four formalin fixed paraffin embedded (FFPE) kidney biopsies with E1 and five with E0. Following deparaffinization and antigen retrieval, the tissue was incubated with a whole transcriptome atlas probe set. GEnCs were stained for CD31 (red) and macrophages with CD68 (yellow) with primary conjugated antibodies. Glomeruli were selected as regions of interests (ROIs), and a custom JavaScript function was used to mask over GEnCs and macrophages (segmentation), which were selected as areas of illumination (AOIs) (Fig 1). Photocleaved nucleotide barcodes were sequenced using an Illumina sequencer.

Single cell enrichment was assessed using the SpatialDecon algorithm[5], differential gene expression was explored using a linear mixed effects model, and pathway analysis was performed using Reactome.

Results: The custom written JavaScript function allowed good segmentation on GEnCs and macrophages (Fig 1). Single cell deconvolution performed using the human kidney cell atlas as a reference showed significant enrichment of GEnCs relative to neighbouring cell types (Fig 2). Exploration of differential gene expressions using a linear mixed effects model found an up-regulation of TRIM23, IL27RA, TMEM139, P14K2B and PSMD9, after P value adjustment, among GEnCs associated with macrophages in glomerular capillary loops compared to those in the absence of macrophages (Fig 3). Pathway analysis based on differential gene expression performed using Reactome revealed that the complement cascade and regulators of the complement cascade were enhanced in GEnCs associated with macrophages (Fig 4).

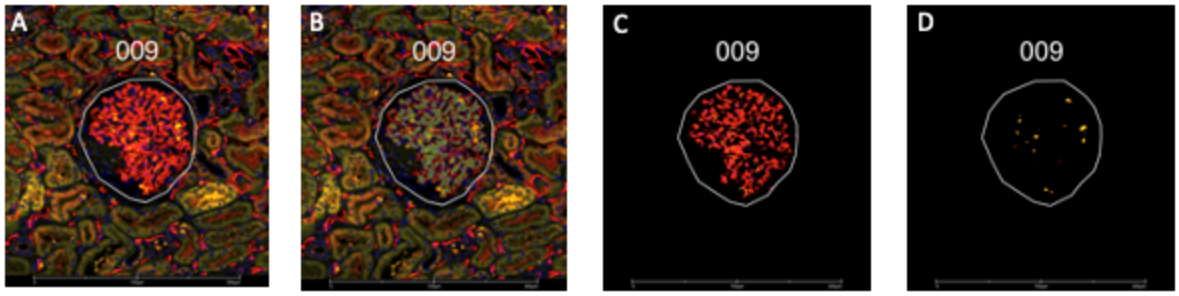


Figure 1: A) Glomerulus selected as an ROI B) Masking on individual cell types C) GEnCs selected as an AOI D) Macrophages selected as an AOI.

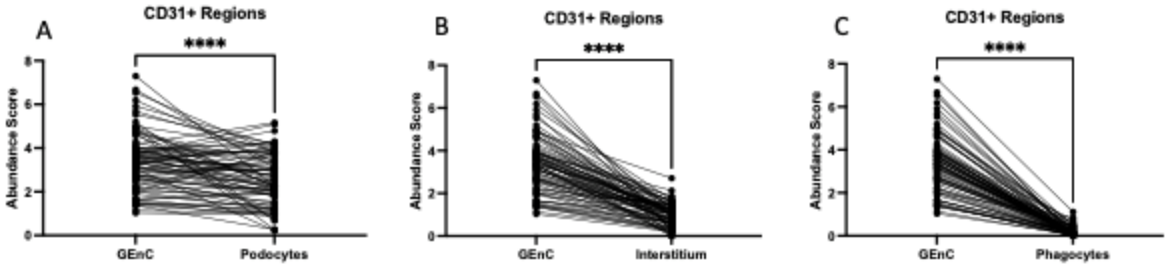


Figure 2: Enrichment of GEnC specific transcriptomes compared to neighbouring cell types; A) Podocytes, B) Interstitium, C) Phagocytes

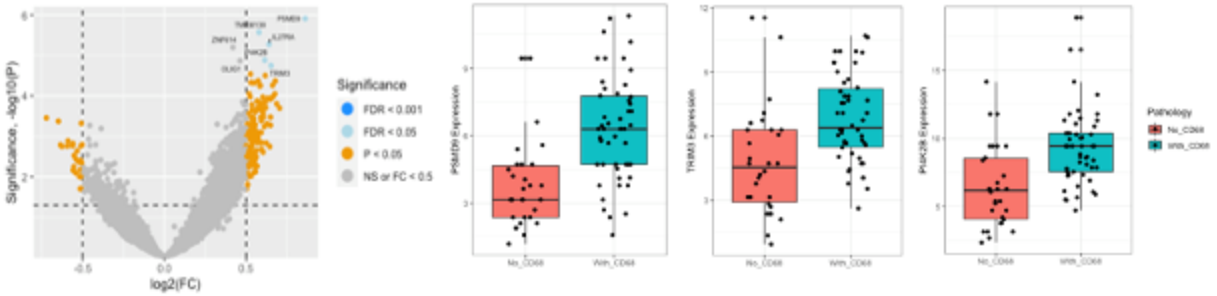
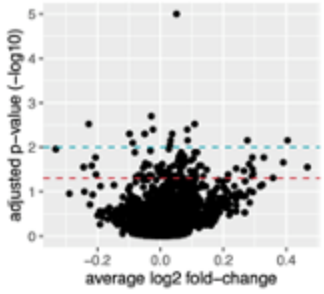


Figure 3: Differential gene expression explored using a linear mixed effects model shows PSMD9, TRIM3 and P14K2B as more dysregulated in GEnCs associated with macrophages.



Regulation of Complement cascade

	RNASEQ_COUNTS_1
Regulation	**Up**
FDR	**0.003**
Av. FC	0.109
N Genes	49

Complement cascade (R-HSA-166658)

	RNASEQ_COUNTS_1
Regulation	**Up**
FDR	**0.018**
Av. FC	0.104
N Genes	58

Figure 4: Pathway analysis demonstrates an up-regulation of complement related pathways in GEnCs associated with macrophages.

Discussion: This pilot study found DSP on the GeoMx to be effective at enriching GEnC transcript signals from neighbouring cell types in FFPE tissue. This preliminary data also shows that GEnCs associated with macrophages display a more inflammatory phenotype, which may be related to up-regulation in complement activity and may account for the progressive phenotype associated with E1 in IgAN. With several trials investigating complement system targeting therapeutics in IgAN, validation of these findings might highlight a cohort of patients with IgAN most likely to benefit from treatment.

References:

1. Trimarchi et al. Kidney Int. 2017

2. Shen et al. J Nephrol. 2015

3. Beckwith et al. NDT. 2017

4. Soares et al. Histopathology. 2019

5. Danaher et al. Nature Commun. 2022

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Track P1 – Glomerulonephritis & Vasculitis 1

Poster: 344
Submission: 229

APOL1 genotyping and proteinuric kidney disease in the United Kingdom

Dr. Kate Bramham[1], Dr. Kieran McCafferty[2], Dr. Mohamad Zaidan[3], Dr. Pablo Antonio Ureña Torres[4], Dr. Vincent Audard[5], Dr. Jean-Jacques Boffa[6], Dr. Bertrand Knebelmann[7], Dr. Thomas Powell[8], Dr. Nauman Shahid[9], Dr. Diego Echeverri[10], Dr. Christopher Provenzano[11], Dr. John Bauman[12], Dr. Aurelia Zamauskaite[13], Dr. Irisz Delestre-Levai[13], Dr. Yuan Yang[13], Dr. Silva Krause[13], Dr. Anna Carolina Ferreira[13], Dr. Ogo Egbuna[13], Dr. Glenn Chertow[14]

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Introduction: Apolipoprotein L1 (APOL1)-mediated kidney disease (AMKD) includes a wide range of progressive, proteinuric nephropathies driven by two toxic gain-of-function variants (*G1* or *G2*) in *APOL1*. The prevalence of *APOL1* variants among people with chronic kidney disease (CKD) in the United Kingdom (UK) is not well known. *APOL1* variants are common in persons of recent African ancestry. We report interim data of a global study estimating the prevalence of *APOL1* genotypes in participants of recent African ancestry and proteinuric CKD, with a focus on data from the UK.

Methods: This ongoing study will enroll up to 2,500 participants worldwide of recent African ancestry or geographic origin with focal segmental glomerulosclerosis (FSGS) or other proteinuric nondiabetic kidney disease (NDKD). Participants have a single visit during which blood samples are collected to determine their genotype using a validated polymerase chain reaction (PCR) assay. The percent of participants with two *APOL1* variants and the percent of participants with *G1/G1*, *G1/G2*, and *G2/G2* genotypes are evaluated. Participants have the option to obtain services of a genetic counselor, if

desired, and may be offered the opportunity to participate in interventional trials targeting treatment of AMKD.

Results: A total of 1256 participants across geographic regions were included in this interim analysis. The distribution of participants with 2 *APOL1* variants by disease state and region is shown in the table. In the UK, 57 of 103 (55.3%) participants have two *APOL1* variants: 31 of 52 (59.6%) with FSGS and 26 of 51 (51.0%) with proteinuric NDKD.

Discussion: Our preliminary data demonstrate the striking prevalence of two *APOL1* variants in participants with recent African ancestry and FSGS or proteinuric NDKD in the UK. These data emphasize the importance of genotyping in kidney disease care to identify patients with AMKD, which could lead to earlier and improved disease management, and enable referral for clinical trials evaluating APOL1-targeted therapies.

Table. Baseline Demographics and *APOL1* Genotyping Results

	FSGS N = 341	**Proteinuric NDKD N = 915**	**Total N = 1256**
Age, years, mean (SD)	42.9 (13.3)	51.8 (13.7)	49.4 (14.2)
Region/country, n (%)			
North America			
United States	253 (74.2)	829 (90.6)	1082 (86.1)
Europe	88 (25.8)	86 (9.4)	174 (13.9)
United Kingdom	52 (15.2)	51 (5.6)	103 (8.2)
France	30 (8.8)	28 (3.1)	58 (4.6)
Spain	6 (1.8)	6 (0.7)	12 (1.0)
Netherlands	0	1 (0.1)	1 (0.1)
***G1/G1*, *G1/G2*, or *G2/G2 APOL1* genotype, n (%)**	164 (48.1)	210 (23.0)	374 (29.8)
G1/G1	82 (24.0)	99 (10.8)	181 (14.4)
G1/G2	66 (19.4)	91 (9.9)	157 (12.5)
G2/G2	16 (4.7)	20 (2.2)	36 (2.9)
***G1/G1*, *G1/G2*, or *G2/G2 APOL1* genotype by region or country, n (%)[a]**			
North America			
United States	110/253 (43.5)	178/829 (21.5)	288/1082 (26.6)
Europe	54/88 (61.4)	32/86 (37.2)	86/174 (49.4)
United Kingdom	31/52 (59.6)	26/51 (51.0)	57/103 (55.3)
France	23/30 (76.7)	4/28 (14.3)	27/58 (46.6)
Spain	0	1/6 (16.7)	1/12 (8.3)
Netherlands	0	1/1 (100.0)	1/1 (100.0)

APOL1: *Apolipoprotein L1;* **FSGS:** focal segmental glomerulosclerosis; **IA:** interim analysis; **NDKD:** nondiabetic kidney disease; **SD:** standard deviation

Notes: Eligible participants are at least 12 years of age and of African ancestry or geographic origin (Black, Caribbean, African American, SubSaharan African, Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture/origin). For more information about the study, please see https://apol1program.com/. This table includes participants in the Full IA Set with a genotyping result as of 01 Dec2022. Percentages were calculated based on the number of participants in the Full IA set, unless otherwise specified.

[a] Percentages were calculated based on the total number of participants in each region/country per disease state.

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Track P1 – Glomerulonephritis & Vasculitis 1

Poster: 345
Submission: 267

Assessing the effects of glucocorticoids on atheroma formation in crescentic glomerulonephritis

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UCL, London

Introduction: Crescentic glomerulonephritis (CGN) can occur as a result of several autoimmune conditions, including ANCA-associated vasculitis (AAV) and systemic lupus erythematous (SLE). These conditions are known to be associated with an increased risk of cardiovascular disease (CVD). The mainstay of treatment for many of these autoimmune conditions are glucocorticoids (GC). It is well established that GC use is also associated with an increased risk of CVD, along with a host of other undesirable side effects.

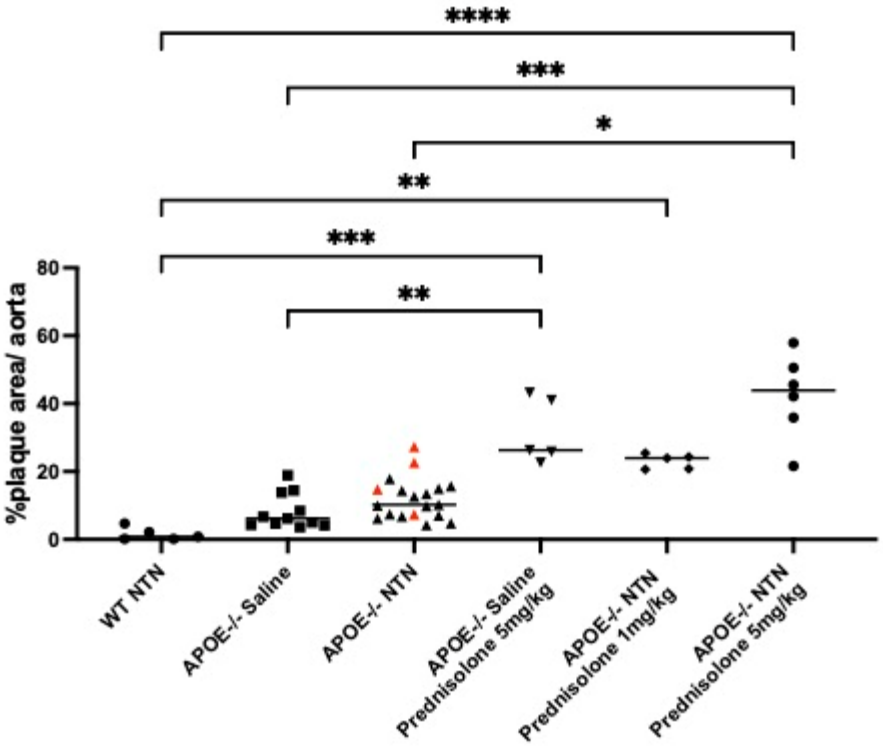
It remains unclear if the increased frequency of CVD in patients with CGN is a result of the underlying inflammatory disease process or a consequence of the GC used in their treatment, or both. We aim to investigate this association to establish the respective contributory roles of both CGN and GC in the development of CVD.

Method:Using atheroma-susceptible APOE-/- mice injected intravenously with saline or nephrotoxic serum (NTS) and fed with a high fat diet (HFD) with or without prednisolone, we were able to assess the presence and extent of CGN and CVD. Weekly blood pressure as well as terminal serum, urine and kidney histology was used to assess kidney disease. Whole aortas, stained with Oil RedO, were imaged to assess and quantify the extent of CVD.

Results: Our model showed the effects of increasing age on increasing aortic atheroma. Additionally, mice given prednisolone were found to have significantly more atheromatous disease than controls. In mice with nephrotoxic nephritis (NTN), there was significantly more atheroma in the presence of high dose steroid, but a non-statistical difference with combined low dose steroid. There was no difference in atheroma between mice with NTN on HFD and those without NTN on prednisolone (summarised in figure 1). There was no significant difference in systolic blood pressures between any of the groups.

Discussion: We have been able to demonstrate that in mice treated with prednisolone there is more atheromatous disease formation in both the presence and absence of kidney disease, however, kidney disease augments the atheroma due to steroids. This effect was not associated with an increase in systolic blood pressure. Further work is being carried out to try and determine the reason behind this causative association.

Figure 1. Percentage atheromatous plaque to whole aorta in APOE-/- mice with or without nephrotoxic nephritis (NTN) fed with high fat diet (HFD) with or without Prednisolone at low (1mg/kg/d) and high (5 mg/kg/d) dose.



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Track P1 – Glomerulonephritis & Vasculitis 1

Poster: 346
Submission: 270

Facial Palsy as an early presenting manifestation of Granulomatosis with Polyangiitis(GPA): A case report.

Dr Eleanor Cox[1], Dr Farid Ghalli[1,2]

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Introduction: Granulomatosis with polyangiitis (GPA) is an Anti-neutrophil Cytoplasmic Antibody (ANCA) positive small vessel vasculitis. Oto-neurological manifestations as facial palsy, are reported with both PR3-ANCA and MPO-ANCA serotypes of ANCA-associated vasculitis. Peripheral facial nerve palsy in GPA patients has been reported with an incidence of 5% - 8% of cases. Necrotizing inflammation of the facial nerve "vasa nervorum" is the most accepted aetiology. Facial nerve palsy, when present, is usually reported during the disease's clinical course. We present this case with GPA with facial palsy as an early presentation of ANCA-associated vasculitis.

Case Scenario: A 68-year-old woman had multiple accident and emergency department attendances in the preceding months with unresolved issues. She had recurrent ear infections and, whilst admitted on one of those occasions, developed a left Bell's Palsy. This was felt to be related to suppurative otitis media for which she required grommet insertion. There was no improvement in Bell's Palsy after several months.

She attended the emergency department again in December with conjunctivitis and then represented feeling unwell on the 23rd of December when she was admitted under the medical team. She described a history of feeling unwell over the past several months with joint pain, myalgia, weight loss and the previously discussed Bell's Palsy.

A lumber puncture (LP) was done to investigate her headache, did not show any signs of infection. Despite treatment with Ceftriaxone, Amoxicillin and Co-Amoxiclav, her CRP remained elevated at over 100 mg/L. Therefore, she had a CT TAP, which showed a cavitating lung lesion which was initially thought to be due to an atypical infection such as Tuberculosis. Due to ongoing sinusitis symptoms, she had an MRI of her skull base and MRI which showed inflammation of mastoid air cells and sinusitis. Whilst admitted for ongoing investigations, she was found with Acute Kidney Injury (AKI), with her creatinine increasing from a baseline of 70 µmol/l and peaking at 198 µmol/l. Her Urine PCR was 63mg/mmol with a positive urine dipstick for blood and protein. The acute renal screen showed a PR3 of 36 iu/ml.

The patient was transferred to our renal unit, where she had a kidney biopsy that showed a picture of ANCA vasculitis as necrotizing segmental lesions with crescents and acute tubular injury were found.

She was started on Cyclophosphamide induction protocol which includes prednisolone 60 mg and oral cyclophosphamide before discharge.

Conclusion: While facial palsy is a rare manifestation of GPA, it can be the presenting symptom. Having facial palsy, sinusitis, mastoiditis and conjunctivitis with feeling unwell for a few months would warrant investigations by ENT specialists for vasculitis as a systemic disease. This would prevent delay in the diagnosis of vasculitis and help in starting early treatment. Considering vasculitis as an important differential diagnosis in different system presentations in different specialities e.g. ENT, respiratory, …etc, is of paramount importance.

Tuesday 6th June 12:15 – 13:15

Track P2 – Glomerulonephritis & Vasculitis 2

Poster: 347
Submission: 279

Voclosporin is effective in achieving proteinuria treatment targets in lupus nephritis defined by EULAR/ERA recommendations

Professor Hans-Joachim Anders[1], Mr Ray Federico[2], Dr Vanessa Birardi[2], Dr Henry Leher[2]

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Background: Pooled data from the Phase 2 AURA-LV and Phase 3 AURORA 1 studies demonstrated that adding voclosporin, a novel calcineurin inhibitor, to mycophenolate mofetil (MMF) and low-dose steroids resulted in significantly higher complete renal response rates at 24 weeks in AURA-LV (32.6% vs 19.3%; odds ratio [OR] 2.03; p=0.045) and 52 weeks in AURORA 1(40.8% vs 22.5%; OR 2.65; p< 0.0001) in patients with lupus nephritis.

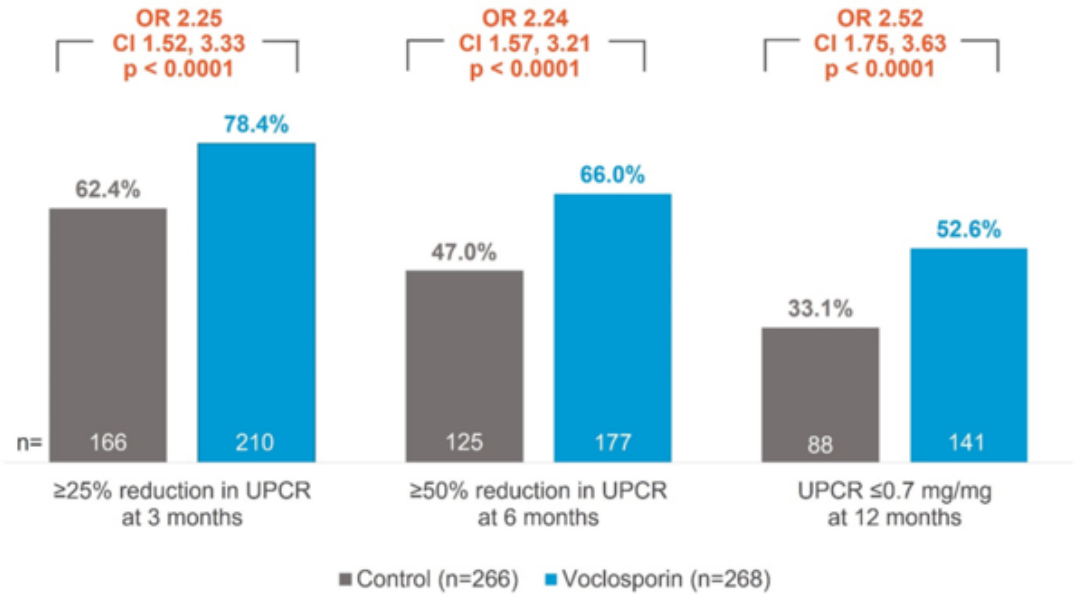
The European League Against Rheumatism and European Renal Association (EULAR/ERA) published updated treatment recommendations for lupus nephritis with targeted reductions in proteinuria over the course of the first year of therapeutic intervention. Here we report on a post-hoc analysis of pooled data from the similarly-designed 48-week AURA-LV and 52-week AURORA 1 studies based on the recommended treatment targets.

Methods: AURA-LV and AURORA 1 enrolled patients with biopsy-proven active lupus nephritis (Class III, IV, or V ± III/IV) and proteinuria ≥1.5 mg/mg (≥2 mg/mg for Class V). Pooled data included 268 patients in the voclosporin arm and 266 patients in the control arm; all patients received MMF (target dose 2 g/day) and low-dose steroids (target dose 2.5 mg/day by week 16 according to protocol-defined steroid taper). We assessed the following EULAR/ERA treatment targets: ≥25% reduction in urine protein creatinine ratio (UPCR) at 3 months, ≥50% reduction in UPCR at 6 months, UPCR ≤0.7 mg/mg at 12 months, and steroid dose ≤7.5 mg/day at 12 months.

Results: After 3 months of treatment, 78.4% of patients in the voclosporin group and 62.4% of patients in the control group achieved ≥25% reduction in UPCR (odds ratio [OR] 2.25; 95% confidence interval [CI] 1.52, 3.33; p< 0.0001). The percentage of patients achieving a reduction of ≥50% in UPCR at 6 months was also significantly greater in the voclosporin arm (66.0% vs 47.0%, respectively; OR 2.24; CI 1.57, 3.21; p< 0.0001). At 12 months, 52.6% and 33.1% of the voclosporin and control arms, respectively, had achieved a UPCR ≤0.7 mg/mg (OR 2.52; CI 1.75, 3.63; p< 0.0001). A total of 89.6% and 82.8% of patients in the voclosporin and control arms, respectively, had reached the recommended steroid dose of ≤7.5 mg/day at 12 months. The proportion of patients achieving a UPCR ≤0.7 mg/mg and having a steroid dose ≤7.5 mg/day at 12 months was 44.4% in the voclosporin arm and 27.1% in the control arm (OR 2.42; CI 1.66, 3.53; p< 0.0001).

Conclusion: The addition of voclosporin to a background regimen of MMF and low-dose steroids in patients with LN significantly increased the likelihood of achieving the 3-, 6-, and 12-month UPCR targets of therapy recommended by EULAR/ERA.

Figure 1. Achievement of UPCR Treatment Targets per EULAR/ERA Lupus Nephritis Recommendations



Analysis includes pooled data from voclosporin 23.7 mg BID and control arms in AURA-LV and AURORA 1.

CI, confidence interval; OR, odds ratio; UPCR, urine protein creatinine ratio.

Tuesday 6th June 12:15 – 13:15

Track P2 – Glomerulonephritis & Vasculitis 2

Poster: 348
Submission: 296

Efficacy and safety of voclosporin over three years in patients with severe lupus nephritis

Dr Hanni Menn-Josephy[1], Mr Matt Truman[2], Dr Mary Palmen[2], Dr Henry Leher[2]

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Introduction: The AURORA 1 study demonstrated that addition of voclosporin, a novel calcineurin inhibitor, to mycophenolate mofetil (MMF) and low-dose steroids significantly increased rates of complete renal response (CRR) at 52 weeks in patients with lupus nephritis, with efficacy maintained for an additional 24 months in those who continued treatment in the AURORA 2 study. Here we report on a post hoc analysis evaluating voclosporin use in patients with severe lupus nephritis using pooled data from the AURORA 1 and AURORA 2 studies.

Methods: Patients who completed AURORA 1 were eligible to enter AURORA 2 to continue the same blinded therapy of voclosporin or placebo; all patients received MMF and low-dose steroids. In this post hoc analysis, the definition of severe lupus nephritis included patients with Class III or IV (± Class V) disease with active lesions and urine protein creatinine ratio (UPCR) ≥3 mg/mg at AURORA 1 baseline. CRR was defined as UPCR ≤0.5 mg/mg with stable renal function, use of low-dose steroids, and no use of rescue medication and was assessed over the three-year treatment period of AURORA 1 and AURORA 2.

Results: Of the 116 patients in the voclosporin arm and 100 patients in the control arm who continued treatment in AURORA 2, 47 and 37 patients in each arm, respectively, had severe disease. Mean (SD) UPCR at pre-treatment AURORA 1 baseline was 6.02 (2.29) mg/mg in the voclosporin arm and 6.08 (2.46) mg/mg in the control arm. Rates of CRR in the voclosporin and control arms were 46.8% and 21.6%, respectively, at one year (OR 4.41, 95% CI 1.47, 13.26; p=0.008), 57.4% and 35.1% at two years (OR 3.08, 95% CI 1.17, 8.10; p=0.022), and 53.2% and 35.1% at three years (OR 2.92, 95% CI 1.07, 7.94; p=0.036). The rates of serious adverse events were similar in the voclosporin (21.3%) and control (27.0%) arms, with one death occurring in a control-treated patient.

Conclusion: In patients with severe lupus nephritis, adding voclosporin to MMF and low-dose steroids results in significantly higher CRR rates and a similar safety profile to that of control. This is clinically meaningful given that patients with severe disease are at higher risk of worse long-term outcomes and development of end stage kidney disease.

Tuesday 6th June 12:15 – 13:15

Track P2 – Glomerulonephritis & Vasculitis 2

Poster: 349
Submission: 306

Long-term safety and efficacy of voclosporin in patients with lupus nephritis and low eGFR

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[3]Otsuka UK, Wexham

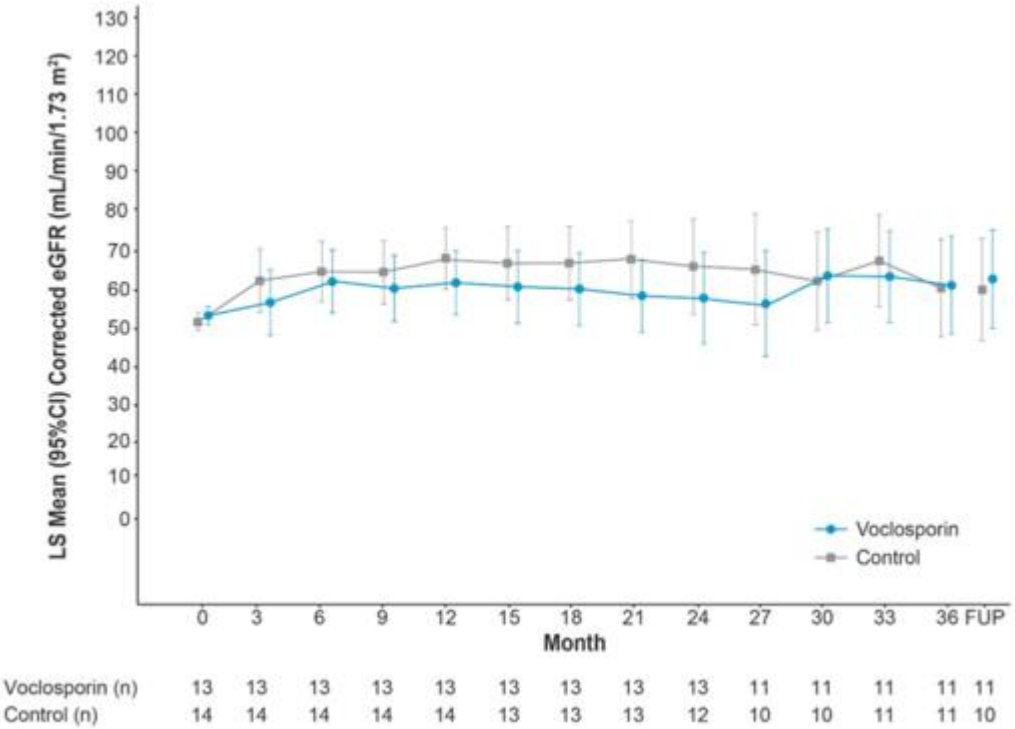
Background: Voclosporin (VCS) is a novel calcineurin inhibitor approved for the treatment of adults with lupus nephritis. In the Phase 3 AURORA 1 study, addition of VCS to mycophenolate mofetil (MMF) and steroids increased rates of complete renal response at 1 year. Efficacy was maintained for an additional 2 years in the AURORA 2 continuation study. Here we report on a post-hoc analysis of the long-term safety and efficacy of VCS in patients with low estimated glomerular filtration rate (eGFR) at baseline using 3 years of pooled data from these studies.

Methods: Patients from AURORA 1 with a baseline eGFR >45 and <60 mL/min/1.73 m2 who also participated in AURORA 2 were included in this analysis. Patients completing AURORA 1 were eligible to enter AURORA 2 on the same blinded therapy (VCS or placebo) in combination with MMF and steroids. Urine protein creatinine ratio (UPCR) and eGFR changes from baseline were measured.

Results: The analysis included 27 patients with low eGFR (13 in the VCS arm and 14 in the control arm) of whom 23 completed 3 years of treatment (12 and 11 patients, respectively). Mean corrected eGFR at baseline for the VCS and control arms was 52.6 and 50.9 mL/min/1.73 m2, respectively. At 6 months, mean eGFR was 62.0 and 63.4 mL/min/1.73 m2 in each arm, respectively, and remained stable in both arms throughout the 3 years of treatment (Figure 1). Safety outcomes were comparable between arms and consistent with the overall study population. Mean UPCR at AURORA 1 baseline was 4.8 mg/mg in the VCS arm and 4.0 mg/mg for the control arm. At 3 months, mean UPCR decreased to 1.7 mg/mg and 2.5 mg/mg in each arm, respectively. Mean UPCR continued to improve throughout AURORA 1, and the reductions were maintained in AURORA 2 for both treatment arms.

Conclusion: In this post-hoc analysis of patients with lupus nephritis and low eGFR at baseline, patients treated with VCS achieved rapid and sustained reductions in proteinuria with no decrease in mean eGFR or unexpected adverse events during 3 years of treatment.

Figure.1 Mean Corrected eGFR in Patients with Low eGFR at Baseline (n=27)



Analysis of AURORA 2 patients includes pooled data from AURORA 1 and AURORA 2 including a follow up visit at four weeks after study drug discontinuation. Patients with AURORA 1 baseline eGFR between >45 and <60 mL/min/1.73 m2 and who continued to AURORA 2 are included in this analysis. Renal function was assessed with corrected eGFR (Chronic Kidney Disease Epidemiology Collaboration equation) using a prespecified ceiling of 90 mL/min/1.73 m2. CI, confidence interval; eGFR, estimated glomerular filtration rate; FUP, follow up; LS, least squares.

Tuesday 6th June 12:15 – 13:15

Track P2 – Glomerulonephritis & Vasculitis 2

Poster: 350
Submission: 314

Voclosporin for lupus nephritis: Assessment of long-term safety and efficacy including renal outcome over three years of treatment in the phase 3 AURORA 1 and AURORA 2 studies

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Background: In the Phase 3 AURORA 1 study, the addition of voclosporin to mycophenolate mofetil (MMF) and low-dose steroids led to significant reductions in proteinuria at one year in patients with lupus nephritis (LN). Here we report on the recently-completed AURORA 2 continuation study evaluating voclosporin compared to placebo in patients treated for an additional two years after AURORA 1.

Methods: Patients with LN completing AURORA 1 were eligible to continue on the same double-blinded treatment of voclosporin or placebo in AURORA 2; all patients received MMF and low-dose steroids. Outcomes assessed over the three-year treatment period of both studies included adverse events, estimated glomerular filtration rate (eGFR), urine protein-creatinine ratio (UPCR), good renal outcome and renal flare. Good renal outcome was defined based on achievement of an adequate response (i.e. sustained reduction in UPCR to ≤0.7 mg/mg) and without renal flare (i.e. an increase to UPCR >1 mg/mg from a post-response UPCR of <0.2 mg/mg or an increase to UPCR >2 mg/mg from a post-response UPCR of 0.2 to 1.0 mg/mg), as adjudicated by a blinded Clinical Endpoints Committee.

Results: Overall rates of serious adverse events in the voclosporin arm (26.7% of 116 patients) and control arm (28.0% of 100 patients) were similar. There were no deaths in the voclosporin arm during AURORA 2; four deaths occurred in the control arm (pulmonary embolism, n=1; coronavirus infection, n=3). Mean corrected eGFR was within the normal range and stable over the study period including at the follow-up visit occurring 4 weeks after study drug discontinuation. The reductions in UPCR achieved in AURORA 1 were maintained in AURORA 2 (Figure 1) and significantly more patients in the voclosporin arm achieved a good renal outcome (66.4% in voclosporin vs 54.0% in control; p-value=0.045, Table 1). Renal flare occurred in 24 of 101 patients with adequate response in the voclosporin arm and 19 of 73 patients in the control arm (23.8% in voclosporin vs 26.0% in control; p-value=0.662); 69.8% of all patients with renal flares completed study treatment.

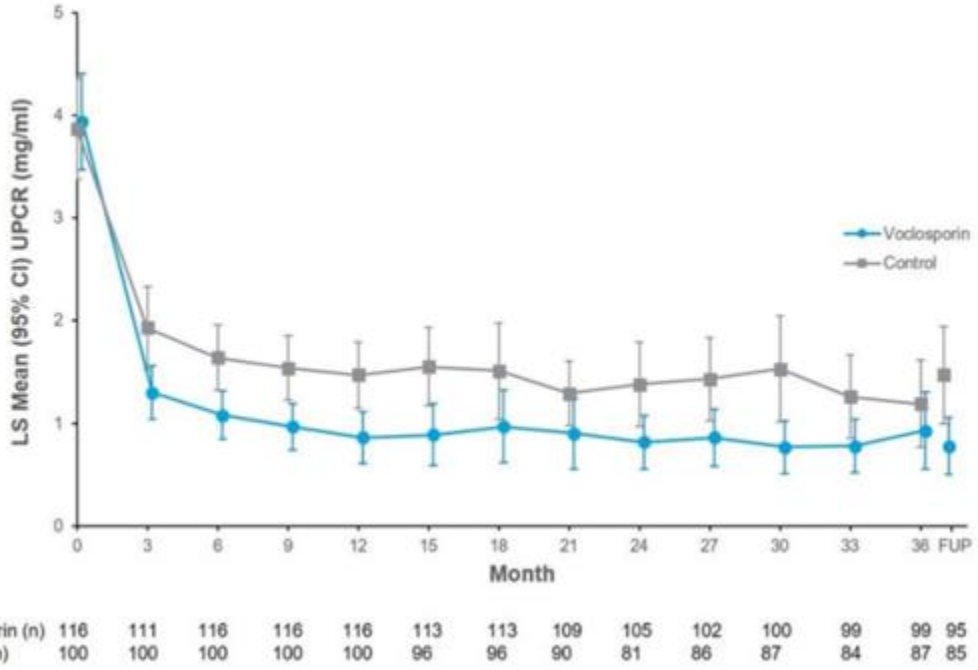
Conclusions: Voclosporin was well-tolerated over three years of treatment. The significant reductions in proteinuria initially achieved in AURORA 1 were maintained throughout AURORA 2, and more patients in the voclosporin arm achieved a good renal outcome. These data provide evidence of a long-term treatment benefit of voclosporin in patients with LN.

Table 1. Renal Outcomes over Three Years of Treatment

Patients, % (n/n)	Voclosporin	Control	Odds Ratio vs Control (95% CI)	p-value
Renal Flare	23.8% (24/101)	26.0% (19/73)	0.85 (0.42, 1.73)	0.662
Good Renal Outcome	66.4% (77/116)	54.0% (54/100)	0.56 (0.32, 0.99)	0.045

Analysis of AURORA 2 patients with adequate response, good renal outcome, and flare includes pooled data from AURORA 1 and AURORA 2. Good renal outcome was defined as achievement of an adequate response (i.e. sustained reduction in UPCR to ≤0.7 mg/mg) and without renal flare. Renal flare was defined as an increase to UPCR >1 mg/mg from a post-response UPCR of <0.2 mg/mg or an increase to UPCR >2 mg/mg from a post-response UPCR of 0.2 to 1.0 mg/mg. Adequate response and renal flare were adjudicated by a blinded Clinical Endpoints Committee. Odds ratios (OR) were calculated using a logistic regression model with terms for treatment arm, baseline UPCR, biopsy class, mycophenolate mofetil use at baseline and region; an odds ratio <1 indicates benefit of voclosporin. CI, confidence interval; UPCR, urine protein creatinine ratio.

Figure 1. UPCR Over Three Year Treatment Period



Analysis of UPCR in AURORA 2 patients includes pooled data from AURORA 1 and AURORA 2 including a follow-up (FUP) visit at 4 weeks after study drug discontinuation. CI, confidence interval; FUP, follow-up; LS, least squares; UPCR, urine protein creatinine ratio.

Tuesday 6th June 12:15 – 13:15

Track P2 – Glomerulonephritis & Vasculitis 2

Poster: 351
Submission: 320

A phase 3, multicenter, randomized, double-blind, placebo-controlled study to evaluate the efficacy and safety of sibeprenlimab administered subcutaneously in patients with IgAN

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[2]University of New South Wales, Sydney, New South Wales.
[3]Stanford University, Stanford, CA.
[4]Hospital Britanico de Buenos Aires, Buenos Aires.
[5]University of Leicester, Leicester, England.
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[7]Charles University, Prague.
[8]Peking University, Beijing.
[9]Juntendo University, Tokyo.
[10]Mount Elizabeth Novena Hospital, Singapore.
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[13]Visterra, Inc., Waltham, MA.
[14]Otsuka Pharmaceutical Development & Commercialization, Inc., Princeton, NJ

Background: Immunoglobulin A Nephropathy (IgAN) is the leading primary glomerulonephritis worldwide. Up to 40% of patients develop kidney failure ~20 years after diagnosis. Current treatment consists of optimized supportive care including renin-angiotensin aldosterone system (RAAS) blockade. New therapies targeting the underlying disease pathophysiology are needed. Emerging data suggest that the B cell growth factor, A Proliferation Inducing Ligand (APRIL), plays a key role in the pathogenesis of IgAN and may be an ideal target. Sibeprenlimab (VIS649), a humanized IgG2 monoclonal antibody (mAb) that inhibits APRIL, is being evaluated for the treatment of IgAN.

Methods: The VISIONARY Trial (NCT05248646) is a global Phase 3 randomized controlled trial which will assess the efficacy and safety of sibeprenlimab in adult patients with IgAN. Approximately 450 patients with biopsy-confirmed IgAN will be randomized to receive 400mg sibeprenlimab subcutaneously or placebo for 24 months, while continuing to receive standard of care. Key inclusion criteria: on maximally tolerated of RAAS blockade, 24 hr uPCR ≥ 0.75 g/g or urine protein ≥ 1.0 g/day, eGFR ≥ 30 mL/min/1.73 m^2. Patients with secondary IgAN, coexisting kidney disease, IgG < 600 mg/dL, MEST-C score T2 or C2 will not be included in the study. An exploratory cohort of 20 patients with eGFR 20-30 mL/min/1.73 m^2 will also be enrolled. The primary efficacy endpoint is to evaluate the change in 24 hr uPCR at 9 months compared with baseline. Key secondary efficacy endpoint is to evaluate the change in annualized eGFR slope over 24 months. Additional secondary endpoints include clinical remission, safety,

pharmacodynamics, and anti-drug Ab. Patients completing the trial will be eligible for a 24-month open label extension study (NCT05248659).

Discussion: Sibeprenlimab is a mAb that blocks APRIL, a B cell growth factor implicated in the pathogenesis of IgAN. A pivotal phase 3 trial is under way to assess the efficacy and safety of sibeprenlimab for the treatment of IgAN.

Funding Source: Otsuka Pharmaceutical Development and Commercialization Inc.

Tuesday 6th June 12:15 – 13:15

Track P2 – Glomerulonephritis & Vasculitis 2

Poster: 352
Submission: 333

Knowledge and uptake of vaccinations in patients with glomerulonephritis on immunosuppression medications

Dr Amanda Koh, Dr Marissa Koh, Dr Jason Diep, Prof Megan Griffith

Imperial College Healthcare NHS Trust, London

Introduction**:** Treatment of glomerulonephritis disease involves a range of immunosuppressive medications. Therefore, this patient cohort is more at risk of developing severe illness from infectious diseases due to both their kidney condition and the immunosuppressive medications. Current NHS/NICE guidance recommends these individuals receive additional vaccination courses or booster doses to provide adequate protection. The situation is complex for these patients as vaccination can precipitate relapses of disease in some patients and therefore clear information is needed to allow patients to make an informed choice. The aim of this project is to improve understanding of the role of vaccination amongst our patients in the glomerulonephritis clinic and potentially improve vaccination uptake.

Methods**:** This project involves four phases: baseline measures, staff education, patient education, and service design. To estimate current uptake rates in our patient group and understand their views regarding vaccinations, we developed a questionnaire to survey a sample of patients attending the glomerulonephritis clinic. Improvement interventions included production of an information letter for general practitioners (GPs) to provide clear guidance for this patient cohort and a patient information leaflet to address specific concerns, including those identified in the initial survey (Fig. 1). The development of these materials involved review of available guidance for immunosuppressed patients, seeking advice from experts in this field (from renal, rheumatology, haematology, and immunology) as well as seeking the opinions of the recipients of the materials (GPs and patients). These materials will then be implemented in Plan-Do-Study-Act (PDSA) cycles.

Results**:** The first round of data collection surveyed a sample of 52 patients from the glomerulonephritis clinic at a single tertiary centre. There were 26 male and 26 female patients with a wide range of ages (Fig. 2). Eighty six% of patients were on oral immunosuppression, and 46% were on intravenous immunosuppression. Vaccine uptake varied widely, ranging from 62% (influenza) to 8% (pneumococcal) and 6% (shingles) (Fig. 3). Lack of vaccine uptake was likely due to concerns raised by patients in the survey (e.g. side effects of vaccinations), general unawareness of the additional vaccines they should receive, and some difficulties obtaining vaccines (Fig. 4). Forty six% of patients had previously received specific information about vaccinations in immunosuppressed patients, 54% had not. The guidance produced for patients and GPs is being finalised following the findings of the survey; this will be given to patients and GPs. Data from subsequent PDSA cycles will be available for review by the time of the conference.

Discussion: Our preliminary results indicate a need for specific guidance on vaccination for patients with glomerulonephritis on immunosuppression medications. We anticipate that by empowering GPs to

provide the recommended vaccines and by providing clear information to help patients make an informed choice regarding vaccination, we can improve vaccination uptake amongst our cohort of patients, and ultimately reduce the rates of severe illness in our patients. Our next steps will involve utilising process mapping to ensure appropriate services are in place for patients to receive the recommended vaccines.

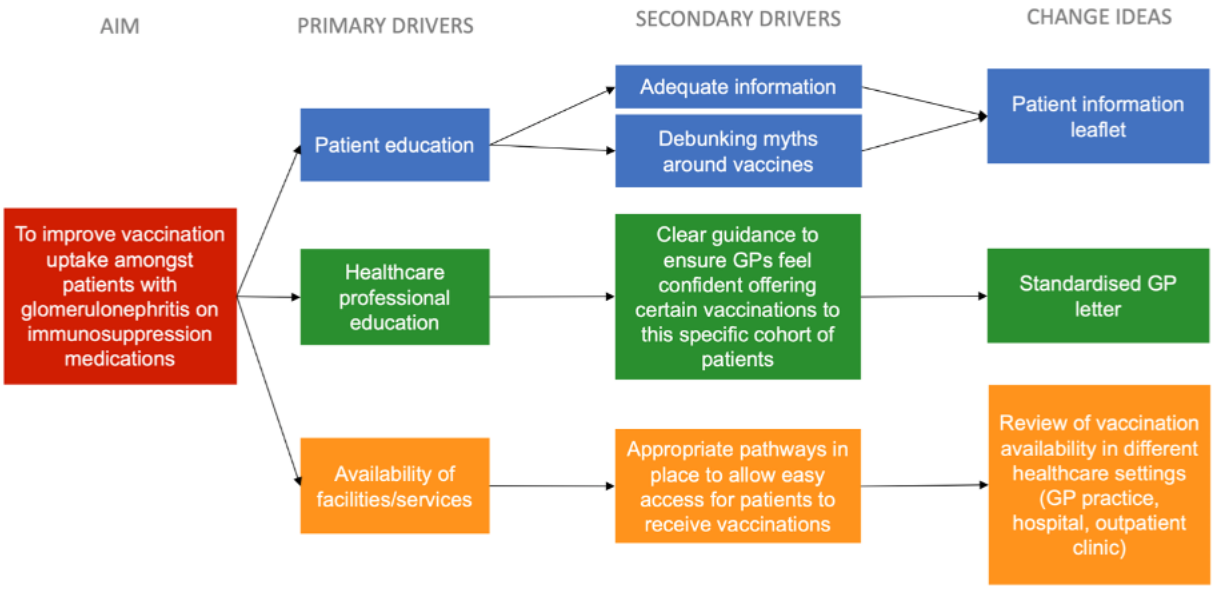


Figure 1: Driver diagram

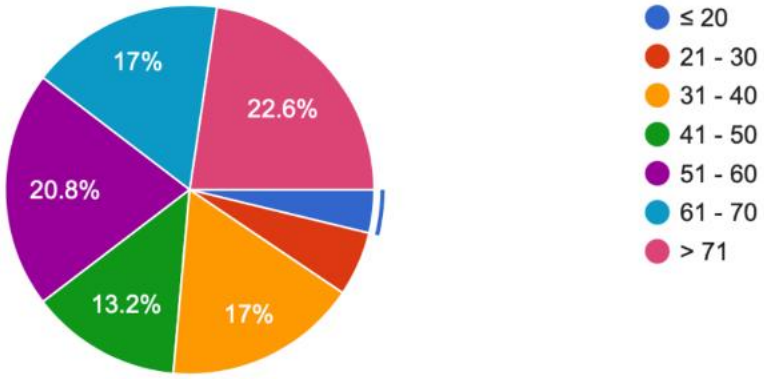


Figure 2: Pie chart of percentage of patients surveyed within a specific age cohort

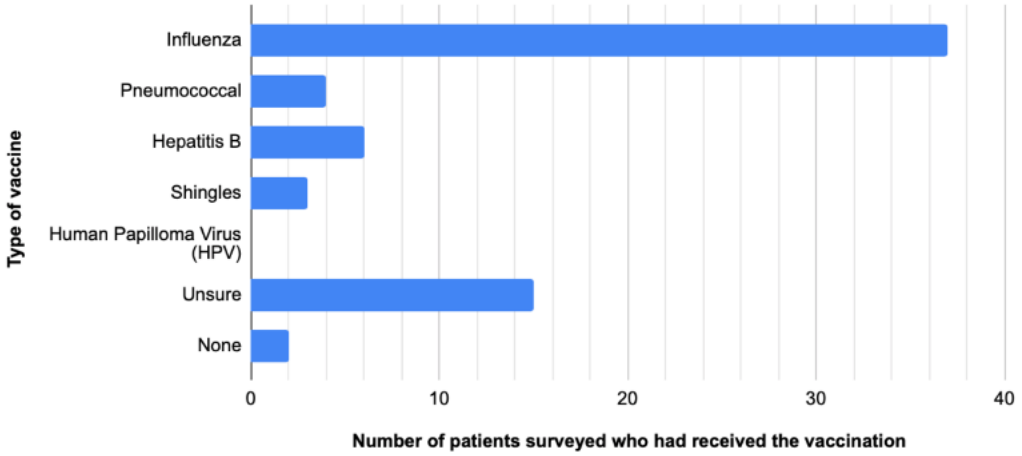
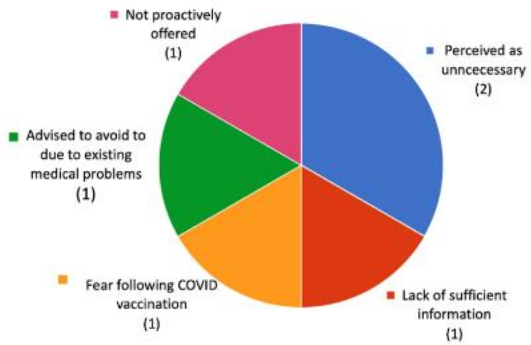


Figure 3: Bar chart of number of patients receiving specific types of vaccines amongst 52 patients



Themes	No. of patients	Verbatim data
Perceived as unncecessary	2	"Not needed", "not required"
Lack of sufficient information	1	"No information", "Unsure", "I don't know"
Fear following COVID vaccination	1	"COVID vaccines"
Advised to avoid to due to existing medical problems	1	"Advised due to my vasculitis condition"
Not proactively offered	1	"Not been offered"

Figure 4: Patient reasons to not receiving vaccines

Tuesday 6th June 12:15 – 13:15

Track P2 – Glomerulonephritis & Vasculitis 2

Poster: 353
Submission: 480

Outcomes of Anti-IL5 Receptor therapy in the management of Eosinophilic Granulomatosis with Polyangiitis (EGPA)

Dr Allyson Egan[1], Dr Pasupathy Sivasothy[1], Sr Caroline Owen[2], Sr Stella Burns[1], Mr Marcos Del Martinez Pero[1], Dr Robin Gore[2], Professor David R. W. Jayne[1,3]

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[2]Department of Respiratory Medicine, Cambridge University Hospital, Cambridge.
[3]University of Cambridge, Cambridge

Introduction: In the MIRRA trial for eosinophilic granulomatosis with polyangiitis (EGPA), 12-month (M) adjuvant therapy with anti-IL5 mAB Mepolizumab, accrued longer times in remission, reduced steroid exposure and reduced relapse rates. The aim of this study is to analyze the outcome of anti-IL5 cytokine receptor blockade with Benralizumab (BRZ) therapy, focusing upon steroid minimization.

Methods: In this retrospective descriptive study, 11 refractory EGPA patients received 30mg BRZ every 4 weeks for the first three doses, followed by 8 weekly thereafter. Immunotherapy assessment time points included BRZ commencement (M0), M6, M12, and time to last follow-up (TLF)on BRZ.

Results: In the study, two were (ANCA) anti-myeloperoxidase antibody positive, 9 were negative. All 11 patients commenced on BRZ continued therapy throughout the analysis [median duration 24M (range 18 – 29M)], due to clinical benefit. At T0, the mean prednisolone dose was 12.04mg, at T6 (6.45mg), T12 (4.5mg) and at TLF (3.18mg). Overall, there was a 50% reduction in steroid usage by 6 months. This continued to reduce to 24M (TLF), by which time 2 were off steroids and the remaining 9 were on prednisolone ≤ 5mg. The number on adjuvant conventional immunosuppressants (ACIS), reduced over time. At T0, 3 patients were on mycophenolate mofetil and one on RTX. At 24M (TLF), 2 were on MMF and none on RTX. One patient had 2 cycles of cyclophosphamide for myocarditis, with adjuvant BRZ well tolerated.

Discussion: The relapsing nature of EGPA places a dependency of therapy on steroids. This study demonstrated a 50% reduction in steroid dosage by 6 months. By 24 months, 2 are steroid free and a further 9 on weaning dose ≤ 5mg. Furthermore, the number on adjuvant conventional immunosuppression reduced over the 24M. This study demonstrates that anti-IL5 receptor therapy serves as a favorable model for steroid and conventional immunosuppressant minimization in EGPA.

Tuesday 6th June 12:15 – 13:15

Track P2 – Glomerulonephritis & Vasculitis 2

Poster: 355
Submission: 489

A dynamic and spatially compartmentalized cellular immune response circuit in the human kidney

Dr Benjamin Stewart[1,2,3], Dr Georgina Bowyer[2], Dr Nathan Richoz[2], Dr James Mccaffrey[2], Dr John Ferdinand[2], Dr Elena Prigmore[1], Dr Elizabeth Tuck[1], Dr Sarah Hosgood[4], Prof Michael Nicholson[3,4], Dr Sarah Teichmann[1], Prof Menna Clatworthy[1,2,3]

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The kidney cortex contains glomerular and tubulo-interstitial (TI) tissue compartments. Glomeruli are particularly affected in a range of autoimmune kidney diseases including those mediated by circulating immune complexes (ICs) (lupus nephritis, post infectious GN, cryoglobulinemic vasculitis). The tubulointerstitial compartment contains abundant proximal tubular epithelial cells (PTEC), and distal nephron epithelial subtypes in addition to an interstitial stromal and capillary network. Immune cells exist in both compartments, but their compartmental abundances and dynamic responses to immunologic perturbations such as ICs have not been explored in the human system.

We performed single-cell RNA sequencing (scRNAseq) on cells from glomerular and PTEC-depleted TI fractions of n=20 human kidneys using the 10X genomics Chromium platform (3'v3.1) in a densely genotype multiplexed design. Data were integrated and analysed using variational inference. Cortical tissue sections (n=4) were profiled by spatial transcriptomics (ST) (10X Visium FFPE platform). We performed normoxic normothermic machine perfusion over a four hour period on human kidney pairs (n=4). The right kidney was challenged with fluorescently-labelled OVA:anti-OVA-IgG ICs to model the acute phase of IC mediated inflammation; the left served as a matched control. We assayed cellular and molecular responses to this highly disease-relevant perturbation using compartmentally resolved scRNAseq (droplet and plate-based scRNAseq), ST, and multiplexed flow cytometry immunoassays. Single-cell and ST data were analysed using graph-based differential abundance analysis, RNA velocity estimation, and trajectory analysis.

We generated and annotated an integrated and spatially compartmentalised atlas of healthy human cells. Differential abundance analysis across the scRNAseq graph representation revealed highly compartmentalised immune cell composition, with glomeruli enriched for monocytes, dendritic cells, and NK cells, whereas the TI fraction housed adaptive lymphocytes (T & B cells), and tissue macrophages. This compartmental organisation was supported by ST data. Expression patterns of activating FcɣR suggested that glomeruli house leukocytes poised to respond to circulating ICs. We performed an integrated analysis of scRNAseq data from IC perturbation experiments and identified shifts in cell states driven by dynamically expressed and cell-type specific gene modules. These

responses were evident in glomerular monocytes and NK cells, and glomerular endothelial cells (GECs). We observed upregulation of inflammatory mediators including IL1**β**, CXCL8, TNF-**α**, F3 (tissue factor), and IL6. In addition to elaborating the neutrophil recruiting signals CXCL8 and CSF3, glomerular endothelial cells upregulated TGF**β**3 suggesting the onset of a reparative program. Cells responding to ICs upregulated receptors for secreted inflammatory mediators. We FACS sorted single-cells on the basis of their binding to fluorescently tagged ICs and performed indexed plate-based scRNAseq. These data demonstrated that glomerular NK cells and monocytes bind to ICs whereas GECs do not, suggesting the GEC response programme is downstream of signals elaborated by monocytes and NK cells.

Overall, this study provides novel insights into the spatial organisation of immunity in the human kidney. We have uncovered a cell circuit localised to the glomerulus which mediates the earliest steps in the inflammatory response to ICs, and have revealed the cell-type specific signalling that orchestrates tissue inflammation at the glomerulus.

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Track Q1 – Home Therapies 1

Poster: 356
Submission: 076

A clinical audit of patients in Northern Ireland who transferred from haemodialysis to peritoneal dialysis

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Introduction: Haemodialysis (HD) and peritoneal dialysis (PD) are the two common dialysis modalities available for patients with end-stage kidney disease (ESKD). PD is known to have several clinical benefits over HD, including better early survival rate, lower cost, higher patient satisfaction and quality of life (QoL), and improved kidney transplant outcomes.[1] Globally, 18% to 34% of adult patients require HD before transferring to PD.[2-4] This audit aims to outline the characteristics of adult PD patients in Northern Ireland (NI) who transferred from HD.

Methods: We identified all adult patients who underwent PD catheter insertion between 01/09/2020 and 30/04/2022 from our prospective database. Our primary outcome measure was the proportion of patients who were on HD prior to PD ("HD-to-PD-switch") and those who were never on HD ("PD-first").

Other secondary outcome measures were:

1. Reasons for "HD-to-PD-switch";
2. PD drop-out rates in both groups (censored for kidney transplantation and death);
3. PD-associated complications and mortality rates in both groups.

The audit standard is the global percentages of "HD-to-PD-switch", which is 18% to 34%.[2-4]

Results: 18% (n=17) of 94 patients were transferred from HD. Of these, 23.5% (n=4/17) had an initial preference for PD but needed HD before PD catheter insertion (Figure 1).

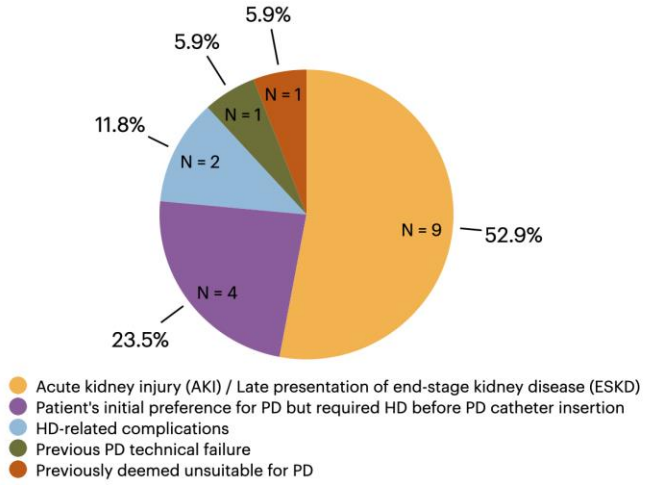

Figure 1 Reasons for HD to PD transfer

At 3 and 12 months, the PD drop-out rates were higher among the “HD-to-PD-switch” patients (Table 1). Two-third of early PD drop-outs in these patients were secondary to psychosocial reasons (Figure 2).

Variable	**PD-first**	**HD-to-PD-switch**	**Total**	**p-value**
3 months				
Number of patients, n	72	15	87	
PD drop-out	4 (6%)	5 (33%)	9 (10%)	0.007
12 months				
Number of patients, n	36	8	44	
PD drop-out	2 (6%)	3 (38%)	5 (11%)	0.035

Table 1 PD drop-out rates in "PD-first" and "HD-to-PD-switch" patients

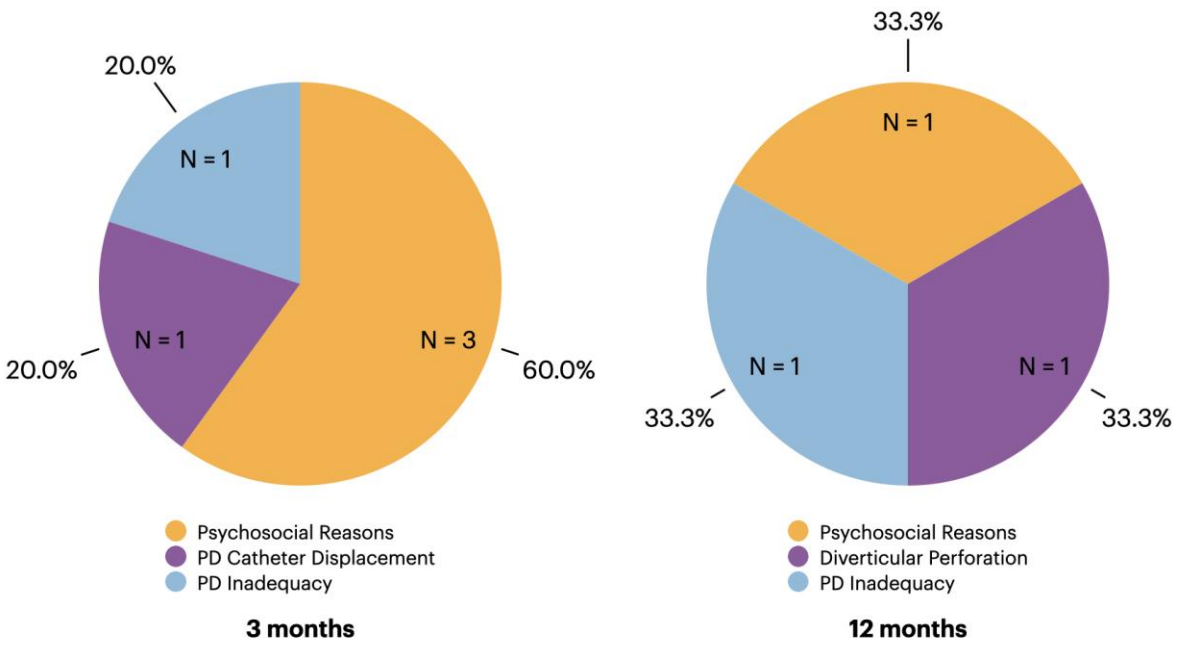

Figure 2 Reasons for PD drop-outs in HD-to-PD-switch patients at 3 and 12 months following PD catheter insertion

The PD-associated complications and mortality rates were similar across both groups.

Discussion/Conclusion: These results suggest there are opportunities to improve the uptake of "PD-first" approach, specifically among the patients who have expressed an initial preference for PD. Psychosocial differences between the "PD-first" and "HD-to-PD-switch" patients should also be further explored, given this is the commonest reason for PD drop-out after switching from HD.

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Tuesday 6th June 12:15 – 13:15

Track Q1 – Home Therapies 1

Poster: 357
Submission: 234

The importance of patient education and training in reducing peritonitis rates – Our 15 year experience

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Background: Peritonitis is an important complication of peritoneal dialysis (PD) and contributes to morbidity and mortality. It is also a leading cause of catheter removal and technique failure necessitating change in modality. In order to achieve low peritonitis rates, successful patient education and training programme is essential.

Methods: Our peritonitis rates in 2007 were 0.7 episodes per patient year. In order to address this, we implemented a structured patient education programme along with prospective data collection and continuous monitoring of infection rates and patient outcomes. The structured curriculum for patient PD education that we formulated in 2007 has been modified to accommodate staff shortages and more recently due to COVID as shown in Table 1

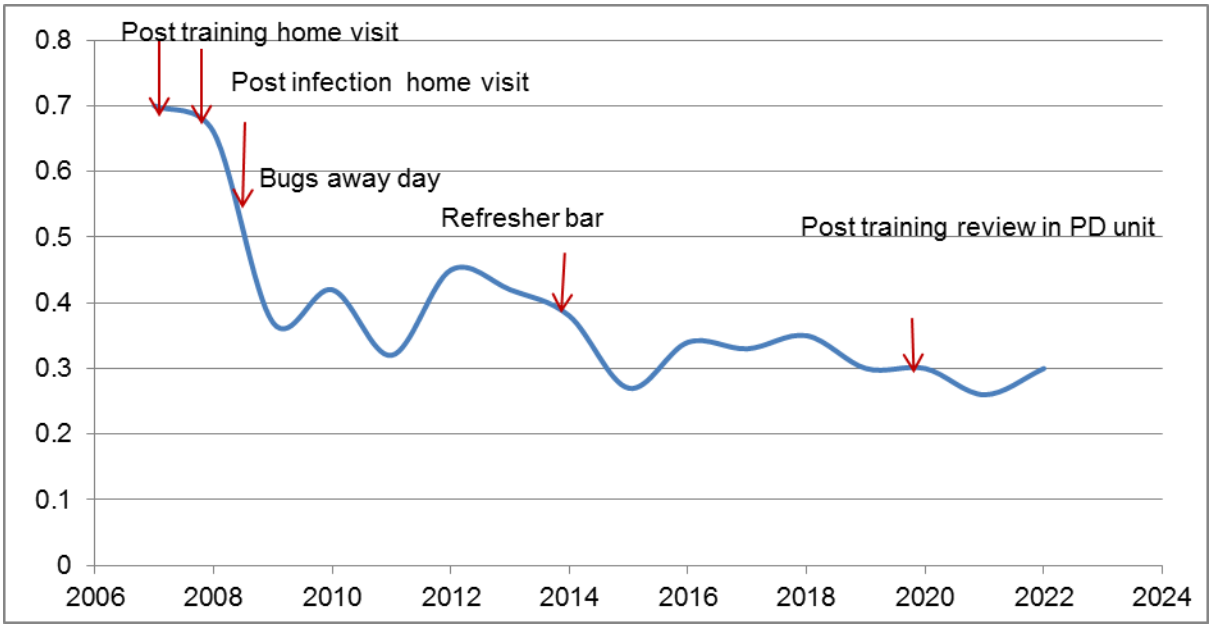
Results: By continually adapting our patient education program, our peritonitis rates have reduced from 0.7 in 2007 to <0.4 episodes per year in 2012 and 0.3 episodes per year since 2019. Monthly governance meetings and continuous data monitoring are important in building focus and is helpful in sustaining enthusiasm

Conclusion: The data presented above shows that is possible to reduce peritonitis rates and sustain it in the long run. Patient training and education is not a “luxury” but an essential part of any Peritoneal Dialysis Program.

Activity	In 2007	In 2022
Patient training	Provided by the PD nurse on 1:1 or 1:2 ratio in QE PD unit	Additional support from industry partners for training. Pathways in place for post training support to make sure that the curriculum is covered
Post training home visit- when additional training was given in home environment and any adequacies addressed	• Home visit to be conducted within 1 week after training	• Post training review conducted in PD unit using the same format at 1 week after training

	• Home visits is often the first thing to stop with staff shortages	• Slowly returning to 1 day allocated for home visit per month • Supported Band 3 nurse Trainer- a pilot project
"Bugs away day"- retrain and reinforce knowledge in hand hygiene, care of exit site and to recognise contamination and infection	• 5-7 new patients (4-12 weeks after training) were invited for group education • Combined with dialysis adequacy test to improve attendance	Paused during COVID (2020-2022) years. Restarted June 2022
Post peritonitis home visit	Within 2 weeks of peritonitis treatment and provide re-training	Review done in PD unit if home visit not possible
"Refresher bar"- check on handwashing, complete questionnaire on basic knowledge of infection prevention	Conducted during clinic visits	Challenging to implement in a 1:1 manner In the new year this will be supported by Band 3 nursing

Graph



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Track Q1 – Home Therapies 1

Poster: 358
Submission: 249

A quality improvement project to increase access to home dialysis therapies - the journey so far

Ms Claire Johnstone, Dr Yasser Al-MulaAbed, Ms Karen Baguley, Ms Anna Ely, Ms Janet Blood, Dr Rajkumar Chinnadurai, Ms Joanne Collier, Ms Laurie Crosby, Ms Emma Jenner, Dr David Lewis, Ms Faith Mapfeka, Ms Lucy Watson, Ms Liana Ramzan, Dr Dimitrios Poulikakos, Dr Rosie Donne, Dr Thilini Abeygunaratne

Salford Royal Foundation Trust, Manchester

Introduction: The Renal Getting it Right First Time (GIRFT) report (2021) highlighted the benefits and cost-effectiveness of home dialysis (peritoneal (PD) or home haemodialysis (HHD)) for patients with CKD stage 5. The national average prevalent rate is 17% of dialysis patients on home therapies, with a target of 20%. In our centre in 2020, 24% of prevalent dialysis patients were on home therapies but this reduced during 2021 to 20.8% coinciding with the COVID-19 pandemic. Our project aim was to increase our prevalent home dialysis therapies rate to 26% by 31/12/22.

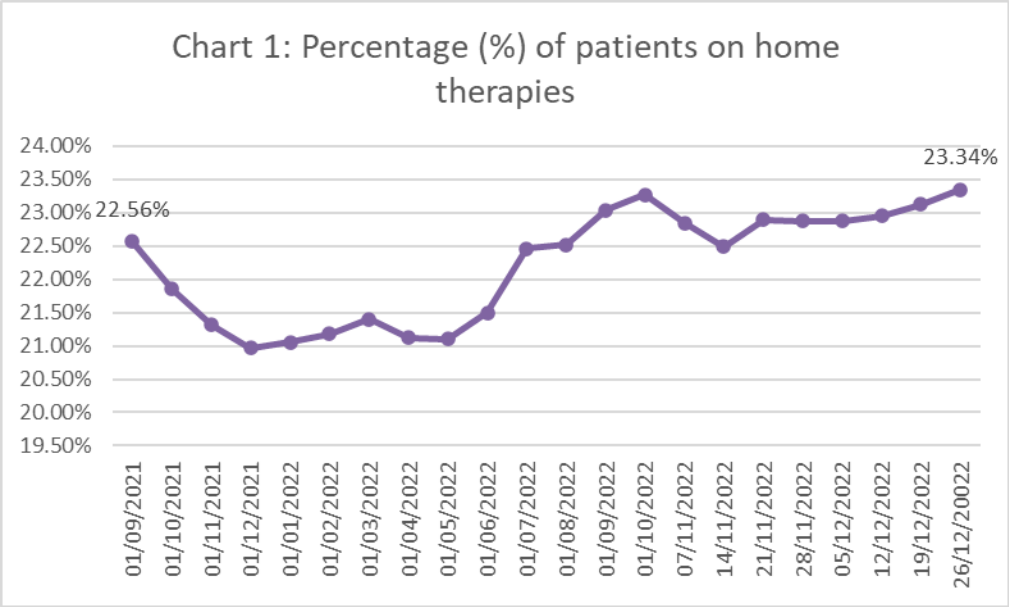
Methods: A multifaceted QI initiative was undertaken by a newly defined multidisciplinary team (MDT). Team members attended Kidney Quality Improvement Partnership (KQUIP) QI workshops including expert patient attendees and participated in the Improvement Science for Leaders (IS4L) Programme. Methodologies included process mapping of the Advanced Kidney Care (AKC) to PD / HHD pathways; Appreciative Inquiry; driver diagrams; run charts; Plan-Do-Study-Act (PDSA) cycles; patient questionnaires. Medical records were interrogated to understand how trends in dialysis modality choices correlated with AKC patient education methods during 2020-2021. Challenges identified included staff shortages; lack of in-person patient education; reduced home HD training area; delays in home HD training and machine installation.

Change ideas included: staff education sessions; early assessment by the PD team for patients with uncertain suitability; protocols for patient assessment and acute PD; staff training on PD tube insertion; improvements to the electronic patient record; videos by expert patients.

Outcome measures - number and % of patients on home therapies. Process measures are number of patients in the following groups - PD/HHD/hospital HD; training for HHD; stopping home therapy (and reason).

Results: The project has raised departmental awareness and facilitated home dialysis by improving pathways, reducing delays increased education and patient support.

Chart 1 shows the % of patients on home therapies rose from 20.9 to 23.3% with increases in number of patients on PD and HHD. A Commissioning for Quality and Innovation (CQUIN) on shared decision making in AKC clinic scored 86% (benchmark 75%).



Other outcomes include filling nursing vacancies, restoration of in-person patient education and pre-pandemic HHD training capacity; structured AKC patient education pathway; PD tube insertion 5 days/week; practical and financial support for home therapies patients by local Kidney Patients Association; creation of new expenses reimbursement pathway.

Conclusion: The multidisciplinary project team achieved measurable improvements in access to home dialysis therapies by use of QI methodologies. Patients benefit from a structured pathway to support preparation and smooth transition onto home dialysis. Embedded new working practices, culture and multidisciplinary teamworking support sustainability of the initiatives. Next steps include a focus on increased use of PD for unplanned starters to dialysis accompanied by ward staff education and improving the HHD training process.

Tuesday 6th June 12:15 – 13:15

Track Q1 – Home Therapies 1

Poster: 359
Submission: 256

The 3 Rs: identifying risk factors for recurrence, relapse and repeat infections of PD peritonitis.

Dr Mark Davies, Ms Gemma Henry, Mr Gareth Bryant, Mrs Helen Thomas, Dr Helen Jefferies

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Introduction: Peritoneal dialysis (PD) peritonitis is the leading cause of PD "failure" (1) and can result in hospitalization and death, as well as impacting on peritoneal membrane function (2,3). Relapses and recurrence of peritonitis (new infection within 4 weeks of completing treatment with the same or different organism, respectively) are both also associated with increased adverse outcome (4,5).

Intraperitoneal vancomycin is the preferred empirical antibiotic in most centres. Whilst some studies have not shown an association between vancomycin levels and peritonitis resolution (6,7), others have suggested that higher trough vancomycin levels correlated with reduced rates of relapse (8). Despite implementation of a vancomycin prescription protocol there was concern in our centre about variations in achieved vancomycin levels. There were also concerns about the potential effect of delayed training, particularly during the covid pandemic. We wanted to survey our local rates of relapse and recurrence and what factors, if any, predicted these.

Method: All peritonitis episodes in our centre were retrospectively identified over a 3+ year period, beginning April 2019. Collected data included date of catheter insertion, date of training, organisms, treatment (including vancomycin levels, if given), as well as relevant outcomes (recurrence, relapse or repeat infection, death and stopping PD).

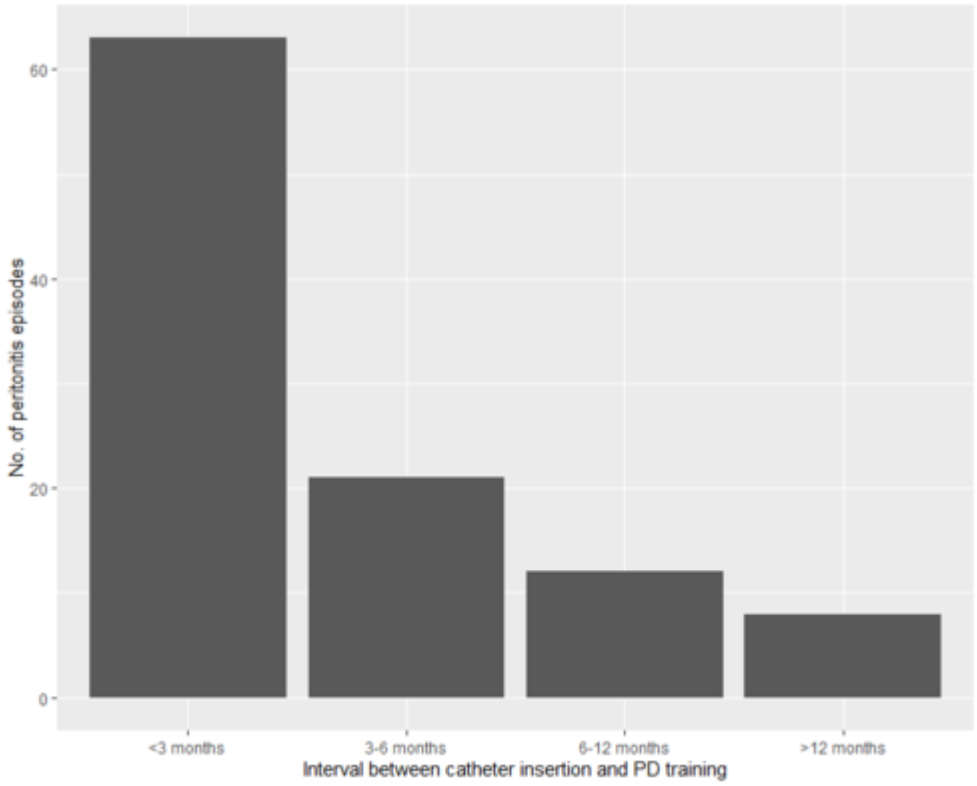
Results: 122 infections were recorded in this period. Rates of recurrence etc were steady across the time period (Table 1). The greatest proportion of infections occurred in patients with short intervals between tube insertion and training (Figure 1). Analysis did not show that vancomycin prescription related factors (patient urine output, dosing intervals, initial dose) significantly impacted vancomycin levels. More infections appeared to occur in patients with a short interval between catheter insertion and commencing therapy. In logistic regression neither vancomycin levels, treatment duration, catheter insertion to training interval or organism was a significant predictor of recurrent/relapse or repeat infection or of stopping PD therapy.

Table 1: Adverse outcomes and tube removals by year

Outcome	2019-20	2020-21	2021-22	2022-23
Recurred	2 (6%)	0	1 (3%)	3 (10%)
Relapsed	3 (10%)	4 (13%)	5 (16%)	4 (14%)
Repeat	4 (13%)	4 (13%)	6 (19%)	1 (3%)

Outcome	2019-20	2020-21	2021-22	2022-23
Resolved	15 (48%)	12 (39%)	10 (32%)	16 (55%)
Tube removed	7 (23%)	7 (23%)	5 (16%)	5 (17%)
Died	0	4 (13%)	4 (13%)	0

Figure 1: Interval between catheter insertion to training and occurence of peritonitis



Discussion: Preventing PD peritonitis, and it's possible sequelae, is a priority for the renal MDT. In patients with infection episodes, this means preventing relapse, recurrence and repeat infections. None of the variables entered into our analysis was a significant predictor. The high proportion of infections patients with shortest interval from catheter insertion to training may suggest a link with the degree of urgency with which dialysis needed to start. We believe that patient specific factors are likely to be critical, as well as staffing constraints limiting patient support. A limitation of the current analysis is the absence some data including PD fluid white cell count and concurrence of exit site infection. Our planned next steps include examining this additional data and reviewing patient training practices to identify variations.

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Track Q1 – Home Therapies 1

Poster: 360
Submission: 283

Improving rates of PD peritonitis: impact of the Midlands Renal Network regional subgroup on PD peritonitis at a single centre

Dr Jennifer Allen, Sr Rachel Humphreys, Ms Ginette Brewster

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Introduction: Peritoneal dialysis (PD) peritonitis rates are high in the UK, and particularly the Midlands. As part of the Midlands Renal Network a regional subgroup was established to focus on improving rates of PD peritonitis. This group set a target to achieve an average peritonitis infection rate of <0.35 and no unit to have a rate of above 0.40 in the East and West Midlands by October 2024. As part of this quality improvement process, we developed two quality improvement projects.

Methods:
Project 1 was to develop proactive technique refresher training for all patients on PD. We identified named nurses to take on refresher training, all prevalent PD patients to were invited to sessions run on a monthly basis. We aimed to offer all patients refresher training within 6 months of starting PD.

Project 2 was to develop a continuous quality improvement project by revamping our peritonitis review meetings. The aim was to improve treatment of peritonitis and identify themes for quality improvement. We used the format from current peritonitis review meetings but increased their frequency from yearly to quarterly. Root cause analyses (RCAs) were performed for every episode of peritonitis a rolling peritonitis action plan was put in place. We added in weekly real time reviews of all current cases of PD peritonitis or exit site infection.

Results:
Project 1 started in January 2022. All prevalent PD patients on PD for greater than 6 months were invited to attend a refresher session. We struggled with low uptake and reduced the frequency of sessions due to lack of interest. The last session had 15 patients invited, with 12 confirming attendance (80%) but only 3 (25%) of those attended. We did however receive excellent feedback from patients who did attend.

Project 2 also started in January 2022. We were easily able to integrate a weekly review of all peritonitis cases into standard practice. We found these meetings led to more proactive management of exit site infections. We identified any prescribing errors early, and tailored antibiotic regimes according to the clinical picture. The quarterly review meetings were manageable in terms of numbers of patients discussed, and led to realistic action plans being put into place.

At the end of year 1 of our quality improvement project being embedded in practice we saw a fall in our peritonitis rates, with an average rate over the final quarter of 2022 0.45 episodes per patient year (Figure 1, 2).

Discussion: Peritonitis rates in our unit remain above ISPD targets and the target set by our regional subgroup. However, with the introduction of our quality improvement project we have seen a significant decline in our peritonitis rates. Our projects need ongoing development, to increase patient engagement and uptake of refresher sessions, and to allow themes and actions from RCA meetings to be put in place.

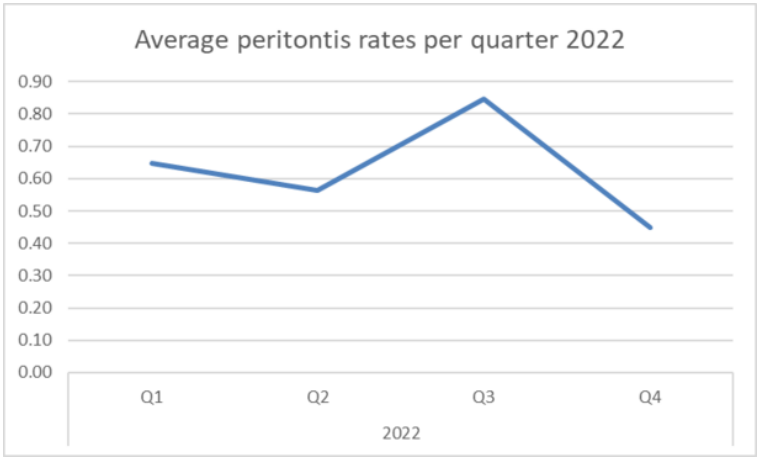

Figure 1. Average peritonitis rates per quarter

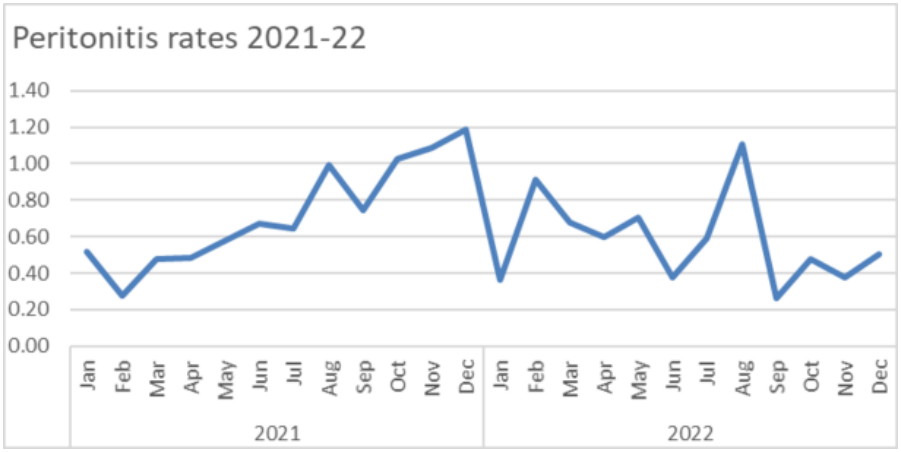

Figure 2. Change in peritonitis rates 2021-22

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Track Q1 – Home Therapies 1

Poster: 361
Submission: 290

Does incident temporary haemodialysis influence outcomes in people receiving peritoneal dialysis?

Dr Osasuyi Iyasere[1,2], Dr Mohamed Mansour[1], Dr Hadeel Ahmed[1], Dr Ismail Anees[1], Dr Maged Elsiae[1]

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Introduction: Transition between kidney replacement therapies (KRT) is common among people with end stage kidney disease (ESKD), with permanent transition from peritoneal dialysis (PD) to haemodialysis (HD) recognised as an important clinical endpoint. At our centre, approximately 30% of low clearance patients, opting for PD, start KRT on incentre HD. This is a recognised risk factor for reduced uptake of home therapies. Moreover, there is limited evidence on the impact of HD on subsequent outcomes on PD.

In this retrospective audit, we evaluated the impact of prior incident HD on peritonitis rates, technique failure (permanent switch to HD) and mortality.

Methods: All patients who had received PD between 2000 and 2018 were identified using our renal database (PROTON). Data relating to demographics, comorbidities and clinical outcomes were retrieved. Statistical analysis was undertaken to compare clinical outcomes between PD patients with a prior HD vintage and those without. A subgroup analysis was undertaken for those with incident HD exposure, to determine the reasons for transition from HD to PD and their impact on clinical outcomes.

Results: 858 PD patients, 206 of whom commenced KRT on HD, were identified and included in the analysis. Those with prior HD exposure were marginally younger [median age 59.9 (46.4 - 68.2) vs 61.1(50 – 72.1) years, $p = 0.05$] ; predominantly of male gender (60.1 % vs 52.4%, $p = 0.05$) and with lower residual kidney function at the onset of PD [Residual Kt/v of 0.46 (0.10 to 0.82) vs 1.07(0.68 to 1.48), $p < 0.01$]. There was no significant difference in the comorbidity burden or ethnic mix between the groups. The median HD vintage was 6 (2 to 17) months, for those with prior HD exposure.

Those with prior HD exposure had shorter time on PD [months – 12 (4 -24) vs 15 (6 -29), $p < 0.01$], higher mortality rate (28.1% vs18.2%) and peritonitis rates [incidence rate ratio =1.22 (1.18 – 1.25), $p < 0.01$]. There was no difference in the proportion of patients who permanently transitioned to HD (47.6% vs 46.9%). In multivariate cox regression analysis, technique survival was not associated with prior HD exposure but with residual kidney function at the onset of PD [HR – 0.71(0.58 to 0.87) and peritonitis episodes [HR – 1.46 (1.37 to 1.56). Those with prior HD exposure had a higher risk of death [HR 3.23 (1.44 to 7.24), $p=0.005$].

The reasons for transition from HD to PD included: change in patient preference (47.1%), PD was the original KRT choice (21%), limited vascular access (16.5%), 10.7% unknown and HD intolerance (4.4%).

Limited vascular access was associated with higher peritonitis rates in this subgroup [B = 1.41(0.58 to 2.24), p <0.001).

Discussion: Our single centre experience indicates that prior HD exposure is associated with higher peritonitis and mortality rates in people receiving PD, but not with technique failure. Change of KRT preference was the most common reason for transition, with vascular access limitations identified as a risk factor for higher peritonitis rates. Patients with such limitations may well require closer monitoring.

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Track Q1 – Home Therapies 1

Poster: 362
Submission: 338

Quality improvement in the home dialysis utilities reimbursement pathway – a key driver of true patient choice in dialysis therapies

Dr Thilini Abeygunaratne, Ms Jayne Moore, Ms Faith Mapfeka, Ms Janet Blood, Ms Laurie Crosby, Mrs Karen Baguley, Ms Anna Ely, Ms Joanne Collier, Ms Claire Johnstone, Mrs Emma Jenner, Ms Lucy Watson, Ms Liana Ramzan, Dr David Lewis, Dr Dimitrios Poulikakos, Dr Rosie Donne, Dr Yasser Al-Mula Abed

Renal Dept, Salford Royal Hospital, Northern Care Alliance NHS Foundation Trust, Salford

Introduction: Home dialysis offers improved quality of life and autonomy for patients with end stage kidney disease. The NHS England service specification for home haemodialysis (HHD) states that patients should be reimbursed for the increased utility costs associated with home dialysis, which may include electricity, gas, water and telephone. Dialysis providers should have a system in place allowing patients to reclaim utility costs. Reimbursement should meet the average additional cost to the individual bill payer (patient) irrespective of receipt of any benefits. Our renal unit had a reimbursement policy in place but not all home dialysis patients were accessing it. The home therapies QI project team identified patients' concerns that rising utility bills may impact their choice of home dialysis. This arm of the project aims to address some of the health inequalities in dialysis provision by redesigning a fair, accessible reimbursement pathway.

Methods: A multidisciplinary team including admin and management support met regularly to review and simplify the reimbursement pathway. Informal feedback on the pathway was sought from HHD patients. Recommendations of the Association of Renal Technologists were obtained to standardise practice. The team discussed how the simplified pathway could be implemented with maximal impact and reach.

Home Haemodialysis Patients (HHD)	
Heating (and lighting)	550 units per quarter 2200 per year
Electricity	450 units per quarter 1800 per year
Water and sewage	50 cu metres per quarter (meter only)
Gas	No reimbursement for gas as electricity tariff price used for heating

Automated Peritoneal Dialysis (APD)	
Electricity	450 units per quarter 1800 per year

Results: A simplified reimbursement pathway was co-designed by all stakeholders. A patient information leaflet was created to outline the simplified process. Since early October 2022, all patients on HHD have successfully claimed reimbursement, which is submitted quarterly and backdated for 12 months if necessary. Patient feedback was very positive, and the project has improved staff morale, knowing that maximal efforts are being made to support patients with home dialysis during the cost of living crisis.

The advanced kidney care team now proactively discusses reimbursement with patients during the pre-dialysis education pathway to support informed choice of future dialysis modality.

Conclusion: Our home therapies QI team identified reimbursement of home dialysis utilities costs as an important driver of sustainable home dialysis. A multidisciplinary subgroup rapidly co-designed and implemented a new, accessible reimbursement pathway with subsequent full uptake by HHD patients. This model is more generous than many others in the UK. Further work will focus on full implementation for patients receiving peritoneal dialysis, including heating costs. This work provides an example of best practice which will assist the drive for national standardisation of reimbursement costs and contribute to increased uptake of home dialysis therapies.

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Poster: 363
Submission: 364

90-day Peritoneal Dialysis Catheter Outcome: A Single Centre UK Observational Study

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Introduction: Medical and surgical (open and laparoscopic) Peritoneal Dialysis Catheter (PDC) placement and their success at initiation of long-term dialysis is vital for increasing home therapies in any centre as a good patient experience increases acceptance of modality and PD survival. However, medical PDC and laparoscopic service is not universally available. In our centre, we have 2 medical and 6 surgical operators who provide PDC service and drive high rates of incident patients starting on PD as their choice of RRT and home therapies accounting for 32% in our dialysis program. We wanted to look at 90-day survival rates of these PDC and compare them between two techniques, and within each operator to identify factors for PDC loss.

Methodology: We started retrospectively last year and then prospectively collected data of all our PDC between Feb 2021 and Jan 2023. We collected key patient demographics, technique (medical, m-PDC and Surgical, s-PDC) and operator data from our renal database. We excluded PDC performed within last 90 days. Data divided into 4 groups - A. Survived 90-day B. Failed before 90-days C. Unsuccessful insertions. D. Not on PD but with functioning catheter at 90-days.

Results: Total of 88 catheters placements were performed during the study period. Mean age was 62.6(15.2) yrs., 38.6% F, 45.5% diabetes and 49% were open surgical. Group split(n=) for A, B, C and D was 48, 25, 7 and 8 with overall 90-day PDC survival of 54.5%.

Among groups, there was no difference in age, gender or diabetes (Table 1.1). In Group A, 90-day PDC survival was 42.2%(m-PDC) and 67.4% (s-PDC) respectively. Twenty-five PDC failed (Group B) - 27.9% (s-PDC) and 28.9%(m-PDC) - due to non-function (17), infection (3), PD leak (2) and one each for drain pain, PDC falling out and visceral perforation. In Group C(n=7) all unsuccessful insertions were m-PDC. In Group D(n=8), 3 -died, 2-recovered, 1-patient changed RRT choice, 1 -transplanted and 1-membrane failure. Two techniques differed widely in number of PDC procedures performed by each operator – between 4 to 17 in s-PDC and 12 to 33 among m-PDC. Operator success rate varied from 33% to 88%. (Fig.1.1 , 1.2).

Discussion: There was no difference in age, gender and diabetes on 90-day PDC survival. Medical insertions were unsuccessful in 15% despite pre-assessment and is a well-known consented risk. High rates of 90-day PDC failure were noted in both PDC techniques at 90-days that is at least related to operator variability. Modifiable factors to improve early catheter success (besides patient education) would include first catheter technique selection, catheter placement practices, limiting operators and exploring laparoscopic and advanced techniques of catheter placement in our centre. We aim to bring down a 90-day PDC failures rates to below 20% in next year.

Tuesday 6th June 12:15 – 13:15

Track Q1 – Home Therapies 1

Poster: 364
Submission: 422

Substantial increase in number of starters to peritoneal dialysis in a single centre following introduction of medical insertion of PD catheters

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Introduction: Preparation for renal replacement therapy (RRT) is one of the most important aspects to a specialised renal service as it sets the scene for the subsequent health and quality of life of kidney patients. Key principles include timely preparation and equitable access to appropriate treatments. It is recognised that there are multiple benefits in peritoneal dialysis (PD), compared to in centre haemodialysis (HD). These include maintenance of more patient autonomy, more flexibility, ability to travel, prolonged preservation of residual kidney function which allows for a more liberal diet and cost efficiency. Access to PD is often limited by lack of availability of surgical insertion of PD catheters for multiple reasons that include high patient risk for general anaesthesia, and long waiting times for surgical slots. Therefore, following training of two nephrologists from the Department, in 2020 we introduced medical insertion of PD catheters under local anaesthesia to address some of these barriers and improve accessibility to PD. The aim of the audit was to assess characteristics, modality and access for all new starters to RRT from advanced kidney care clinic (AKCC) before and after this pathway was embedded with the aim of increasing the number of patients starting PD.

Methods: We evaluated all patients who started RRT from AKCC in 2020 and 2021 and compared results from the two periods. Data was examined retrospectively from iCLIP and Clinical Vision 5, the renal database and analysed with Microsoft excel.

Results: Number of new starters to RRT from AKCC were similar in 2020 (n=54) and 2021 (n=56). Demographics between the two years were similar with median age of 61 years of whom 35 (62.5%) were male. In 2020, 39 (72.2%) of all new starters were established on HD, 11(20.3%) on PD, of which 2 (18%) had a medical PD catheter insertion, & 4(7%) were pre-emptively transplanted. In 2021, 33 (58.9%) new starters commenced HD, 21 (37.5%) PD, of which 11 (59%) had a medical PD catheter insertion, & 2 (3.6%) were transplanted. There was a substantial increase in the number of patients starting PD and those undergoing medical PD catheter insertion in 2021 compared to 2020. 20% of all new starters to RRT were in AKCC for <3 months with a direct correlation between less time in AKCC and less desirable outcomes of fewer starters to PD, more lines as initial access for HD starters and less pre-emptive transplantation.

Discussion: Results from 2021 show successful uptake of medical PD catheter insertion with a threefold increase in this method of PD catheter insertion compared to 2020. This has contributed to the doubling of patients starting PD and achieving the target of a minimum 20% prevalent rate in home therapies. The higher proportion and numbers starting on PD is an overall cost saving to the Unit but there is an

increased demand on the PD team particularly as the initial period when starting PD requires more intense nursing input. We aim to use these figures to support staff expansion in this area.

Tuesday 6th June 12:15 – 13:15

Track Q1 – Home Therapies 1

Poster: 365
Submission: 464

Percutaneous peritoneal dialysis catheter insertion: Feasibility and cost effectiveness compared to surgical technique

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Introduction & Aims: Peritoneal dialysis (PD) remains a vital option for renal replacement therapy in patients with chronic kidney disease (CKD) with its significant advantages for most patients and only possible option for certain group of patients. PD catheters can be inserted using surgical (open or laparoscopic) or percutaneous techniques. It is widely accepted that both techniques should be available to optimise uptake of PD, presenting a challenge for units who have historically relied on surgical insertions only. In order to develop a percutaneous PD catheter insertion service at a centre using only surgical insertions, we reviewed PD catheter insertions over 1 year, to determine how many could be inserted using the percutaneous technique and the cost effectiveness compared to surgically placed PD catheters.

Methods: We extracted all patients data who had PD catheter inserted in 2021 from our renal database. We excluded patients who were <18 years old. Criteria for eligibility for percutaneous catheter insertions were BMI <30, first PD catheter, virgin abdomen and no hernias. Patients meeting these criteria were considered suitable for medical insertions. We gathered information on cost of a surgical PD catheter insertion which included pre-op clinic, day case surgical admission and theatre slot and compared it to a medical day case admission. We excluded equipment costs which were equivalent between the two techniques.

Results: 76 patients had PD catheters inserted in 2021. Median age at insertion was 57 (IQR 41-70) and 82% were male. Only 23 (30%) had previous surgeries and 11 (14%) had abdominal hernias. After taking into account all our exclusion criteria including the BMI cut off, 32 (42%) were eligible for percutaneous PD catheter insertion by a physician.

Based on local cost data, the cost of a surgical PD catheter insertion for a patient who would qualify for a medical PD tube catheter insertion based on our criteria was 3777.35£. The cost of a medical day case admission was 1203.51£. A cost difference of 2573.84 (68%).

Conclusion: The proportion of patients who were eligible for percutaneous peritoneal dialysis catheter insertion even with our very conservative eligibility criteria is substantial. As it is also much more cost-effective compared to surgical insertion we strongly recommend starting a formal medical PD catheter insertion pathway with future scope to expanding our eligibility criteria. The results of our study are being used to generate a business case for a day case PD catheter insertion service.

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Track Q2 – Home Therapies 2

Poster: 366
Submission: 134

Growing a Peritoneal dialysis programme: Take on and drop off at a single centre over 7 years.

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Introduction: Peritoneal dialysis (PD) has medical and lifestyle advantages over in centre dialysis, and is a cost- effective way of providing renal replacement therapy. Growth in PD is limited by kidney transplantation, switch to haemodialysis and death. We did a retrospective analysis to assess the outcomes of patients starting PD over a 7-year period and to understand the trends in prevalent PD population in our centre.

Methods: An electronic database (eMED) was used to identify the number of patients starting and stopping PD each year from 2015 to 2021. The reasons for stopping PD and duration of technique survival were noted. Patients who converted to temporary HD for less than 3 months were not classified as technique failure.

Results: The number of patients starting (n=305) PD was higher than the number stopping PD (n=213) Take on was similar from 2015-2018 and increased by 10-20% from 2019 to 2021(table 1). Modality switch to haemodialysis accounted for 28 % of patients stopping PD. 23% patients stopped PD because they received a renal transplant. 17% patients died. Modality switch to haemodialysis was primarily due to infection (56%), followed by fluid leak (21%), poor clearance/ultrafiltration failure (7%), social reasons (13 %) (Table 2). Among patients who switched to Haemodialysis (HD) due to an infection, peritonitis accounted for 83% of the cases with the remainder caused by exit site and tunnel infections (17%).

The prevalent PD population increased each year since 2018.

Discussion: Maintaining growth in a PD population can be challenging even with a high incident PD population. Major modifiable factors leading to drop off from PD include infection and social reasons. Having mechanisms which prevent infections, early identification and treatment of infections, and improving access to PD to increase take on may help to increase the prevalent PD population.

Table 1. Year wise numbers of Patients Starting or leaving PD

Year	Number of patients Initiating PD	Number of Patients Stopped PD
2015	40	12
2016	38	18

2017	42	30
2018	38	32
2019	51	42
2020	46	35
2021	50	44

Table 2: Reasons for the Modality switch from PD (Year wise distribution)

Year	Renal transplants	Death	Switch to HD				
			Infections	UF failure	Social Reasons	Leak	Catheter Malposition
2015	4	3	2	0	2	0	0
2016	9	1	3	1	1	3	0
2017	9	3	11	0	1	6	0
2018	14	4	7	2	0	4	0
2019	12	18	6	1	3	1	0
2020	12	10	7	0	0	2	0
2021	10	13	11	2	4	2	2

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Track Q2 – Home Therapies 2

Poster: 367
Submission: 285

A Cost- Utility Analysis of Assisted Peritoneal Dialysis for Patients with Frailty in the Republic of Ireland

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Introduction: Management of End-Stage Kidney disease (ESKD) is very costly to healthcare systems worldwide and the demand for dialysis therapies is forecasted to rise in the future. Frailty is increasingly prevalent in this population. Some countries have adopted assisted peritoneal dialysis (asPD) as a means of dialysing their frail population with ESKD. It is a less expensive therapy and there is evidence of greater quality of life as it allows patients to remain in their own home. However, it is not available in the Republic of Ireland (ROI). All patients default to incentre haemodialysis (iHD). There are fears that the cost of providing assistance to facilitate peritoneal dialysis in this population would prove too expensive. Advocates have recommended that an ideal dialysis system should have 40% of individuals on peritoneal dialysis.

Methods: A cost- utility analysis, from the payer perspective of the Health Service Executive of the ROI, was undertaken using a Markov model to compare a scenario where asPD is provided for 40% of frail individuals, to the current practice where all are commenced on iHD. Outcomes were valued in terms of quality-adjusted life years and the main outcome measure was the incremental cost effectiveness ratio (ICER), the cost per incremental QALY. A national survey was distributed to collect data from an Irish perspective with regard to complications of therapies, prevalence of significant frailty, distance from nearest dialysis unit and current transportation costs. Cycle length was set at one year and time horizon was set to five years. As recommended by the Irish Department of Finance, discounting of 4% was applied to costs and outcomes.

Results: A third of the total haemodialysis population nationally were surveyed and it was found that 39% had a had a clinical frailty scale score of five or greater. The annual cost of iHD was €126,640 per patient per annum and the estimated annual cost of asPD was €55,281 per patient per annum. The five-year cumulative cost of the new combined modality pathway per patient with discounting applied was €231,730.77 compared to €298,012.41of the iHD alone pathway with a difference of €66,281.64. The five- year cumulative quality adjusted life year (QALY) gained per patient with discounting applied was 1.32 in the new pathway compared to 1.29 the iHD alone pathway, with a difference of 0.03 QALYs. The base case analysis revealed a negative ICER suggesting a saving of €2,913,253 / QALY with adoption of the new pathway, over current practice of iHD alone. One way sensitivity analysis and probabilistic sensitivity analysis were performed which supported the findings of the base case analysis.

Discussion: Under the assumptions of this model, there were cost savings found with introduction of assisted peritoneal dialysis despite the cost of providing assistance. This is the first economic analysis of asPD in the ROI. It may not only help policymakers faced with limited capacity in haemodialysis units but may also empower individuals to maintain their quality of life despite frailty.

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Track Q2 – Home Therapies 2

Poster: 368
Submission: 280

Transfer from peritoneal dialysis to home haemodialysis: a single centre review

Dr Jennifer Allen, Dr Charlotte Bebb

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Introduction: Renal home therapies have significant advantages over in-centre haemodialysis (ICHD) for patients and renal units; they offer favourable clinical outcomes, increased patient involvement and autonomy, and are cost effective. Peritoneal dialysis (PD) is usually the first modality choice for patients wishing to dialyse at home, but patients may need to switch to haemodialysis due to eventual failure of PD. Pathways between peritoneal dialysis and home haemodialysis (HHD) are not standardised and patients may spend some time on ICHD before being able to return to a home therapy. We examined the histories of the prevalent HHD population at a single centre to establish their pathways from PD to HHD.

Methods: We conducted a retrospective review of the renal replacement therapy history of all our patients on HHD. We identified all prevalent HHD patients and reviewed timelines on our renal computer system. Time on each modality was counted, up to the point that they started HHD. We calculated the PD vintage (total time spent on PD) and the amount of time patients spent on ICHD between stopping PD and starting HHD (excluding patients who had a transplant between peritoneal dialysis and HHD).

Results: We examined the records of 32 pts currently on HHD. 19 (59%) patients did PD before HHD (15 (47%) as first therapy, 3 (9%) as second therapy, 1 (3%) as third therapy). 3 patients had 2 separate periods on PD (interrupted by transplant or temporary recovery). The median number of months on PD was 17 (+/- 23) (range 1-74 months). 12 (63%) patients were on PD for >1 yr, 9 (47%) for >2 yr and 2 (11%) for >5 yr.

After the first period on PD 8 (42%) were transplanted, 1 (3%) went back to low clearance, 10 (53%) went to ICHD. After 2nd period on PD all patients went to ICHD.

Of patients switching from PD to ICHD 1 (9%) was transplanted before starting HHD.

Patients who moved from PD to ICHD and then HHD spent median 15.04 months (+/- 43) on ICHD prior to moving to HHD. This compares to 12 patients starting on ICHD who switched to HHD, who spent median 11.77 months (+/- 15) on ICHD prior to HHD.

Discussion: Patients moving from PD to HHD spent longer on ICHD than patients who had never done PD. Factors that may contribute to this may include patient and carer burn out, unplanned PD stop (particularly where this coincided with an acute illness such as peritonitis) and issues with vascular access. Renal units should examine their local pathways to ensure patients can be supported to remain

on a home therapy, even when PD is no longer suitable. We should also bear in mind the risk of burn out and allow patients time on ICHD for respite where needed, to allow a successful and sustained return to home therapies.

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Track Q2 – Home Therapies 2

Poster: 369
Submission: 351

Home Haemodialysis as a means of treating patients with Learning Disability and/or Autism

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Introduction: Dialysis can be difficult to deliver to patients living with learning disability (LD) and/or autism. We present 3 cases where home haemodialysis (HHD) allowed treatment for patients who might otherwise not have received active treatment.

CASE 1 - male age 52 at date of start of dialysis preparation with significant LD of unknown cause and schizophrenia since childhood. Parents had died and aunt/uncle are in full time employment, alternate in supporting patient with his care. Educated about options and deemed would not tolerate PD tube; fearful and agitated when attending hospital; on transplant list but no LD options. Desensitisation was done over 5 months with visits to the HHD unit and home visits. Treatment commenced on HHD unit as tolerated. Uncle and carers trained and supported in home HD over a 10-month period. Multiple hospital admissions with infections and access issues. Became familiar with hospital staff through this and transferred to in-centre dialysis after 5 months. Remains on this treatment 18 months later.

CASE 2 - male age 47 at date of start of dialysis preparation with significant learning disability and autism secondary to fragile X syndrome. Cared for by father who died a year before patient developed ESKD. Judged would not tolerate PD tube. Sister (allied health professional) trained in HHD prior to commencing desensitisation of patient. Patient began dialysis with the HHD team and transitioned home thereafter under the care of his sister, individualised treatment plan guided by UKM. Remains on treatment at home on 3 hours 2x/week with good biochemical control. Active on transplant list. Now on renal replacement therapy for 11 months.

CASE 3 - male age 40 at date of start of dialysis preparation living with Down's syndrome - difficulty in communication (understands but can't speak native language); hearing impairment; expresses himself with hand gestures. Living with his sister and extended family; niece main carer with lasting power of attorney. First referred to renal services with eGFR 23, but unexpectedly rapid deterioration. Fast track training of patient's niece and introduction of patient to HHD services over 4-month period until transitioned home. Started on tunnelled line; undergoing fistula work up. Also undergoing Transplant listing assessment

Conclusions: These cases illustrate the value of HHD for increasing access to renal replacement therapy for patients with LD/autism. All are loved by family and had good quality of life pre-dialysis which we wished to extend. HHD enabled true personalised care. Developing innovative methods for preparing and supporting people with LD facilitated active kidney treatment, where previously treatment would have likely been palliation. There were commonalities - all benefitted from a mix of early education,

good liaison between pre-dialysis and HHD services, rewards for good adherence to treatment, presence of loving/caring family, introduction of relevant staff as early as possible - and differences - experiences of dialysis/adjustment, coping with treatment. Increasing confidence of managing these patients enabled "fast-track" of Case 3; we anticipate this will increase further. Challenges and implications for future management will be discussed.

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Track Q2 – Home Therapies 2

Poster: 370
Submission: 071

Perspectives on incremental peritoneal dialysis: A survey of clinicians in the United Kingdom

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Introduction: The prescription of incremental peritoneal dialysis (PD) considers the contribution of residual kidney function and is considered safe with the potential for better outcomes and cost effectiveness compared to full dose PD. There is limited evidence on the benefits of incremental PD, and little is known about current practice in the United Kingdom (UK). A survey was undertaken to understand the perspectives of clinicians in the UK, relating to incremental PD.

Methods: A survey questionnaire was developed to collect data across the following domains: demographic and centre characteristics, practice patterns and perspectives related to incremental PD. An online version was disseminated to PD clinicians in the UK, between February and March 2022. A descriptive analysis was conducted to evaluate centre characteristics and practice. Finally, a thematic analysis of free text comments relating to incremental PD.

Results: There were 38 responses from 21 renal centres. 81.2 % and 76.3 % of respondents agreed that incremental PD was safe and less intrusive, respectively. However, only 47.3% agreed that there was sufficient evidence to support incremental PD; 39.4% considered incremental PD to be standard of care. Respondents were more comfortable randomising incident patients to incremental (76.5%) versus full dose PD (55.3%). The underlying themes included: a perceived reluctance by patients to undertake full dose therapy; a reluctance to change practice and the impact on patient lifestyle.

Discussion: Incremental PD, although perceived to be safe by UK clinicians, is not considered by most to be the standard of care. There is uncertainty about the level of supportive evidence with some insight into the challenges to consider in future trials on incremental PD.

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Track Q2 – Home Therapies 2

Poster: 371
Submission: 159

The Ellen Medical Devices Point-of-Care Affordable Peritoneal Dialysis System – A Pilot Study

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Introduction: The global unmet need for kidney replacement therapy (KRT) means that millions of people die every year as they cannot afford treatment. Peritoneal dialysis (PD) is a home-based therapy which avoids the need for hospital-based treatment and expensive machinery. PD often allows patients to continue to work and may offer a favourable dialysis modality for many patients in lower-middle-income regions where the number of people treated with KRT is projected to rise. One barrier to increasing access to PD is that current manufacture and transportation of PD fluid is both financially and environmentally costly. Creation of PD fluid at the point of care offers a possible solution. The Ellen Medical Devices Point of Care (EM-POC) affordable dialysis system comprises a portable pure water distiller capable of producing sterile water suitable for injection which is mixed with electrolytes and glucose to fill 2L PD fluid bags at the point-of-care, which can then be used for conventional PD.

We present the results of an open label interventional pilot study to assess whether patients could use this novel dialysis system at home to generate PD fluid meeting the standard sterility requirements for PD fluid.

Methods: EM-POC dialysis system prototypes were installed in the homes of 3 eligible adult participants with kidney failure in Sydney, Australia. Potable Sydney tap water was used as input water to the distiller and participant homes required a reliable supply of electricity. Patients were trained to use the

prototypes for 3 days by an experienced PD nurse specialist. Each participant used the EM-POC system independently to fill 4 PD bags/day for 5 days in their own home. Filled PD bags were collected within 24 hours of being reconstituted and sent for microbiological culture and endotoxin testing at a National Association of Testing Authorities (NATA) accredited laboratory. Microbiological samples were cultured for 5 days for aerobic, anaerobic and yeast microorganisms. Presence of endotoxin was confirmed using Limulus Amebocyte Lysate (LAL) test methods. Semi-structured interviews were carried out with each participant to assess usability of the system.

Results: Participants were aged 49, 63 and 73 years with a median PD experience of 20 months (IQR 6-29). All 60 scheduled bag fills were completed and submitted for testing.

Microbiological testing: All 60 samples tested were sterile for aerobic, anaerobic and yeast cultures.

Endotoxin testing: 2/60 (3%) samples were borderline significant for endotoxin. One sample with confirmed concentration between 0.05EU/ml and 0.25EU/ml. The second sample was reported as >0.03EU/ml with the laboratory unable to re-test this sample further.

No serious unexpected adverse events (SUAEs) or unexpected serious adverse device effects (USADEs) occurred and participants reported the distiller and user interface as simple and easy to use.

Conclusion: This pilot study confirms that PD patients can successfully use EM-POC dialysis system prototypes at home to produce sterile PD fluid at the point-of-care. Further large-scale testing is required to confirm these results and further investigate the borderline endotoxin results which are suspected to be due to contamination under experimental manufacturing arrangements.

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Track Q2 – Home Therapies 2

Poster: 372
Submission: 272

Beyond adoption: remote monitoring in peritoneal dialysis - A scoping review and complexity assessment

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Introduction: Remote monitoring (RM) has the potential to improve outcomes through healthcare providers to monitor and manage their patients' chronic conditions, with ShareSource (Baxter Healthcare) enabling this for people on automated peritoneal dialysis (PD). Literature and experience suggests there are barriers and enablers to the adoption of these technologies.

A scoping review was undertaken to identify the existing evidence around the sustained adoption of ShareSource.

Methods: In addition to grey literature provided by Baxter, studies were identified through database searches using MeSH terms "telemedicine", "device" and each specific disease. Broader evidence on specific diseases (obstructive sleep apnoea, diabetes mellitus, cardiac arrhythmias and heart failure identified from systematic reviews) was included. Evidence was classified and deductive thematic analysis undertaken using the non-adoption, abandonment, scale up, spread and sustainability (NASSS) framework and assessed using the NASSS-Complexity Assessment Tool.

Results: The majority of evidence included in the review was categorised into three NASSS framework domains (technology, value proposition and adopters). The remaining domains (condition, organisation, wider system and embedding & adaptation) had comparatively little evidence. The table below provides an overview of the evidence categorised according to the NASSS framework.

Domain 1 - Condition	2 (3.1%)
1A - Nature of Condition or Illness	1
1B - Comobridities, Sociocultural influences	1
Domain 2 - Technology	**17 (26.2%)**
2A - Material Features	3
2B - Type of data generated	7
2C - Knowledge needed to use	5
2D - Technology supply model	2
Domain 3 - Value Proposition	**34 (52.3%)**
3A - Supply-side value (developer)	15
3B - Demand-side value (patient?)	19
Domain 4 - Adopters	**9 (13.8%)**
4A - Staff	4
4B - Patient	4
4C - Carers	1

Domain 5 - Organisation	2 (3.1%)
5A - Capacity to innovate (leadership etc)	0
5B - Readiness for technology/change	0
5C - Nature of decision/adoption	0
5D - Extent of change needed of routines	2
5E - Work needed to implement change	0
Domain 6 - Wider System	**1 (1.5%)**
6A - Political / policy	0
6B - Regulatory / legal	1
6C - Professional	0
6D - Socio-cultural	0
Domain 7 - Embedding and Adaption	**0 (0%)**
7A - Scope for adaptation over time	0
7B - Organisational resilience	0

RM is proposed to encourage proactive practice through the generation of additional patient level data. However, further evidence is required to determine the impact on patient outcomes. Most studies reported the impact on physicians despite nursing staff often being the first point of contact for patients. Literature from a dedicated search in other conditions recognised the importance of nursing staff attitudes to the success of remote technologies with existing workload, the need to development new roles, lack of nursing training and limited organisational support being barriers to adoption.

Within the value proposition domain, studies demonstrated a reduction in routine care episodes and hospitalisation rates when ShareSource RM was implemented, while there was little evidence supporting the role of RM in promoting patient adherence to therapy. RM in other diseases areas was associated with increased or at least comparable adherence compared to usual care in the short term.

RM is believed to give healthcare professionals and organisations adopters confidence although additional skills are required to ensure this translates to reduced resource use. When considering patient adoption a lack of privacy was reported across multiple studies. The intrusiveness of PD treatment was not fully addressed as although alarms are reviewed promptly through ShareSource they still occur.

Overall ShareSource was considered low complexity by the NASSS-CAT tool.

Discussion: The maturity of the ShareSource platform may explain the overall paucity of evidence leading to an inaccurate assessment of complexity assessed by the NASSS-CAT, which was at odds with clinical experience within the reviewing team. Evidence within and beyond PD was short term and future research should focus on the longer-term effects of RM. Through increased maturity and breadth of evidence a more accurate representation of the complexity involved in implementation of ShareSource will inform successful adoptions of this potentially valuable technology in varying contexts to improve patient care.

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Track Q2 – Home Therapies 2

Poster: 373
Submission: 285

Frequent low-volume Haemodialysis using NxStage System One delivers superior adequacy compared to standard thrice weekly In-Centre Haemodialysis in Obese individuals

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Background: Although frequent low-flow low-volume haemodialysis using the NxStage System One is now well-established as an option for home therapy of end-stage chronic kidney disease, its ability to deliver adequate dialysis in people with high BMI remains questionable. This doubt may lead to obese individuals being denied the potential benefits of this modality. To establish if this doubt is justified, we compared dialysis adequacy in two groups of obese individuals; one receiving standard thrice-weekly in-centre haemodialysis and the other receiving frequent haemodialysis at home using the NxStage System One.

Methods: This is a retrospective observational cohort study of 105 adult dialysis patients with obesity (BMI ≥ 30 kg/m2). All had been maintained on dialysis for at least 6 months. Fifty-five patients receiving in-centre haemodialysis were compared with 50 patients receiving home haemodialysis using NxStage System One. Dialysis adequacy (standard Kt/V calculated by the Daugirdas equation) was compared between the two groups. The clinical characteristics, laboratory test results and treatment regimens of each group were also compared. IBM SPSS Statistics 26 (IBM Corp., Armonk, NY, USA) was used for data entry and analysis.

Results: The in-centre haemodialysis group was older (63.6 ± 12.8 yrs. vs 58.5 ± 10.9 yrs., p=0.033) with a higher Charlson comorbidity score (5.9 ± 2.1 vs 4.5 ± 2.5, p=0.003). Standard Kt/V was significantly higher in the home haemodialysis group (2.4 ± 0.5) than in the in-centre haemodialysis group (2.2 ± 0.2) (p = 0.006). The mean serum inorganic phosphate was significantly lower in the home haemodialysis group than the in-centre haemodialysis group (1.6 ± 0.4 mmols/l vs 1.8 ± 0.5 mmols/l, p = 0.010) (Figure 1).

There were no statistically significant differences in the usage of antihypertensives, phosphate binders or erythropoiesis-stimulating agents between the two groups (Figure 2).

Conclusion: In this study, dialysis adequacy in obese individuals (expressed as standard Kt/V) delivered by frequent low-volume home haemodialysis using the NxStage System One is superior to that of standard thrice-weekly in-centre haemodialysis. Hesitancy about recommending frequent low-volume home haemodialysis to obese individuals is therefore unjustified.

Figures:

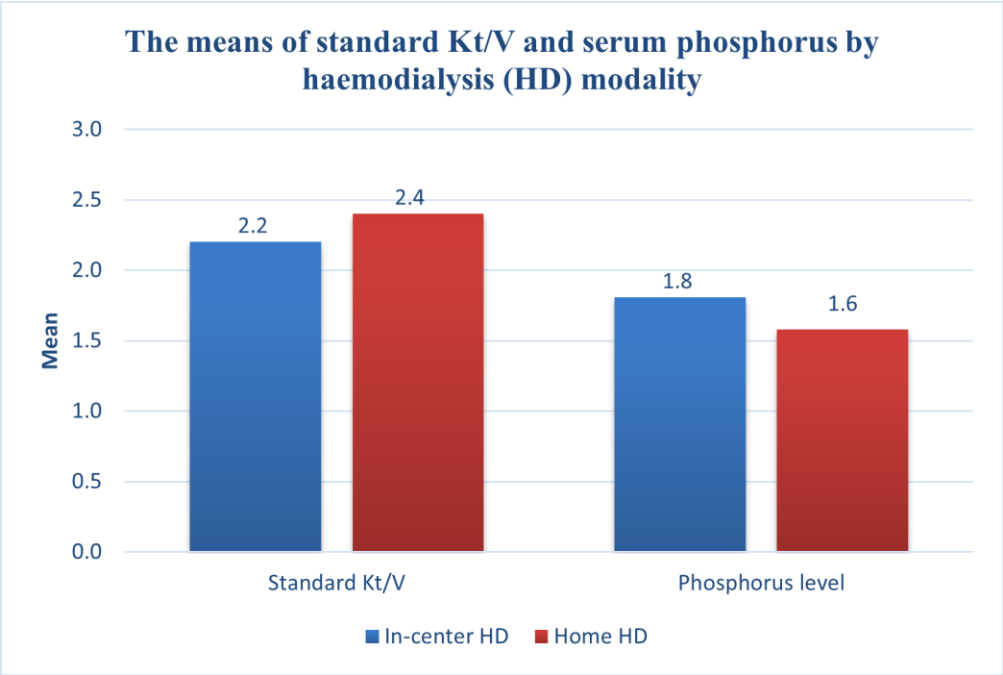

Figure 1: The means of standard Kt/V and serum phosphorus by haemodialysis (HD) modality.

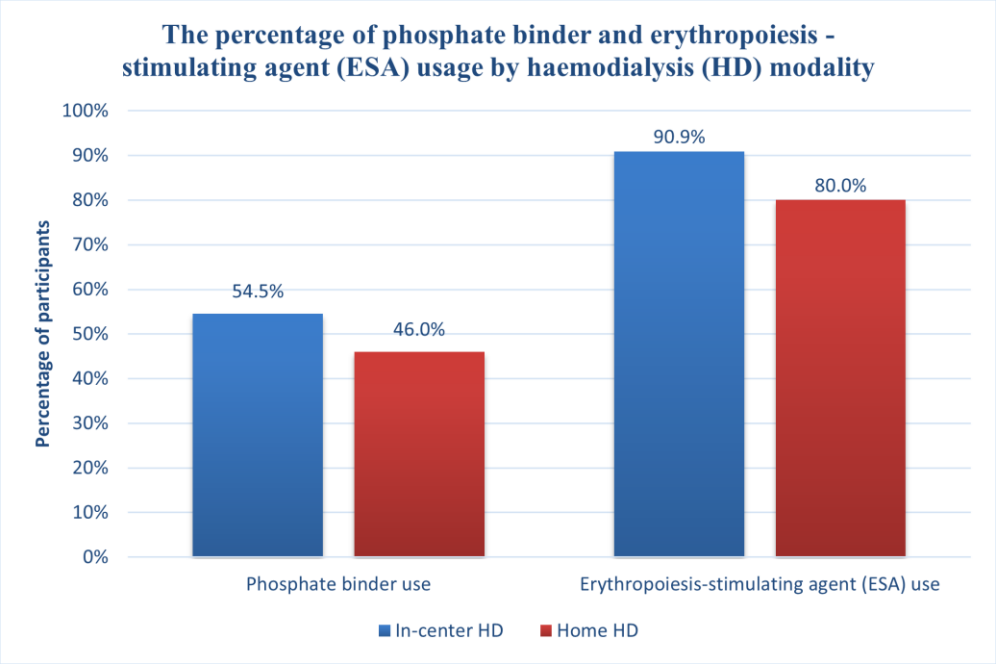

Figure 2: The percentage of phosphate binder and erythropoiesis-stimulating agent (ESA) usage by haemodialysis (HD) modality.

Tuesday 6th June 12:15 – 13:15

Track Q2 – Home Therapies 2

Poster: 374
Submission: 409

The impact of the COVID-19 pandemic on UK dialysis modality use and its relation to demographic factors

Dr Martin Wilkie[1], Dr William McKane[1], Dr James Medcalf[2,3], Dr Retha Steenkamp[2], Dr Dorothea Nitsch[4,2]

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[3]University Hospital of Leicester NHS Trust, Leicester.
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Introduction: During the COVID-19 pandemic, patients requiring in-centre haemodialysis (ICHD) were at high risk of COVID-19 infection and poor outcomes. Home therapies (Home haemodialysis (HHD) and peritoneal dialysis (PD)) enabled shielding from COVID-19 with a substantial reduction in mortality compared to ICHD. In this study we describe i) variation in home therapies (HT) use for incident patients starting dialysis before, during and after the COVID-19 pandemic, ii) the relationship between starting kidney replacement therapy (KRT) on HT and demographic factors, and iii) the COVID-19 burden.

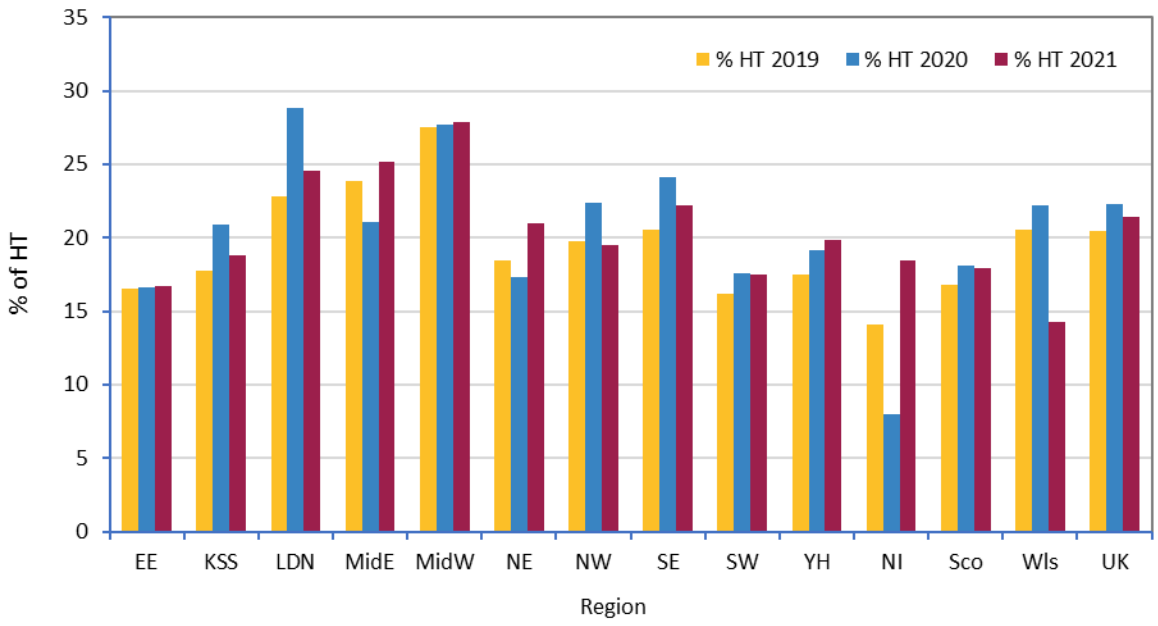
Methods: Adult incident patients starting KRT from 2019 to 2021 was used to describe the variation in HT by centre, region, and nation, stratified by age, sex, ethnicity, and deprivation group. The percentage of prevalent patients infected with COVID-19 was used to describe the burden of infections in kidney centres. Vascular access data from the annual audit and sessional data was combined to describe changes in access. A multivariable logistic regression model was used to determine the likelihood of starting on HT. All data came from the UK Renal Registry (UKRR), the Scottish Renal Registry contributed Scotland data, UKRR data for 2021 are preliminary.

Results: Incident patients on KRT decreased by 8% in 2020 and increased by about 10% in 2021, reaching pre-pandemic levels. HT as % of incident KRT increased by 1.8% in 2020 across the UK and declined by 0.9% in 2021 but is still higher than pre-pandemic levels in 2019 (see figure 1). The majority of regions similarly increased incident HT use in 2020, with the biggest increase in London (6%), decreasing HT use in the Midlands-East, North-East and Northern Ireland. There was wide variation in HT as % of incident KRT in 2021, with HT use declining in London (-4.2%) and Wales (-7.9%) and increasing in Northern Ireland (10.4%). Compared to 2019, use of arteriovenous fistulas (AVF) and grafts (AVG) in incident dialysis patients decreased in 2020 (39.8% to 35.7%) and were similar in 2021 (35.8%), whilst the use of non-tunnelled lines (NTL) increased more than the use of tunnelled lines (TL) in 2020, 21.0% to 23.9% and 39.2% to 40.5% respectively. In 2021, incident NTL use (22.5%) was still higher than pre-pandemic levels, and TL use further increased to 41.7%. Younger age and being less deprived were associated with a higher likelihood of starting HT across all three years, and during the pandemic (2020 and 2021) Asian patients were more likely to start on a HT compared to White patients. The was a positive correlation in

2020 between the prevalence of COVID-19 infections in kidney centres and more patients starting KRT on HT, however, the correlation was not sustained in 2021.

Discussion: HT use as % of KRT in incident patients increased in 2020 across most nations and regions in the UK. In 2021, the use of HT decreased by 0.9% compared to 2020 but is still higher than pre-pandemic levels. Definitive access in haemodialysis patients (AVF/AVG) is still below pre-pandemic levels, and increased TL use were sustained across 2020 and 2021.

Figure 1 Home therapy (HT) % of incident KRT, 2019 to 2021



EE=East of England, KSS=Kent, Surrey & Sussex, LDN=London, MidE-Midlands East, MidW-Midlands West, SE=South East, SW=South West, YH=Yorkshire & Humber, NI=Northern Ireland, Sco=Scotland, Wls=Wales, UK=United Kingdom

Tuesday 6th June 12:15 – 13:15

Track Q2 – Home Therapies 2

Poster: 375
Submission: 446

A report on home hemodialysis training time in patients with kidney failure using the Quanta SC+ hemodialysis device

Mr. Reid Whitlock[1], Dr. Paul Komenda[1,2], Ms. Angela Pietrafesa[3], Dr. Charlotte Bebb[4], Dr. Suzanne Forbes[5], Dr. Saeed Ahmed[6], Dr. Kelley Gorbe[2], Ms. Kate O'Reilly[2], Mr. Ryan Bamforth[1], Dr. David Collister[1,7]

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Introduction: Frequent self-care hemodialysis (HD) in the home setting has several advantages to patients and providers including improved health outcomes, health-related quality of life, patient satisfaction, and lower health care costs. The Quanta SC+ is a contemporary, portable HD device intended to be operated by a broad range of lay users. It was developed in collaboration with experienced home HD patients and human factors engineers with intuitive linear workflows, on-screen step-by-step instructions, and troubleshooting help screens that are easy to navigate. This study is a descriptive report on the home HD training time of first-time users of the Quanta SC+ HD device in the United Kingdom.

Methods: From August 2020 until March 2022, patients on dialysis across 5 sites in the United Kingdom were trained on the Quanta SC+ HD device as part of standard of care for self-care home HD as treatment for their kidney failure. We collected data on the number of total training weeks and sessions to be signed off as safe by a nephrologist and the frequency of training loss. Training time included organizational delays plus needling training time.

Results: As of March 2022, a total of 34 patients completed training on the Quanta SC+ HD device. The mean age of the patients was 52.3 ± 15.1 years, 14 (41.2%) were female. Patients had an average dialysis vintage of 2.6 ± 2.2 years. A total of 9 (26.5%) patients were already on home HD and converted to Quanta SC+ from another device. Training time for these individuals before being signed off as safe by a nephrologist ranged from 2 to 3 weeks (6 to 9 sessions). A total of 25 (73.5%) patients converted to Quanta SC+ from another dialysis modality. The average training time for these individuals before being signed off as safe by a nephrologist was 6 weeks (18 sessions).

Discussion: A descriptive report of 34 patients with kidney failure who trained for frequent self-care home HD with the Quanta SC+ HD device reported an average training time within expectations set from

national kidney organizations with minimal training. These results indicate that the device is user-friendly and intuitive to learn.

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Track R1 – Transplantation 1

Poster: 376
Submission: 025

After a kidney transplant, CMV viremia is predicted to start and be under control by NK and CD8+ T cell phenotypes.

Dr Ramy Abdel Aziz

Zagazig faculty of medicine, Zagazig

CMV causes mostly asymptomatic but lifelong infection. Primary infection or reactivation in immunocompromised individuals can be life-threatening. CMV viremia often occurs in solid organ transplant recipients and associates with decreased graft survival and higher mortality. Furthering understanding of impaired immunity that allows CMV reactivation is critical to guiding antiviral therapy and examining the effect of CMV on solid organ transplant outcomes. This study characterized longitudinal immune responses to CMV in 31 kidney transplant recipients with CMV viremia and matched, nonviremic recipients. Recipients were sampled 3 and 12 months after transplant, with additional samples 1 week and 1 month after viremia. PBMCs were stained for NK and T cell markers. PBMC transcriptomes were characterized by RNA-Seq. Plasma proteins were quantified by Luminex. CD8+ T cell transcriptomes were characterized by single-cell RNA-Seq. Before viremia, patients had high levels of IL-15 with concurrent expansion of immature CD56bright NK cells. After viremia, mature CD56dim NK cells and CD28–CD8+ T cells upregulating inhibitory and NK-associated receptors were expanded. Memory NK cells and NK-like CD28–CD8+ T cells were associated with control of viremia. These findings suggest that signatures of innate activation may be prognostic for CMV reactivation after transplant, while CD8+ T cell functionality is critical for effective control of CMV.

Tuesday 6th June 12:15 – 13:15

Track R41– Transplantation 1

Poster: 377
Submission: 073

Streamlining transplant work-up: A Quality Improvement Project in a transplant referral centre

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[2]ULHT, Lincoln

Introduction: Local network protocols mandate cardiac assessment and testing prior to renal transplantation with testing protocols determined by agreed risk criteria. Many of these patients then require assessment by a cardiologist if dynamic/stress testing is abnormal. Even before Covid this resulted in a delay in the transplant work up pathway. This has been worse since the pandemic with the current wait for a routine cardiology appointment locally being around 6 months.

Historical data used to plan change shows the average waiting time for initial cardiac evaluation is 5.1 months.

Methods: We have used retrospective study design to calculate the mean waiting time for initial cardiology review for renal transplant patients between years 2020-2022. The outcome was calculated in mean waiting time, mode and median values along with the outcome.

The proposed QI project was to introduce a monthly cardio-renal MDT with cardiology consultant and renal consultant attendance to avoid unnecessary outpatient appointments and delays. Referral was electronic via a standardised referral form. Decision in MDT was categorised to fit for surgical transplant work up, needs further tests (these would be organised by an MDT member), never fit for transplantation.

Results: With the historic data, mean waiting times for first cardiology contact was 5.1 months, median 4 months and mode 2 months. Furthermore, 62% of the patient were planned to be seen back in Cardiology clinic after investigations to decide fitness resulting in additional delays.

Comparing this with our project, the MDT has been in pilot form for two months now and so far 8 patients have been discussed. The maximum wait for review at MDT was 31 days. 37.5 % of patients were deemed fit for transplant work up and 62.5 % needed further investigations. 1 patient was deemed to need formal cardiology clinic review before requesting investigations.

Discussion: As you can see that waiting time for cardiology review for assessment of surgical fitness for renal transplantation was unacceptably long. This is not only detrimental for the patient but, may also affect the transplant outcome if the patient waits longer on dialysis. One of the pillars of renal GIRFT is to streamline transplant work up and this was the area in our referral centre, we could see, that most resulted in delays.

The QIP is in its early days but already improvements in waits have been seen and out of 8 patients who would have been referred for a cardiology outpatient appointment only one has now been listed for formal review in clinic. This will not only speed up patient assessment but also reduce pressure on an already stretched cardiology service.

We have corresponded with the transplant lead who has confirmed that the output form from the MDT is acceptable for the purposes of transplant work up.

Whilst the project is in its early days, all stakeholders have expressed satisfaction with the process and output. More data will be available and the process may be further streamlined after ongoing PDSA cycles.

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Track R1 – Transplantation 1

Poster: 378
Submission: 100

The barriers to transplantation in the diabetic haemodialysis population

Dr Maria Angela Gauci, Dr Marwa Ahmed, Dr Mar Wright

Leeds Teaching Hospitals NHS Trust, Leeds

Introduction: According to the 24th Annual Renal Registry Report, diabetes is the commonest identified primary renal disease in patients starting renal replacement therapy. The prevalence of this underlying disease amounted to 30.5% by the end of 2020, having increased from 27% in 2015. This highlights the challenges faced by healthcare services in meeting the accrescent demands of this cohort of patients.

The Renal Association and British Transplantation Society suggest that patients with a BMI >30 kg/m^2 are at a heightened risk of complications from transplantation, and is therefore discouraged. The Leeds Transplant Centre accepts recipients with a BMI of up to 35 kg/m^2 for kidney alone transplantation should no other medical/ surgical contraindications to transplantation prevail. Despite this threshold, there remains a significant proportion of patients suspended from the waiting list due to an unacceptably raised BMI.

Methods: Data was collected through the use of clinic letters or GP records uploaded to Patient Pathway Manager and BHLY Renal Patient System. Our patient population consisted of those diabetic patients on home and in-centre haemodialysis (dialysing at Leeds St James's University Hospital, Pontefract, Seacroft, Beeston, Dewsbury, Calderdale and Huddersfield).

The aims of our study are to assess the demographics of the diabetic haemodialysis (HD) population at the Leeds Teaching Hospitals NHS Trust, to determine the proportion of diabetic HD patients suspended from the transplant list, and whether overall diabetes control (including raised BMI) may be related to this. We also assessed the commonest treatment modality (insulin vs other) and the use of continuous glucose monitoring.

Results: The Leeds renal services provide haemodialysis for 248 diabetic patients, 66% of whom are male, with a mean age of 60. Just over 50% of patients are Caucasian in ethnicity, while 30% are South Asian. Only 14% (n=35) are active on the national deceased transplant waiting list, 13% (n=31) are under assessment, 14% (n=35) declined and/or disengaged from assessment for transplantation, while the rest are either temporarily or permanently suspended. Almost 10% (n=24) of all diabetic haemodialysis patients are suspended solely due to a BMI >35 kg/m2 .

Discussion: Our audit reveals that only 14% of the haemodialysis diabetic population is presently active on the deceased transplant waiting list. This remains suboptimal, as renal or simultaneous pancreas kidney transplantation is the gold standard for diabetes-induced ESKD. Obesity (BMI >35) was a reason for temporary suspension in 10% of our haemodialysis diabetic population, which is a difficult but treatable condition.

NICE recommend pharmacological weight-lowering therapy for people who have failed to achieve a healthy BMI following conservative methods. Such medical therapy (eg. liraglutide) is still yet to be evaluated in depth in the HD-dependent obese population. Only one patient in our cohort was being treated with liraglutide, while the rest were either on insulin, linagliptin, gliclazide or non-pharmacological dietary modification. The authors of this study encourage the inclusion of CKD5 patients on liraglutide, before they are started on HD, in order to pave their way to transplantation before it is too late.

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Track R1 – Transplantation 1

Poster: 379
Submission: 114

Introducing an enhanced recovery after surgery (ERAS) programme within the field of renal transplantation. The Newcastle experience

Ms Carrie Scuffell, Ms Katherine Ashton, Ms Jenny Houston, Ms Angela Telford, Ms Frankie Dowen, Ms Elisabeth Turnbull, Prof Neil Sheerin, Prof Derek Manas, Mr Aimen Amer

Institute of transplantation, Freeman Hospital, Newcastle upon Tyne

Introduction: Despite being well established in many surgical specialties, Enhanced Recovery after Surgery (ERAS) is not yet widely adopted within transplantation. Length of stay (LOS) for our transplant recipients was the longest in the UK. We aimed to reduce LOS, better empower our patients and demonstrate the safety and feasibility of ERAS in renal transplantation

Methods: A national survey and local audit were carried out and used to inform the development of an ERAS protocol. Following the implementation of the protocol, domains were examined including LOS, postoperative complications and readmission rates. Questionnaires captured both patient and staff feedback.

Results: 140 renal transplant recipients (70 Living and 70 deceased donor) were included between Sept-2020 and July 2022 with 50% reduction in Median LOS from 12 to 6 days. All patients received ERAS counselling. IV fluids were discontinued within 24hrs in 89% of cases and the median duration of postoperative IV fluids was 13hr. A 47% reduction in opioid use was achieved with significant reduction in postoperative nausea. 89% of patients mobilised within 24hrs. A single drain was inserted in 86% of cases, 7% receiving no drain. Median day of drain removal was D3. Median day of urinary catheter removal was D3 compared to D5 pre-ERAS. No increase in readmission within 1 month compared to pre-ERAS (13%vs20% respectively). Incidence of perinephric collections requiring intervention was unchanged (3%vs5% pre-ERAS). There were no urinary leaks. Incidence of UTI requiring treatment was 14% when catheters were removed ≤3days compared with 24% with delayed removal. Survey feedback reported patients feeling empowered and demonstrating an increased sense of shared responsibility as well an increased sense of autonomy among staff.

Discussion: ERAS is safe and effective in renal transplantation. This patient centred, transferrable model has received national and international interest within the transplant community and is now informing the development of local ERAS programmes for liver transplant and pancreas transplant recipients.

Tuesday 6th June 12:15 – 13:15

Track R1 – Transplantation 1

Poster: 380
Submission: 119

Improving access to renal transplantation: a quality improvement project.

Dr Ankit Sharma, Dr Mahzuz Karim

Norfolk and Norwich University Hospital, Norwich

Introduction: Pre-emptive renal transplantation confers better patient and graft survival than dialysis, improves quality of life, and is cheaper. The UK Kidney Association (UKKA) recommends that suitable patients undergo pre-emptive live donor transplantation or be activated on the cadaveric transplant waiting list 6 months before their anticipated need for renal replacement therapy (RRT). According to the 2017-2018 UKKA annual report, our unit's pre-emptive listing rate was 44%, compared to a national average of 48%. The aim of this quality improvement project (QIP) was to improve the rate of pre-emptive listing or live donor transplantation to at least 50% by 2021.

Methods: The QIP was carried out in 2 phases. The first aimed to identify factors contributing to late referral / delayed transplant workup. We retrospectively reviewed the records of patients undergoing any form of dialysis during January 2020 who were less than 75 years old and had been known to the renal service for more than 6 months before starting RRT. Based on our findings, the following measures were proposed: improving knowledge amongst renal registrars regarding suitability for transplantation; introducing low clearance clinics with templates prompting clinicians to consider suitability for transplantation and appropriate assessment; approaching the regional transplant unit to develop criteria for suitability for transplantation and investigations required; enabling our nurse transplant co-ordinator to request a wider range of investigations. We were unable to achieve most of these goals in the time available due to competing pressures (particularly the COVID-19 pandemic). Nevertheless, in phase 2 we examined the workup process for patients who underwent transplantation in 2021.

Results: In phase 1, there were 57 patients below the age of 75 with no documented contraindication to transplantation and who had been known to the service for more than 6 months prior to RRT. 48/57 (84%) had been referred for transplant assessment in a timely manner. Amongst the 9 who had not, 3 (33%) had been overlooked and were later identified in dialysis clinics; in the other 6 there was no documented reason for non-referral or unsuitability for transplantation, but on further assessment were not felt to be suitable. In phase 2, 24 patients underwent transplantation in 2021 (20 cadaveric, 4 live donor). 16/24 (66%) had been referred for transplant assessment more than 6 months prior to starting RRT, but only 9/24 (38%) satisfied the criteria of being pre-emptively activated on the cadaveric transplant waiting list or receiving a pre-emptive live donor transplant. Of the 8 patients not referred in a timely manner, 2 had no clear medical reason for late referral, 2 were not referred due to obesity, 1 was delayed due to non-compliance with clinic attendance, 4 had an unexpectedly rapid decline in renal function, and 4 had complex medical issues requiring extensive workup.

Conclusion: These data demonstrate that a significant number of patients were not considered or referred for renal transplantation in a timely manner. We have proposed several approaches to address these issues, but many of these have not been possible during the COVID-19 pandemic.

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Track R1 – Transplantation 1

Poster: 381
Submission: 120

Inequity of access to kidney transplant waiting list in the UK

Ms Esther Wong[1,2], Dr Anna Casula[1], Dr Retha Steenkamp[1], Dr Barnaby Hole[2,3], Ms Rebecca Curtis[4], Dr Matthew Robb[4], Dr Rommel Ravanan[3,4]

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[2]University of Bristol, Bristol.
[3]North Bristol Trust, Bristol.
[4]NHS Blood and Transplant, Bristol

Background: As part of the audit process on analysing the care provided to kidney patients, the UK Renal registry (UKRR) published a chapter in the past annual reports (1), evaluating equity of access to the kidney transplant waiting list and access to kidney transplantation in the UK. In our analyses, we focus on evaluating access to waiting list by using the latest combined UKRR and NHS Blood and Transplant (NHSBT) datasets, including associations, if any, with demographic characteristics or by transplanting versus non-transplanting centre.

Method: Three years of incident Kidney Replacement Therapy (KRT) patients from March 2017 to February 2020 in the UK were included in the analyses, with 2-year follow-up to February 2022. Multivariable logistic regression was used to analyse the proportion of patients being listed within the two years of starting dialysis, adjusting for age group, sex, ethnicity, if the primary diagnosis was diabetic nephropathy and socioeconomic status. We have also compared the odds ratio of transplanting centre vs non-transplanting centre in the adjusted model.

Results: After adjusting for relevant demographic characteristics, patients of Asian ethnicity have a 67% higher chance to be listed for transplantation within 2 years compared to white ethnicity, whereas black ethnicity was 13% less likely to be listed compared to white patients (Figure 1). In Figure 2, the centre listing rate within 2 years since the start of KRT ranged from 23% to 54% in non-transplanting centres, compared to a higher listing rate of 34% to 64% in transplanting centres. Even after adjusting for demographic characteristics listed above, there was a 50% higher chance to be listed within 2 years if patients were having treatment in a transplanting compared to non-transplanting centre. We have performed a sensitivity analysis by splitting the cohort into 3 event time periods to investigate the impact of COVID-19 pandemic, to adjust the time-period as an effect of the pandemic on top of other risk factors. Patients who started KRT during the period from March 2019 to February 2020 have a 10% lower chance of being listed, but there was no interaction between the time-period against ethnicity or centre type. We plan to do a more detailed analysis on the impact of pandemic until a more up-to-date cohort becomes available.

Conclusion: Our analyses indicates presence of demographic and centre specific reasons for variation in access to transplantation in the UK. The analyses spanned the 2-year period of significant impact due to the COVID-19 pandemic, a more detailed analysis in the future will further investigate the pandemic

impact on the findings. The continued presence of transplant vs non-transplant centre related variation in our dataset is similar to findings from 2011-2013 data set in Access to Transplantation and Transplant Outcome Measures (ATTOM) study (2). However, ATTOM analysed pre-emptively listed patients separately, here we combined pre-emptive listing, pre-emptive transplant with dialysis patients to evaluate them in a higher level. Further research is required to understand the possible reasons for these disparities and needs attention to address this unwarranted variation.

Figure 1 Odds ratio of proportion of patients wait listed for kidney transplant since the start of kidney replacement therapy by age, sex, ethnicity, primary kidney diagnosis diabetic nephropathy and socioeconomic status.

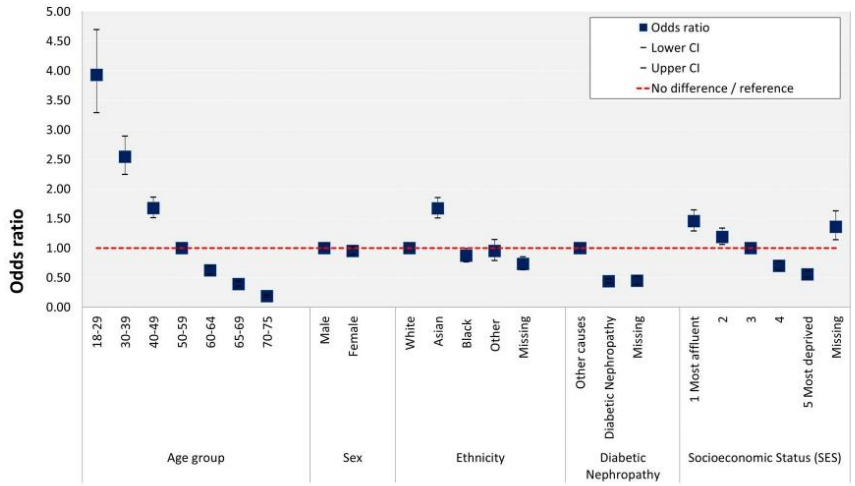
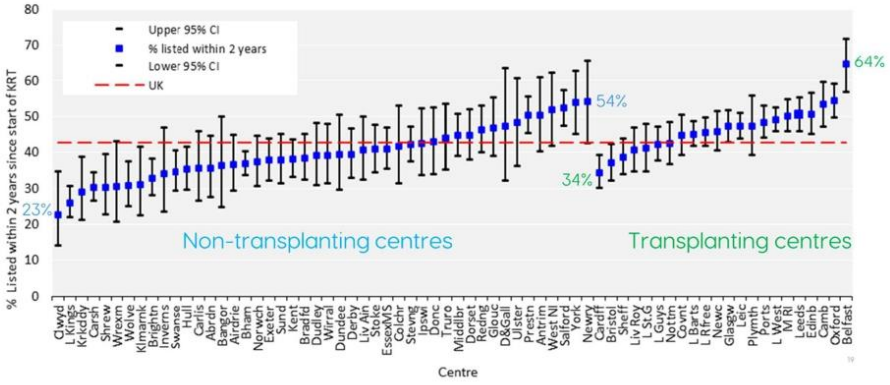


Figure 2 Centre listing rate adjusted by age, sex, ethnicity, primary diagnosis diabetic nephropathy and socioeconomic status, sorted by transplanting and non-transplanting centre



Reference:

1. UK Renal Registry (2019) UK Renal Registry 21st Annual Report – data to 31/12/2017, Bristol, UK. Chapter 6 - Access to transplantation P.147-160. Available from https://ukkidney.org/audit-research/annual-report

2. Rishi Pruthi, Matthew L. Robb, Gabriel C. Oniscu et al and on behalf of the ATTOM Investigators: Inequity in Access to Transplantation in the United Kingdom. CJASN June 2020, 15 (6) 830-842; DOI: https://doi.org/10.2215/CJN.11460919

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Track R1 – Transplantation 1

Poster: 383
Submission: 133

Timely referral for Kidney Transplantation

Miss Suha Abdullahi[1,2], Dr James Tollitt[2,1]

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Introduction: Risk based referral criteria represents an efficient use of resource in resource limited health economies. Pre-emptive kidney transplantation and therefore pre-emptive transplant listing represents the best possible outcome for suitable patients approaching dialysis in the absence of a potential live donor. Currently, referral for transplant workup in patients with advanced chronic kidney disease is predominantly guided by delta eGFR decline or eGFR cut-offs. This study aimed to validate the use of the 4-variable, 2-year Kidney Failure Risk equation (KFRE) score to guide referrals to the one-stop transplant work up clinic and thus increase pre-emptive listing outcomes. It aimed to determine an optimal threshold for referral that would most likely result in pre-emptive listing.

Methods: A retrospective analysis of pre-dialysis patients referred to the one-stop transplant work up clinic between 2015 and 2020 was performed. The KFRE scores were determined from biochemistry and demographic data at the time of transplant workup. Binary logistic regression assessed the association between pre-emptive listing outcomes and KFRE % scores at different risk thresholds (< 20%, 20-30%, 30-40%, >40%). Discrimination of the KFRE risk tool to determine outcomes of pre-emptive listing was evaluated using a receiver operator characteristic curve.

Results: 240 patients (mean eGFR 14.2mL/min (SD 6.2), median KFRE 16.6% (IQR 8-28)) were analysed, 111 patients (46.3%) were pre-emptively listed for transplant. Only 13.3% were pre-emptively transplanted over median of 39.5 (IQR 27-54) months follow up. Binary logistic regression showed there were no associations between the 2-year KFRE.and being pre-emptively listed at every KFRE threshold. The 4-variable KFRE equation showed poor discrimination with an area under the curve of 0.334 (95% CI 0.265-0.403). Median time from transplant one stop clinic to transplant listing was 10 months.

Discussion: This retrospective study demonstrated the 2-year KFRE is of poor clinical utility in guiding referral to the one-stop transplant workup clinic in our centre. An optimal threshold for referral was not found. Further research is required to ascertain the efficacy of the 2-year KFRE in guiding referral for transplant workup This can be achieved through increasing the sample size, prospectively analysing reasons for transplant workup delays and extending this study to multiple centres across the UK.

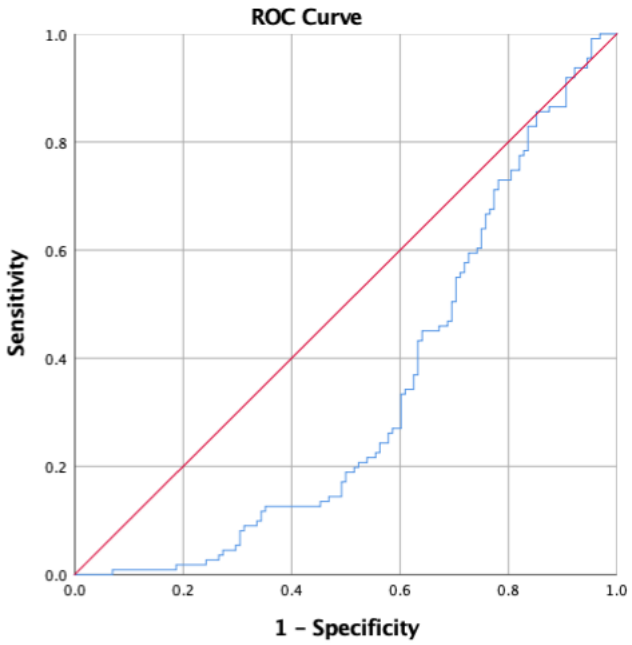

Figure 1: Receiver operating characteristic (ROC) curve for the KFRE risk prediction tool.

Outcomes at follow up	Total Population, n, (%)	KFRE, Mean (SD), (%)
ESRD	148 (61.6)	23.9 (15.9)
Deaths before ESRD	20 (8.3)	14.5 (14.0)
Total deaths	68 (28.3)	21.2 (15.3)
Total listed	167 (69.6)	21.1(15.4)
Pre-emptive listing	111 (46.3)	14.6 (9.8)
Pre-emptive transplant	32 (13.3)	15.8 (10.6)
Dialysis	148 (61.6)	24.8 (15.9)

Table 1: Summary of the observed outcomes at follow up post attendance of the transplant work up clinic.

Tuesday 6th June 12:15 – 13:15

Track R1 – Transplantation 1

Poster: 384
Submission: 162

The impact of standard immunosuppression regimens on immunological and infective complications in older kidney transplant patients

Dr Inji Alshaer[1], Dr Rachel KY Hung[1], Dr sumoyee basu[1], Dr gabrielle goldet[1], Dr Gareth Jones[1], Dr Mark Harber[1], Dr Raymond Fernando[2], Dr Ciara N Magee[1], prof Reza Motallebzadeh[1], prof Benjamine Caplin[1], prof Alan Salama[1]

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Introduction: Infection and cancer are two other common causes of death in older kidney transplant recipients, and in many cases are likely to reflect synergetic effects of maintenance immunosuppression (IS) combined with age-related immunosenescence.

Our objective was to investigate if a standard immunosuppressive protocol resulted in features of over-immunosuppression, as judged by increased incidence of cytomegalovirus (CMV) viraemia as well as malignancy, alongside lower rates of acute rejection, in older compared to younger recipients.

Methods: We investigated outcomes of kidney transplants(recipients aged >60 years, n=148) compared to younger recipients(n=272) in age groups (18-34, 35-49 & 50-60 years) matched for calculated reaction frequency, number of donor-recipient HLA-mismatches, and CMV serostatus, between April 2009-March 2019.

Outcomes were time to (i) first episode of biopsy-proven acute rejection (BPAR), (ii) CMV viraemia within the first 6-months, (iii) incidence of new non-skin malignancy, and (iv) development of donor-specific anti-HLA antibodies (DSA).

Results: Patient's characteristics are shown in Table 1

Table 1

	Recipient age: 18-34yrs (n=71)	Recipient age: 35-49yrs (n=90)	Recipient age 50-59yrs (n=111)	Recipient age >60yrs (n=148)	p value *
Male recipient gender, n (%)	35 (50)	49 (49)	70 (63)	101 (68)	0.03

Recipient ethnicity, n (%) White	29 (41)	35 (39)	48 (43)	84 (57)	0.03
Cause of ESRD, n (%) DM	3 (4)	6 (7)	21 (19)	31 (21)	<0.001
BMI, kg/m2 mean (SD)	24 (4.7)	26 (4.7)	27 (3.8)	26 4.1)	<0.001
Pre-emptive transplantation, n (%)	24 (34)	28 (31)	28 (25)	40 (37)	0.60
Median dialysis duration, days (IQR)	456 (191-913)	775 (463-1669)	878 (394-1744)	943 (465-1682)	0.29

Overall rates of BPAR were highest in the recipients under the age of 35 but there was no evidence for a difference between older age groups.

Conversely, the risk of CMV viraemia and malignancy were significantly higher in older recipients; in the over 60-year-old group, CMV viraemia HR: 2.66 (95% CI: 1.49-4.75) versus the youngest group, and malignancy HR: 7.3 (95% CI: 1.7-31.10), with little evidence this was confounded by co-morbidity or donor factors on multivariate analysis (Table 2).

Table 2

Recipient outcome per Age group (years)	Univariate HR (95% CI)	Multivariable HR (95% CI)*
Graft loss censored to patient loss		

18-34 35-49 50-60 >60	Reference 0.95(0.35-2.55) 1.88(0.78-4.55) 4.01(1.81-8.90)	Reference 0.49(0.14-1.71) 1.02(0.35-2.97) 1.54(0.58-1.05)
CMV infection within 6 months post KT 18-34 35-49 50-60 >60	Reference 1.82(0.966-3.438) 2.55(1.394-4.574) 2.66(1.497-4.745)	Reference 1.28(0.63-2.60) 1.95(0.99-3.86) 2.09(1.06-4.12)
Rejection 18-34 35-49 50-60 >60	Reference 0.40(0.17-0.92) 0.32(0.14-0.75) 0.50(0.24-1.04)	Reference 0.30(.10-0.86) 0.18(0.05-0.59) 0.30(0.11-0.81)
Malignancy 18-34 35-49	Reference 2.29(0.46-11.35)	Reference 3.305(0.30-35.39)

50-60 >60	1.53(0.28-8.39) 7.26(1.69-31.10)	0.00(0.00-2.52E+192) 11.68(1.4-97.35)

*Recipient gender and ethnicity , Donor age, gender and ethnicity, presence of DM, current and previous smoking, recipient BMI and dialysis prior to transplant.

Conclusion: Our data indicate that older recipient age is associated with increased risk of CMV viraemia and malignancy after transplantation, suggesting an age-associated increased vulnerability to immunosuppression and providing support for the need to develop age-specific immunosuppression protocol adjustments.

Tuesday 6th June 12:15 – 13:15

Track R2 – Transplantation 2

Poster: 385
Submission: 204

Developing a patient centered deceased donor transplant monitoring system in Sri Lanka

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Introduction: Deceased donor kidney transplant is an underdeveloped transplant methodology in Sri Lanka due to the reduced availability of resources. There also has not been a unified system in place for prioritizing the available kidneys for the patients and hence different transplant units have adopted their own methods in distributing them. This has necessitated the patients who are on dialysis to wait for long periods. Some patients in time lose hope in getting a cadaveric kidney which can affect how they care for their health. Therefore, when they get a call, most patients are sub-optimized medically and mentally. In this background, a system to effectively utilize the available resources and to distribute the donor kidneys was desperately needed.

Methodology: A computer and mobile based program was developed to store all the patients' data in the deceased donor recipient waiting list. The program used a simple formula to calculate a score for each patient and rank them accordingly. An app was developed so that each patient can monitor their current score and their respective rank in the waiting list. As the whole program was done without any funding, all programming and maintenance was done by the main author and the program was hosted on a free hosting platform. It was first rolled out in the central province of the country in January 2022.

Results: The system has been up and running for a year and currently 70 active patients from the central province are in the system. Patients monitor their rank and score and get notifications when a transplant happens or their rank or status gets changed. The healthcare workers in the transplant unit are able to monitor and maintain the list of all patients and also are able to communicate readily with the patients with the help of the app.

Discussion: The program enables patients to be more responsible in the management of their chronic kidney disease and enables them to closely monitor the pre operative optimizations as they move up in rank. The program has improved transparency and helped the patients to have more trust in the system. Currently the program is being expanded to include the northern part of the country thereby enabling it to serve an even larger area. An objective study to assess patient satisfaction is being planned.

Tuesday 6th June 12:15 – 13:15

Track R2 – Transplantation 2

Poster: 386
Submission: 209

Recipient work-up for renal transplantation: a snapshot of a newly developed nurse-led "Transplant Work-Up Clinic".

Ms Amanda Sawdon, Mrs Bethan Wicks, Dr Hannah Kilbride, Dr Michelle Webb

EKHUFT, Canterbury

Introduction: For most people with chronic kidney disease a transplant is the best form of kidney replacement therapy yet just 1 in 10 people with kidney failure receive a kidney transplant pre-dialysis (2019 Renal Registry Report).

Method: As part of KQuIP Transplant First we process-mapped the patients' transplant pathway journey identifying that starting the work-up process late (GFR<15ml/min) was the commonest reason for not listing pre-dialysis. Patients and staff were invited to review the maps and to work with us to identify ideas for improvement.

Even though patients had attended a group education session they felt they had not fully understood the process or how long it would take. To make it easier for clinicians to initiate work we set up an electronic referral to a recipient transplant co-ordinator (RTC) led Transplant Work-Up clinic. Data on patient experience and the time from referral to being seen in clinic, and from completion of work up to transplant surgeon referral is collected.

Results: The clinic started June 22 and offers eight, 60-minute appointments per week. At the visit, RTCs clarify risks and benefits, the work-up process, tests required and why, waiting times for deceased donor organ offers, immunosuppressants and their risks including cancer and NODAT. They highlight lifestyle issues which the patient can address to optimise their chances of a good outcome and to speed up their listing for a transplant. These include weight loss, smoking cessation, dental review and engagement with cancer screening programmes. They request necessary blood tests, perform an ECG, arrange a CXR and request copies of any cancer screening results.

Results: After initial teething problems, time from referral to being seen in clinic has reduced from 8 to 2 weeks. A total of 47 patients attended the clinic between 27/06 – 19/12/2022. Four were ruled out, three identified as marginal candidates, 10 have completed work-up and are waiting to see transplant surgeons, and two are now activated. The remaining 28 are still in work-up. 100% of patient feedback has been positive and even though we cover a wide geographical area, all have said it was worth the journey. They now have a dedicated "go to" contact for any queries about transplantation and feel they have a better understanding and grasp of the key issues around transplantation.

Discussion: Whilst the clinic is still in its infancy and more robust data is needed to provide evidence of its effectiveness, it is already demonstrating benefits for both patients and clinical staff. It enables more efficient use of transplant surgeon resources and provides opportunities for the specialist nurses to get

to know the patient and identify their needs in terms of reassurance and psychological support as well as ensuring all necessary tests have been requested and are followed up.

Looking to the future, the aim is to make the clinic more of a “one-stop shop” and reduce the delays in the work-up process even further.

Tuesday 6th June 12:15 – 13:15

Track R2 – Transplantation 2

Poster: 387
Submission: 223

Different centres, same aim: co-ordinating Quality Improvement in three large renal units to improve access to living kidney donation for Black kidney patients. A GOLD (Gift of Living Donation) Peer Buddy Initiative.

Dr Kathryn Griffiths[1,2], Ms Dela Idowu[3], Mrs Wendy Brown[4], Dr Sumoyee Basu[5,2], Dr Anamika Adwaney[6], Ms Cristina Horpos[6], Ms Gillian King[4,3], Mr Frank Dor[6]

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Introduction: The rates of pre-emptive living donor kidney transplantation (LDKTx) for black kidney patients have not increased at the same rate as for those of white ethnicities in the UK. Patient and public involvement work suggests that discussing living donor transplantation with a peer who understands both the experience as a kidney patient or living donor and as a member of the same community can help navigate the culturally specific difficulties of approaching the topic with family and friends for some black patients. GOLD is a charity focussing on working to promote and create awareness of living kidney donation in the black community; they developed a phone buddy scheme for black patients approaching the need for renal replacement therapy (RRT). We developed a Quality Improvement Programme (QIP) as a collaboration between GOLD, a multidisciplinary clinical team (MDT) across three kidney transplant (KTx) centres and the local kidney network.

Methods: The QIP was designed to look at the effectiveness and the implementation of the phone buddy scheme to KTx centres. Three working groups were developed in each site (MDT advanced kidney care and transplant clinicians), a data team was established to retrieve and analyse the data (clinical research associates) and an overall co-ordination team to ensure consistency.

Eligible patients were defined as black or mixed black patients with an eGFR of <25ml/min/1.732, not on RRT and with no evident contra-indications for transplantation.

Each site developed a process map for where to implement offers for the phone buddy scheme. The data team collected the same effectiveness and implementation outcomes for each site on a combined database.

Parallel to this an education drive took place in each site using local data.

The working groups will meet regularly to review data and the QIP will evolve through problem do study act (PDSA) cycles to try and ensure that all eligible patients have easy access to a phone buddy. The QIP will be scaled up to include more varied pathways overtime and is intended to run over several years to implement the phone buddy scheme into routine practice to ensure equity in access to LDKTx.

Results: The QIP launches on 1st February and we will collect and report the following measures:

Effectiveness:

- Number of potential living donors presenting to co-ordinators for eligible black patients

- Proportion of those presenting for a recipient who has spoken with a phone buddy

Implementation outcomes:

- Number of offered referrals

- Proportion of offered referrals which led to a phone buddy call

- Proportion of eligible population offered referral and had a conversation with a peer phone buddy

Discussion: This project embodies a unique quality improvement unifying three KTx centres working towards more equal access to pre-emptive LDKTx in the black community using a public and patient informed intervention to educate and support peers in their journey to LDKTx. National and local data are a powerful motivator for instituting change and considering such a complex problem needs to be done in collaboration with the community it seeks to serve.

Tuesday 6th June 12:15 – 13:15

Track R2 – Transplantation 2

Poster: 388
Submission: 250

KQUIP Transplant First: COVID recovery

Mrs Karen Baguley[1], Mrs Gillian Smith[1], Mrs Zoe Morris[1], Mrs Lisa Gosling[1], Mrs Beverley Heyworth[1], Mr Joseph Wright[2], Mrs Claire Pitchford[1], Mrs Tracey Collins[1], Dr Gavin Freeman[1], Dr Rosie Donne[1,3], Dr James Tollitt[1]

[1]Northern Care Alliance, Salford.
[2]Patient Group, Salford.
[3]KQUIP, North West

Introduction: Pre-emptive kidney transplantation is the optimal renal replacement therapy (RRT). Nationally around 9% of patients with end stage renal disease undergo pre-emptive renal transplant although some UK centres can achieve nearly 30%. A previous iteration of transplant first in our centre was able to increase pre-emptive transplantation from 9% to 13% between 2017 and 2019. The aim of this project was to increase pre-emptive renal transplantation to 20% of all patients commencing renal replacement therapy (excluding unplanned starters) by 31/12/2023. Initially our aim has been to reinstate and recover our transplant workup service to match the pre-pandemic transplantation rates.

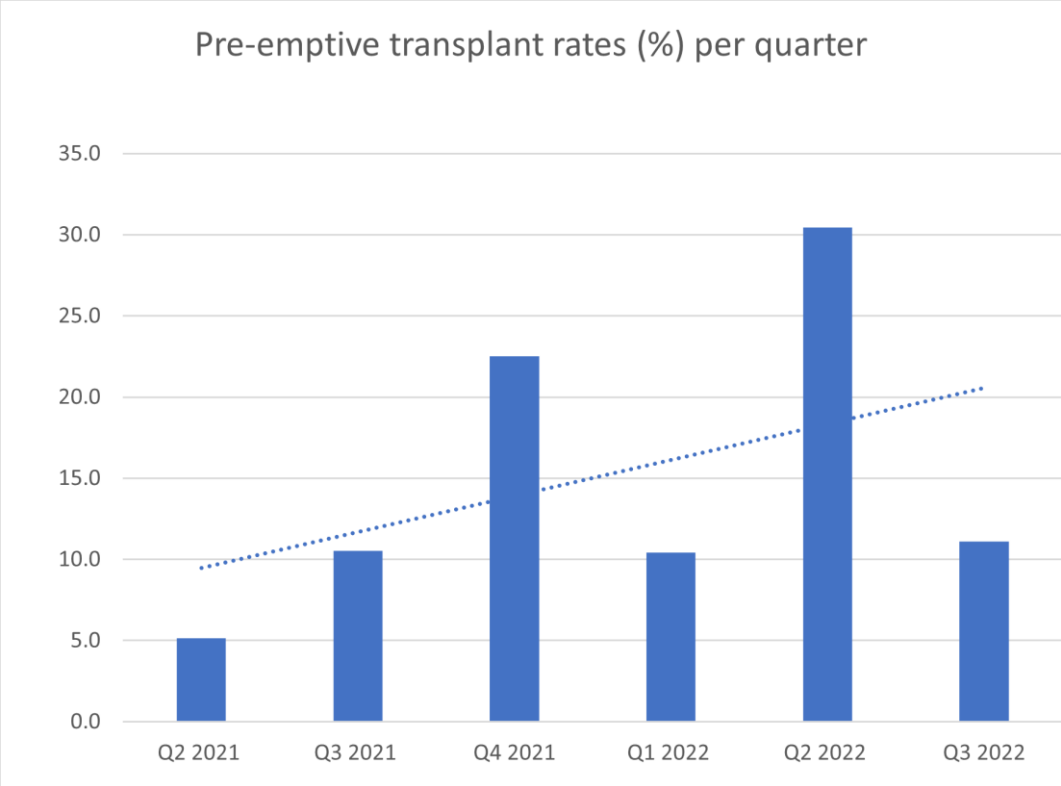
Methods: With support from the Kidney Quality Improvement Partnership (KQuIP) and 8 half day workshops we adopted a multifaceted QI approach. Workshops were attended by team members, QI experts and RPLAN (renal patient led advisory network). Two key areas of improvement were; increasing live donation and improving and expediting potential transplant recipient workup. The outcome measure was quarterly number of pre-emptive transplants as a proportion of total new patients commencing RRT after excluding patients who commenced RRT in an unplanned fashion. PDSA outputs were supported by also recording process measures including number of live donor transplants, number of potential recipients who have live donors come forward and number of patients who are activated on the renal transplant waiting list before starting dialysis. All outputs and PDSA cycles were recorded on lifeqi (www.lifeqisystem.com). Interventions included increased number of cardiology time slots for echocardiography and stress echocardiography, proactive approach to organ donation week, a new live donor nursing position, utilisation of the kidney failure risk equation in advanced kidney care clinics, a new transplant workup patient information leaflet directly addressing barriers to transplantation, a new live donor advertisement poster and closer MDT working with our transplant centre.

Results: Despite the challenging backdrop of COVID 19 recovery there was an improvement in pre-emptive transplantation rates. During the second quarter of 2022 (July to September 2022) 30.4% of patients commenced RRT with a pre-emptive renal transplant. The team matched the greatest number of pre-emptive transplants in a calendar year in 2022 (23), equivalent to pre-pandemic year of 2019.

Conclusion: A multifaceted Qi approach has started to demonstrate an improvement in pre-emptive renal transplantation in our centre. Further work is aimed at increasing live donation amongst harder to reach patients (lower socioeconomic class and patients from non-Caucasian background). In addition,

transplant workup in spoke hospitals is underway to reduce waiting lists and allow for investigations to take place closer to the patient's home. An automated data collection tool is being piloted which aims to identify patients at high risk for kidney failure in our service but who have not yet undergone transplant workup.

Year	Number of pre-emptive renal transplants
2018	20
2019	23
2020	13
2021	12
2022	23



Tuesday 6th June 12:15 – 13:15

Track R2 – Transplantation 2

Poster: 389
Submission: 253

Significant reduction in morbidity from recurrent urinary tract infection in renal transplant patients with convenient oral antiseptic Methenamine Hippurate.

Dr Oshini Shivakumar[1], Dr Anan Ghazy[2], Dr Andreas Kousios[1], Ms Bynvant Sandhu[1], Ms Rachna Bedi[3], Dr Rawya Charif[1], Dr Neill Duncan[1]

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[2]Department of Infection, Imperial College Healthcare NHS Trust, London.
[3]Senior Lead Renal Pharmacist, Imperial College Healthcare NHS Trust, London

Introduction: Urinary tract infections(UTI) are the most common cause of infection in kidney transplant recipients. Recurrent UTIs are not only a significant cause of morbidity and mortality in renal transplant recipients, but are associated with loss of graft function. Independent risk factors for recurrent UTIs are age, gender, urological abnormalities, and a pre-transplant history of recurrent UTIs. Prophylactic antibiotics predispose to antibiotic resistance, while D-mannose and faecal microbiota transplantation(FMT) are not a resolution. Methenamine, a non-antibiotic compound used as urinary anti-septic, has published efficacy in non-transplant patients, but limited data in kidney transplant patients.

Methods: Single centre retrospective review of use of Methenamine Hippurate(MH) in renal transplant patients. We reviewed electronic clinical notes to obtain UTI episodes, antibiotic exposure, hospital admissions due to UTI and causative organisms. Pre-treatment period is from transplantation or 3 years pre-treatment when available. The post treatment period was from date of first prescription till study end date or stop date of repeat prescription.

Results: 13 kidney transplant recipients met the inclusion criteria of more than 2 episodes of UTIs within 3 months. All were given patient information sheets about adjusting behaviour to reduce UTI and prescribed MH 1g twice a day. Mean age was 51.7±14.8yrs and median follow up period of 36months pre-treatment and 8months post treatment. 15% of UTIs pre treatment were caused by multi drug resistant organisms(MDRO). Six patients had a history of urological diagnosis as outlined in Table 1.

Patient A had chronic urethral obstruction requiring intermittent self-catheterisation, spending 89 days per patient-year(PPY) in hospital, pretreatment. His MH course was interrupted by urosepsis within a week of treatment onset, and again due to cardiovascular event. Patient M discontinued MH due to loose stools and epigastric discomfort, within one week of treatment start. Hence, both patients not included in analysis. 11 patients analysed as treated. Patients E and H did not demonstrate a reduction in total antibiotic exposure post treatment, unlike the other patients. Interestingly, they had no documented urological issues. All patients who had hospital admissions due to urine infection demonstrated a reduction in total time spent in hospital post treatment.

Conclusion: MH is an antiseptic and reduces antibiotic exposure rates for renal transplant patients with recurrent UTIs. This convenient oral medication was well tolerated in this small cohort study, and renal graft function remained stable. MH was apparently effective even in patients with MDRO infection that had required hospitalisation, or anatomical abnormalities that were presumed sumps for infection.

Patient	Gender	Age (years)	Urological issues	Pre-treatment follow up (months)	Pre-treatment, total time in hospital (days ppy)	Pre-treatment, antibiotic use (days ppy)	Post treatment follow up (months)	Post treatment, total time in hospital (days ppy)	Post treatment, antibiotic use (days ppy)
A	M	69	Intermittent self-catheterisation due to chronic urothelial obstruction	6	104	266	<1	*follow up too short*	*follow up too short*
B	F	78	Congenital dysplasia; ileal conduit urostomy insitu	36	0	32	21	0	0
C	M	41	Reflux nephropathy; Native kidney stones; Intermittent self-catheterisation due to small bladder volume and reflux	36	9	62	15	0	6
D	F	56	Nil	25	80	103	7	24	33
E	F	64	Nil	36	5	25	9	0	51
F	F	43	Nil	36	0	29	14	0	0
G	F	31	Nil	28	0	55	8	0	32
H	F	48	Nil	36	0	67	5	0	101
I	M	55	Keratinising squamous metaplasia of bladder. Chronic cystitis with pseudomonas colonisation.	36	0	2	8	0	0
J	M	67	Nil	2	12	252	4	0	0
K	M	55	Neuropathic bladder requiring intermittent self-catheterisation	36	0	15	2	0	0
L	F	31	Gravid uterus causing transplant hydronephrosis, subsequent ureteric stent for stricture.	36	6	30	1	0	0
M	F	51	Nil	36	*Episodes out of local Trust*	*Episodes out of local Trust*	<1	*follow up too short*	*follow up too short*

Table 1. Outline of demographics and key findings.
Days ppy= Days per patient year.

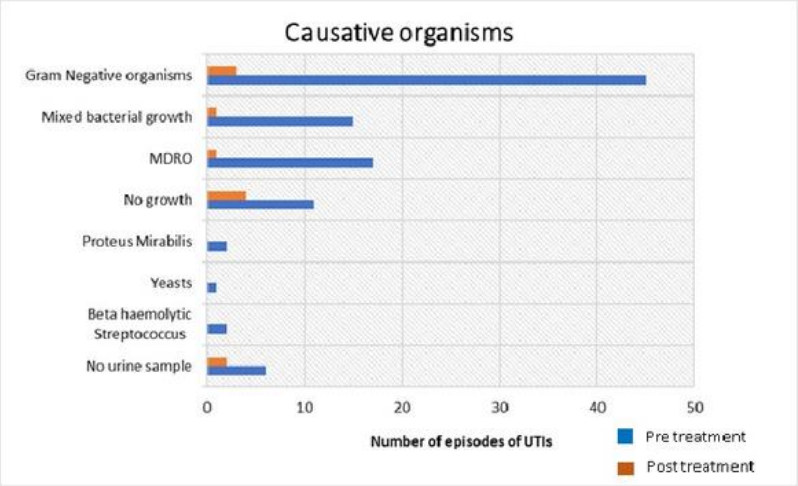

Chart 2. Microbiology distribution pre and post treatment with Methenamine Hippurate.

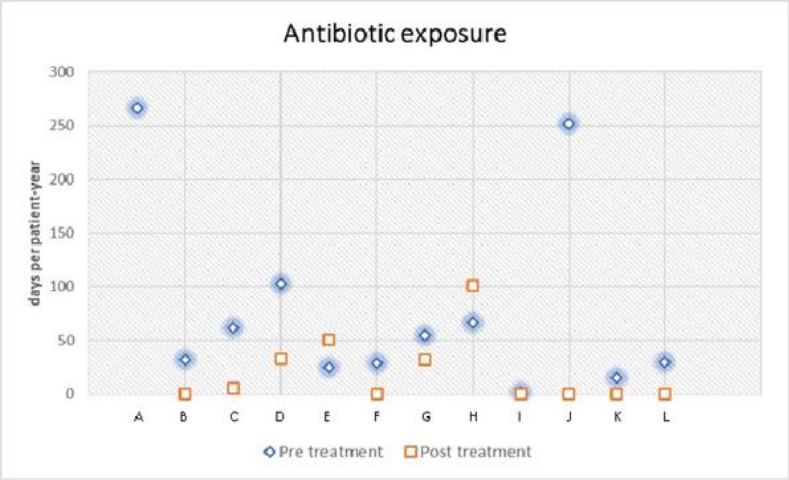

Chart 3. Duration of antibiotic exposure of each patient pretreatment and post treatment

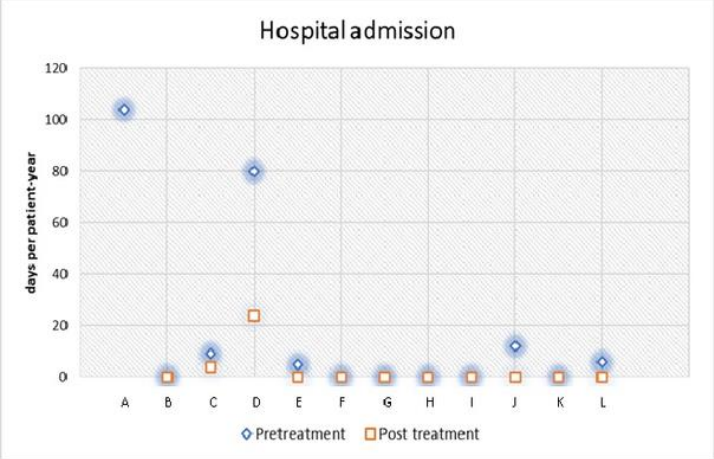

Chart 4. Time spent in hospital due to UTIs for each patient pre treatment and post treatment.

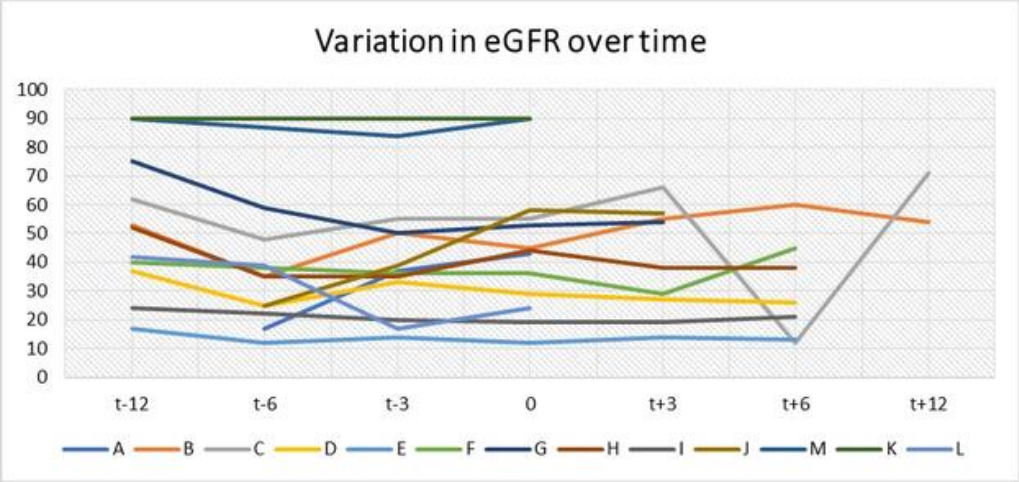

Chart 5. Variation of eGFR with time (months). t=0 is time of Methenamine Hippurate start.

Tuesday 6th June 12:15 – 13:15

Track R2 – Transplantation 2

Poster: 390
Submission: 257

Barriers to timely transplant listing: single centre experience

Dr Ismet Boral, Dr Shu Sit, Dr Catherine Byrne

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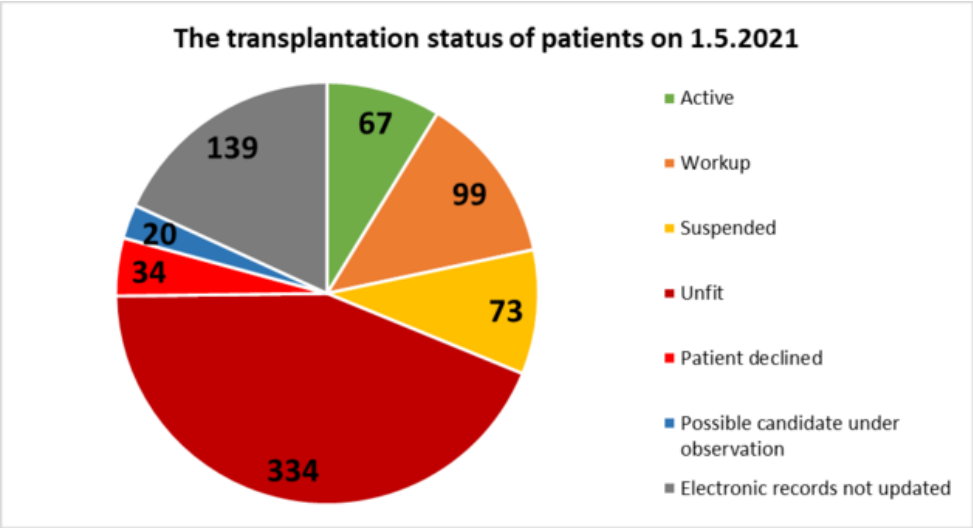
Introduction: Transplantation is the gold standard treatment for kidney replacement therapy. Ideally all patients should have a pre-emptive decision regarding transplant suitability. We reviewed all patients with chronic kidney disease G5, on dialysis or with a failing renal transplant, to assess timeliness of referral for transplantation and reasons for delays.

Methods: Using our electronic systems we identified patients with eGFR <15 with or without previous transplants, or currently on haemodialysis and peritoneal dialysis. Data were collected on 1.5.21 including demographics, previous transplantation, dialysis start date, transplant suitability, date of referral to transplant surgeons, date of activation on the national waiting list and investigations required for listing.

Results: We identified 766 patients (466 male, 300 female) of whom 303 were pre-dialysis, 346 were on haemodialysis (HD), 98 were on peritoneal dialysis (PD) and 19 had a failing transplant.



627 patients (82%) had a documented decision about transplantation on their electronic record. Old age and comorbidities were the commonest reasons given for unsuitability for transplant listing. Once referred, the average time for surgical review was 85 days. The commonest delays to reach a decision were waiting for imaging and other specialities input. 12% of patients are not listed after surgical review as their GFR is too high for listing.

77 of 244 referrals (31%) to see a surgeon were made after the patient started dialysis.

Of 160 patients who were listed at any point, 93 (58%) were activated on the national list before needing dialysis.

Discussion: We identified areas for improvement; ensure all patients have a transplant suitability decision made and recorded at the advanced kidney care clinic with timely referral for listing, reduction in waiting time to see a surgeon, reduction in time in obtaining imaging or other speciality reviews and more robust electronic record keeping.

Tuesday 6th June 12:15 – 13:15

Track R2 – Transplantation 2

Poster: 391
Submission: 318

Utility of ramp test time in patients undergoing assessment for renal transplantation

Miss Rebecca Smith[1], Mr Pranav Satish[2], Mr Nader Bedwani[1], Ms Ewa Frackiewicz[1], Professor Reza Motallebzadeh[1,2], Dr Gareth Jones[1]

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[2]University College London, London

Introduction: Prior to renal transplant listing, cardiovascular screening is performed in order to stratify the risk of cardiovascular disease (CVD). During pre-assessment in our centre, patients undergo a "ramp test" (a timed assessment to walk 130m), which is a simple, rapid and non-invasive method of quantifying exercise tolerance. The purpose of this study is to correlate ramp test time (RTT) with:

1. transplant waiting list status;
2. nuclear medicine or echocardiographic cardiac stress testing;
3. post-transplant cardiovascular (CV) events and mortality.

Methods: Retrospective analysis of all patients that underwent pre-assessment. Data collection included patient demographics, history of CVD and diabetes, RTT, ejection fraction and evidence of myocardial ischaemia, transplant list status, any subsequent CV event (defined as any acute event/intervention related to CVD requiring hospitalisation), and mortality. Three distinct groups were analysed: (1) patients unable to perform the ramp test; (2) RTT ≥2mins; (3) RTT ≤1min.

Results: 1508 patients were pre-assessed for transplantation between November 2014 and June 2022, of which 1302 had RTTs recorded. Mean RTT was 86 seconds (SD±26 seconds). Patients with RTT <1min were younger and had less pre-existing CVD (Table 1), of whom 93% had normal cardiac function by stress testing. Over half of the patients who either had RTT >2mins or were unable to perform the test had abnormal cardiac function, with a 3-year mortality of about 30% (Figure 1).

Discussion: RTT can be to assess cardiovascular fitness and suitability for transplantation. Patients who are unable to perform the test are unlikely to be listed for transplantation, with a quarter suffering a CV event post-assessment. In contrast, patients with RTT ≤ 1min are almost all activated on the waiting list with no subsequent CV events. The low rate of CV events or abnormal stress tests in this group may allow early activation without the need for extensive cardiovascular assessment.

Table 1.

			UNABLE TO PERFORM	RTT ≥ 2 MINS	RTT ≤ 1MIN	p-value
DEMOGRAPHICS	Total number of patients, n		89	92	67	
	Mean follow-up, months (SD)		32 (±17)	52 (±28)	33 (±20)	<0.0001
	Mean age, years (SD)		60 (±9)	60 (±10)	42 (±13)	<0.0001
	Sex (M:F)		49:51	50:50	84:16	<0.0001
	Mean BMI, kg/m^2 (SD)		29.3 (±5.7)	29.7 (±5.3)	25.7 (±4.8)	<0.0001
	Median frailty score (IQR)		5 (4-6)	4 (3-6)	2 (1-3)	<0.0001
	History of CVD, n (%)		41 (46)	37 (40)	1 (1.5)	<0.0001
	History of diabetes, n (%)		47 (53)	60 (65)	8 (12)**	<0.0001
CARDIAC STRESS TESTING	Stress testing performed, n (%)		43 (48)	71 (77)	27 (40)	<0.0001
		Normal	24 (56)	56 (79)	25 (93)	0.001
		Activated	11 (46) *	25 (45)	23 (92) ±	
		CV event	6 (25)	11 (20)	0	
		Died	5 (21)	13 (23)	1 (4)	
		Abnormal	19 (44)	15 (21)	2 (7)±±	0.001
		Activated	1 (5) *	4 (27)	0	
		CV event	10 (53)	7 (47)	0	
		Died	5 (26)	4 (27)	2 (100) ±±	
	Stress testing not performed, n (%)		46 (52)	21 (23)	40 (60)	<0.0001
		Activated	0	2 (10)	39 (98)	
		CV event	6 (13)	4 (19)	0	
		Died	28 (61)	15 (71)	1 (3)	
TRANSPLANT LIST STATUS	Activated, n (%)		12 (13) *	31 (34)	62 (93)	<0.0001
	Excluded, n (%)		77 (87)	61 (66)	5 (7)	
OUTCOME	CV event, n (%)		22 (25)	22 (24)	0	<0.0001
	Died, n (%)		38 (43)	32 (35)	4 (6)	<0.0001

Table 1. Patient demographics and outcomes of cardiac stress testing, transplant list status and survival according to RTT

*All patients unable to perform the ramp test and activated on the transplant list had a normal cardiac stress test, except for one patient, who had an abnormal stress test, was activated, and died from a post-operative myocardial infarction

** All 8 diabetic patients in the RTT≤1minute group underwent cardiac stress testing, with all 8 having a normal test

± 2 patients with normal cardiac stress testing were not activated: 1 patient was excluded due to untreated TB; 1 patient died from a post-operative wound infection

±± 2 patients with abnormal cardiac stress testing died from intracerebral haemorrhages during work-up

Figure 1.

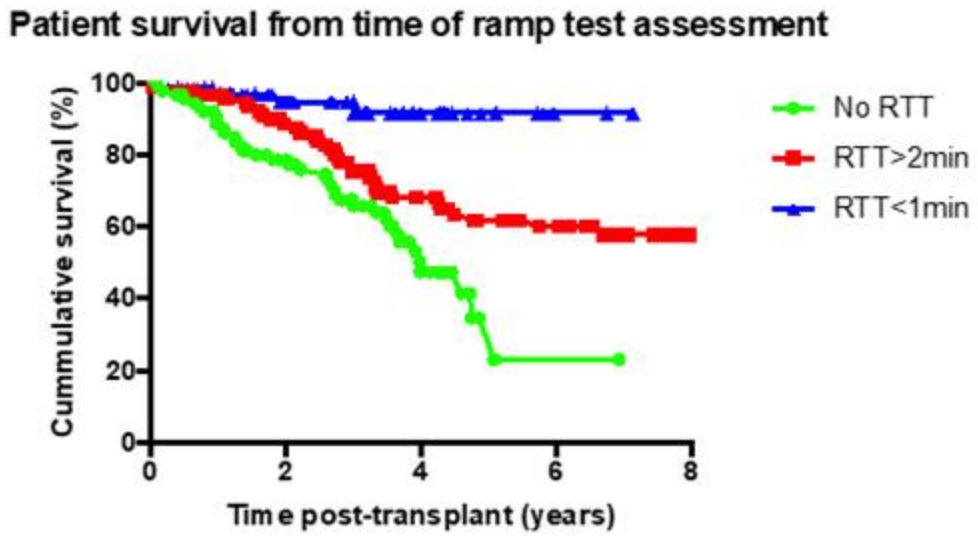

Figure 1. Kaplan–Meier curves showing patient survival from time of assessment, with censoring at last follow-up. p<0.0001 overall, log-rank test.

Tuesday 6th June 12:15 – 13:15

Track R2 – Transplantation 2

Poster: 392
Submission: 347

Perioperative management of anticoagulation in kidney and simultaneous kidney-pancreas transplant recipients

Dr Ashley Simpson, Dr Lorna Henderson, Dr Julia Anderson

Royal Infirmary of Edinburgh, Edinburgh

Introduction: The management of anticoagulation in patients undergoing kidney (KT) or simultaneous kidney pancreas (SKP) transplant is challenging. Currently there are no guidelines specific to patients on anticoagulation undergoing transplantation. Our experience shows variability in assessment and inconsistency in management of similar clinical scenarios. This project reviewed peri-operative prescribing practice in KT and SKP recipients who were prescribed therapeutic anticoagulation. We sought to determine the incidence of bleeding and thrombotic complications and identify any specific aspects of management that predisposed to a higher risk of bleeding.

Methods: Electronic records were reviewed for patients who received a KT or SKP transplant between 1st January 2016 and 1st August 2022. Any patient receiving anticoagulation prior to admission or following discharge was included. Patients receiving prophylactic doses of low molecular weight heparin (LMWH) or anti-platelet agents alone were excluded.

Results: 278 live donor kidney, 428 deceased donor kidney and 105 SKP transplants were carried out between 1st Jan 2016 and 1st August 2022. Forty-six patients were identified as having been prescribed anticoagulation; 28 of these patients were prescribed anticoagulation on admission which was continued through to discharge; 10 had their anticoagulation discontinued perioperatively; 8 were newly prescribed anticoagulation post-operatively.

Of the 38 patients prescribed anticoagulation on admission: 36 received warfarin and two received low molecular weight heparin (LMWH). Indications for anticoagulation included; previous venous thromboembolism (13), AF (8), vascular access patency (8), metallic heart valve (6) and lupus anticoagulant / antiphospholipid syndrome (3). Of the 36 patients anticoagulated on discharge; 8 received warfarin, 7 received apixaban and 21 received LMWH.

Postoperatively, 30 patients were managed with unfractionated heparin 5000 units BD; 6 patients received 5000 units TDS; 9 patients received an intravenous (IV) heparin infusion and one patient received treatment dose LMWH. Seven patients experienced a bleeding complication. Five of these were significant bleeds requiring a return to theatre and/or blood transfusion. Of these patients, four received IV heparin. APTT was above target at some point in all cases post operatively (range 59-104). One patient received therapeutic LMWH but took an accidental additional dose.

Of the 39/46 patients who did not experience bleeding complications, 28 received unfractionated heparin 5000units BD; 6 received 5000 units TDS and 5 received IV heparin. In all cases APTT was within

the normal range. We identified one patient who had a thrombotic event at Day 53 which was managed with LMWH and warfarin. 17 patients had documentation of discussion with a Haematologist before transplant.

Discussion: The majority of patients prescribed therapeutic anticoagulation before or after transplantation did not experience serious bleeding complications. Those that did were more likely to have received IV heparin with an abnormal APTT. Prescribing practice was inconsistent and specialist Haematology advice was not consistently sought or followed. In collaboration with haematology colleagues, we have devised guidance for the management of perioperative anticoagulation in transplant recipients. The purpose is to reduce the risk of bleeding complications, improve consistency in prescribing and identify the patients who require specialist haematology input.

Tuesday 6th June 12:15 – 13:15

Track R2 – Transplantation 2

Poster: 393
Submission: 394

How the Southeast KQuIP Transforming the transplant pathway project team improved their documented transplant decisions for kidney patients

Mrs Julie Slevin[1], Dr Michelle Webb[2], Mrs Rachel Gair[1], Mrs Ranjit Klare[1], Mrs Leeanne Lockley[1], Dr Kostas Koutroutsos[3]

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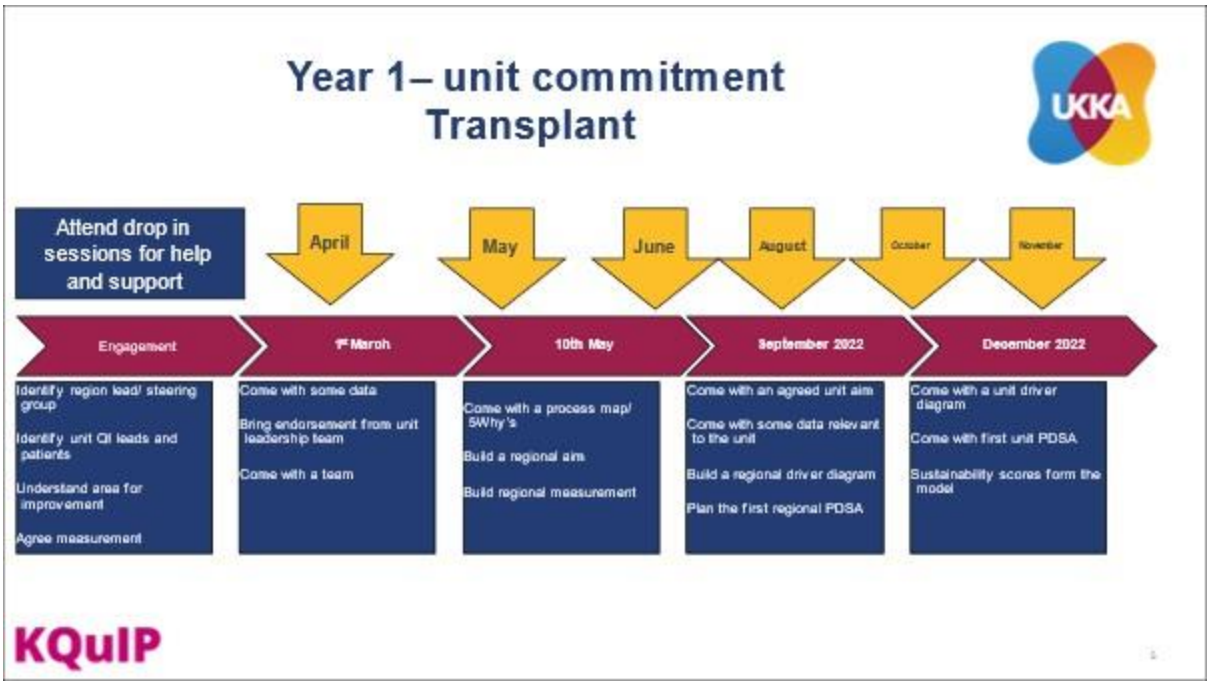
Introduction: The Kidney Quality Improvement Partnership (KQuIP) have been supporting the Southeast kidney network by developing quality improvement (QI) leadership and teaching QI tools and methodologies since 2018. The transforming the transplant pathway project team looked at the NHS England & Improvement Renal Services Transformation Programme (RSTP) and Getting It Right First Time (GIRFT) (Lipkin and McKane, 2021) guidance, which requires timely and equitable assessment and transplant listing. Recognising the local need to improve timely kidney transplants for all, In November 2021, the KQuIP project group agreed the initial aim for the project would be “95% dialysis patients AND patients known to the unit for six months, with an eGFR of 20 or less should have a documented transplant decision”. This reflected the need to ensure that patients had a documented decision about their transplant status by the time dialysis became necessary. The hypothesis was that this would lead to earlier conversations with patients about transplantation, and therefore timely referral for transplant workup.

Methods: Multi-professional leads were invited to participate in the KQuIP QI programme (figure 1) These workshops facilitated clinical teams and patients to apply the QI methodology to understand the problem and develop local change ideas to achieve the aim.

Fig.1. KQuIP QI programme

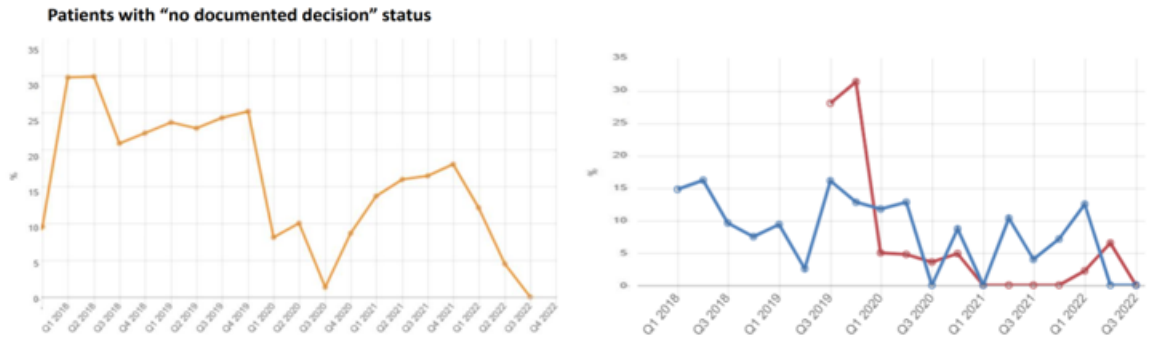


To identify where to make changes, the units made use of QI tools: Process maps to look at the steps in the transplant pathway, Driver diagrams to describe the change ideas and the KQuIP Transplant First measurement platform to collect data.

Results: The process maps and data collected in the Transplant First dashboard were analysed, and we found a common cause of delays was late referral to the transplant assessment team.

Ten months after agreeing the aim, the data shows that two units are reliably achieving the stated aim, while for the rest of the region there is ongoing improvement. In parallel, improvements have been shown in pre-emptive transplant listing rates and overall pre-emptive transplantation numbers indicating also post COVID recovery.

Fig. 2 Transplant First dashboard data:



Discussion: We found that, although there was enthusiasm to make improvements, and the RSTP and GIRFT recommendations clearly set out the required changes, it took time to form the team and make

the improvements needed. We carefully created our improvement team and took time to collect and analyse data and agree what was needed to make changes. The aim was clear, and measurement strategy was simple. It was well communicated across local teams and that has ensured the change has been successfully implemented. There are clear benefits for patients and staff, so early discussions and documented decisions are now “business as usual”.

The project is still in its infancy, but so far, the impact is that transplant is discussed sooner with patients and documented in the notes. The project team are now agreeing a second aim, which will be to increase the number of transplants – pre-emptively and for those who already have renal replacement therapy.

Tuesday 6th June 12:15 – 13:15

Track R3 – Transplantation 3

Poster: 394
Submission: 406

A 2-year KQuIP multiprofessional QI training and support programme produced measurable improvements in home dialysis and pre-emptive listing for kidney transplant for patients in the North West.

Mrs Leeanne Lockley[1], Mrs Rachel Gair[1], Mrs Julie Slevin[1], Ms Ranjit Klare[1], Mr Rob Finnigan[2], Mr Fez Awan[3], Dr Rosie Donne[4]

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[2]North West Kidney Network, Liverpool.
[3]RPLAN, Liverpool.
[4]Northern Care Alliance, Salford

Introduction: In March 2021, NHS England produced the Renal Getting It Right First Time (GIRFT) report, providing the kidney community with recommendations on how to improve kidney care. It states "A regional approach to service transformation, QI co-ordination, project management, training and leadership is particularly important for delivery of the recommendations ..." (p31). The NHSE Northwest Kidney Network (NWKN) agreed to work with Kidney Quality Improvement Partnership (KQuIP) to provide QI training and project support. The aim of NW KQuIP is to establish sustainable quality improvement (QI) across the region for all four GIRFT themes by the 31st of Dec 2023. This involves working with the Northwest formal patient involvement network Renal Patient Led Advisory Network (RPLAN).

Methodology: Healthcare professionals, patients, and industry partners from 5 renal units in the Northwest attended a 2-year QI training and support programme starting July 2021. QI projects focused on increasing access to pre-emptive kidney transplant and/or home dialysis. Four half-day virtual workshops occurred in year one, then three in year 2 followed by an in-person QI conference in November 2022.

Workshops included training on QI concepts followed by time for practical application of the concept in small groups which included expert patients. QI project teams provided an update on project progress including presentation of outcome data, challenges and next steps accompanied by informal peer-to-peer support from other teams. Projects leads had monthly access to the regional KQuIP programme manager for QI advice and project support.

Attendee confidence in using QI concepts was measured by questionnaire at the end of each workshop. Each project was asked to submit a QI abstract and present a QI poster at the QI conference.

Results: Each QI workshop throughout the programme was attended by 7-19 healthcare professionals and 5-7 patients. A high % of attendees reported high or improved confidence in using each QI concept at the end of each workshop (see table 1)

Table 1 - QI training events

Workshop	QI Concepts taught	% of attendees reporting they are confident to use the QI concept at end of workshop
1	Overview of KQuIP 10 steps in QI Stakeholder engagement	Not surveyed 100%
2	Defining project aim Choosing project measures	100% 67%
3	Driver diagrams and change ideas Plan Do Study Act cycles	80% 80%
4	Appreciative Inquiry Sustainability	Not surveyed
5	QI leadership	38% before workshop, 83% after
6	Measurement for QI Update from Renal Registry	Not surveyed
7	Creating a QI abstract and poster	33% before workshop, 83% after

The NW QI conference was attended by 83 healthcare professionals and 7 patients. 7 posters were presented, including one by the Northwest RPLAN describing their work so far. All QI project teams reported improvement in their outcome measures and the benefits of learning QI skills in a safe, multidisciplinary environment (see table 2).

Table 2 - Project outcomes

Project no.	Theme	Project outcome after 18 months
1	Home dialysis	Increase in number of patients on peritoneal dialysis from 54 (2019) to 65 (2022)
2	Home dialysis	Increase in % of dialysis patients on home dialysis from 20% (Oct 2021) to 23% (Oct 2022)
3	Home dialysis (expenses)	Increase in % of home HD patients claiming reimbursement from 33% (Jan 2022) to 100% (Oct 2022)
4	Home dialysis	Increase in home dialysis from 10% (March 2021) to 15% (Oct. 2022)
5	Pre-emptive transplantation	Standardisation of transplant listing referral document and reduction in time from referral to surgical assessment to a mean of 3 weeks
6	Pre-emptive transplantation	Increase in % of patients starting renal replacement therapy with a pre-emptive transplant to 23% (2022 Q3) [was 13% in 2019]

Conclusion: The 2-year KQuIP training programme improved QI skills and confidence in multidisciplinary teams including expert patients. This work led to integral patient participation and measurable improvements in patient care for all projects. Project teams benefitted from having a safe environment to apply QI tools and share project updates whilst accessing informal peer support. The next step for KQuIP Northwest is to provide QI support to the newly established GIRFT themed workstreams whilst

continuing to provide support to current QI projects. Partnership working between the Northwest Kidney Network, KQuIP, and RPLAN are essential for achieving measurable improvements in kidney care.

Tuesday 6th June 12:15 – 13:15

Track R3 – Transplantation 3

Poster: 395
Submission: 434

Renal transplant patients returning early to local renal units - a single centre study auditing graft function and complication rates

Dr Iain Smith, Dr Callum O'Keeffe, Dr Ellie Payne

Gloucestershire Royal Hospital, Gloucester

Introduction: Renal transplantation is a life-saving intervention adding many quality life years for patients in end-stage renal failure. Transplant patients are managed in specialist centres around the country before returning to local District General Hospitals (DGHs) under care by the local nephrologist. Agreement between the specialist transplant centre and local service allows for return when the patient and graft are deemed stable. The field is now moving towards early local service transfer for care.

This study looked at the outcomes of patients who had an agreed early return to local nephrology service. The British transplant society (BTS) set out clear standards that a renal centre should be offering following transplant. This study audited the complication rates and graft function of early return patients following renal transplantation, to identify success of early return to clinic whilst meeting the BTS standards of care.

Methods: This study analysed retrospective data from renal transplant patients returning to follow-up at a local DGH, with operation dates between June 2020 and September 2021 (n=25). Time to return was measured from transplant date to first local clinic appointment.

Graft function was analysed through the comparison of creatinine at the first clinic and at 12 months (n=20). Complication rates, including number of hospitalisations, transplant rejections, and immunosuppression related complications were measured from first clinic return to May 2022.

All confidence intervals were calculated through standard data analysis software to the 95% confidence level. Averages are displayed as means.

Results: Patients underwent transplantation in two tertiary transplant centres (n=25). Full demographics are outlined in Table 1. Transplants were either kidney transplants (n=22) or simultaneous pancreas-kidney transplantation (n=3).

The average time to return was 136 ±23 days with the shortest at 49 days and the longest 336 days. Quarterly averages are shown in Table 2.

After twelve months, creatinine levels were worse in thirteen patients but improved in seven, with average creatinine increasing from 146 to 148 µmol/L.

Immunosuppression related complications are outlined in Table 3. Eleven out of the twenty-five patients were admitted to hospital during the study period. Hospital related admissions totalled 124 days across all patients with an average of length of stay of 5.4 days, as outlined in Table 4. In addition to this, four required biopsy as shown in Table 5.

Discussion: Local clinic follow-up has enabled transplant patients to receive care closer to home. Rates of complications are as expected when compared to national transplant data, suggesting minimal increased risk of early return to local clinic.

The rise in creatinine over the study period was not statistically significant, indicating that there may be some transplant stability in locally returning patients. However, the small study population has affected the reliability of results.

Overall, this study outlined rates of complications and graft function for the population of renal transplant patients returning early to non-transplant local follow-up. This will provide useful data for enabling patients to be seen locally in the future.

Tables

Table 1- Demographics of patients undergoing transplant returning to Gloucester Royal Hospital for local follow up. (N=total number of patients, SPK=simultaneous pancreas and kidney, LKD = living kidney donor, DCD = Death after circulatory death, DBD= Death after brain stem death)

Demographic	Number of Patients
N	25
Sex	
Male	19
Female	6
Age	
0-30	6
30-60	9
>60	10
Location	
Oxford	16
Bristol	9
Transplant	
SPK	3
Renal	22
Donor Type	
LKDs	5
DCD	14
DBD	6

Table 2 - Average time to return for patients in Yearly Quarters of 2021

Quarter	Average days to return
1	136
2	137
3	161
4	107

Table 3 - Complication rates of patients returning from transplant

Complication	Number of Patients
Death	1
Recurrent UTIs	3
CMV disease	3
Neutropenia	2
Viral Meningitis	1

Table 4 - List of hospital admissions and respective causes (UTI = Urinary tract infection, CMV = Cytomegalovirus)

Cause of hospital admissions	Number of Admissions
Infection related	
UTI	12
Covid	2
CMV	2
Viral meningitis	1
Non infection:	
PE	1
Neutropaenia	1
High potassium	1
Low phosphate	1
AKI / biopsy	2

Table 5 - List of biopsies patients and results of biopsies, AMR = Antibody-Mediated Rejection, BK = BK virus, CNI= calcineurin inhibitor, TMA = Thrombotic microangiopathy, SPK = Simultaneous pancreas and kidney, LKD = living kidney donor, DCD = Donation after Circulatory Death

Transplant information	Biopsy result
Ox SPK	1b rejection
Ox LKD	1b rejection
SMH DCD	AMR, BK nephropathy, CNI toxicity
Ox LKD	CNI toxicity, possible TMA

Tuesday 6th June 12:15 – 13:15

Track R3 – Transplantation 3

Poster: 396
Submission: 072

Cytomegalovirus infections in kidney transplant recipients a single centre retrospective cohort study

Dr Chukwuma Austin Chukwu[1,2], miss Kairi Pullerits[2], Miss Shona Garland[2], Dr Sharmilee Rengarajan[1], Dr Rajkumar Chinnadurai[1,2], Dr Rachel Middleton[1,2], Prof Phillip Kalra[3,2]

[1]Salford Royal hospital, Manchester.
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[3]Salford royal hospital, Manchester

Introduction: With improved immunosuppression, allograft loss due to acute rejection has lessened. However, the incidence of post-transplant infections is on the rise. CMV infection is considered the most common opportunistic infection in kidney transplant recipients (KTR).

The study ained to assess the prevalence, risk factors of CMV viremia in a single tertiary nephrology centre . We also sought to evaluate the impact of CMV viremia on graft and recipient survival

Methods: The medical records of 962KTR transplanted between 2000 and 2020 were reviewed. Recipients were categorised into those with no history of CMV viremia vs those who experienced CMV viremia. CMV log of viral count was recorded and correlated with presence or abscence of tissue-invasive disease. A multivariate Cox proportional hazard model was used to evaluate the time to infection and the risk factors associated with CMV viremia. Fine and Gray competing risk model was used to assess the impact of CMV viremia on death censored graft loss (death as competing risk). Cox proportional hazard model was used to assess the effect of CMV viremia on recipients' survival.

Result: 131 recipients(14%) experienced CMV viremia with an incidence rate of 1.9% per year and a median time to infection of 9 months (IQR: 8- 3mo). The groups were similar in age, gender, primary renal disease, total HLA mismatch, rate of new onset diabetes and immunosuppression regime. However, recipients who experience CMV viremia were more likely to be non-white, receive a deceased donor graft, receive allograft from a CMV positive donor, have a history of acute rejection, have a lower baseline eGFR and receive more than 3 months of steroid therapy(table 1).

CMV viremia was significantly associated with increasing age, lower baseline eGFR, CMV-positive donor allograft, CMV-negative recipient and receiving more than 3 months of corticosteroid therapy (Figure 1).

74% of those who experienced CMV viremia had a non-tissue invasive (asymptomatic infection) whereas 26% experienced tissue invasive infection. of these, CMV enteritis was the commonest presentation (45%). Followed by pneumonitis (18%), 9% had disseminated CMV infection while meningitis and nephritis occurred in 6% of those with tissue invasive disease. Tissue-invasive disease was associated with a higher median log of viral count (4.57 vs 3.12);$p<0.001$ (figure 2)

After adjusting for age, baseline eGFR, donor type and history of acute rejection, allograft loss (death as competing risk) did not differ significantly between the CMV viremia and the non-CMV viremia groups (SHR= 0.98;p=0.89). On the contrary death with functioning graft adjusted for age, baseline eGFR, donor type and history of acute rejection was significantly higher in recipients who experienced CMV viremia compared to those who did not. HR= 1.67:p=0.035 (figure 3)

Conclusion: Our study showed that CMV viremia is an important cause of morbidity and mortality in allograft recipients. Older recipients, recipients with lower allograft function, CMV seronegative recipients, recipients of CMV seropositive allografts and those with prolonged corticosteroid therapy are predisposed to CMV viremia. CMV viremia is associated with increased mortality and therefore should be actively prevented and aggressively treated.

Table 1: Baseline characteristics of cohort stratified by incidence of CMV viremia. Incidence of CMV viremia

Characteristics	No CMV viremia n=829(86%)	CMV viremia n= 131(14%)	Total (962)	p-value
Age at transplant	47±15	48±15	47±15	0.35
Male	520(63)	77(58)	597(62)	0.29
White	682(82)	101(75)	783(81)	0.02
Recipient BMI	27±8	28±7	27±8	0.08
Total HLA mismatch	2.4±1.4	2.4±1.4	2.4±1.4	0.73
Glomerulonephritis	232(38)	36(27)	268(28)	
Diabetic nephropathy	108(13)	13(10)	121(13)	
Hypertension	54(7)	14(11)	68(7)	
polycystic kidney disease	106(13)	20(15)	126(13)	0.43
Reflux	121(15)	16(12)	137(14)	
Others	89(11)	11(8)	100(10)	
Unknown	119(14)	23(17)	142(15)	
Living donor	209(31)	24(21)	233(29)	0.04
Deceased donor	475(69)	89(79)	564(71)	0.04
Pre-emptive transplant	219(32)	38(33)	257(32)	0.79
Donor CMV positive	335(51)	78(77)	413(55)	<0.001
Recipient CMV positive	394(59)	57(54)	451(58)	0.36
Total ischaemia time	13(5-18)	14(9-19)	13(5-18)	0.09
History of acute rejection	82(10)	22(17)	104(11)	0.02
Baseline eGFR	51(41-65)	47(36-61)	51(40-64)	0.03
NODAT	138(17)	19(14)	157(16)	0.50
More than 3 months of steroid	325(48)	73(64)	398(50)	0.002
Tacrolimus	735(91)	112(88)	847(91)	0.43
Cyclosporine	63(8)	14(11)	77(8)	0.43
Rapamycin	9(1)	2(2)	11(1)	0.43
mycophenolic acid	602(77)	105(83)	707(78)	0.24
Azathioprine	109(14)	11(9)	120(14)	0.24
No antimetabolite	73(9)	11(9)	84(9)	0.24

Figure 1: Factors associated with CMV viremia by multivariate Cox regression model

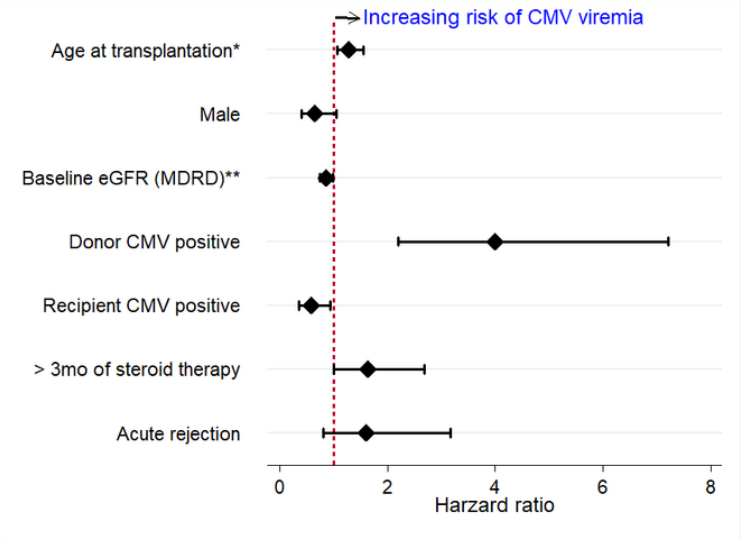


Figure 2: Tissue invasive vs non-tissue invasive infections

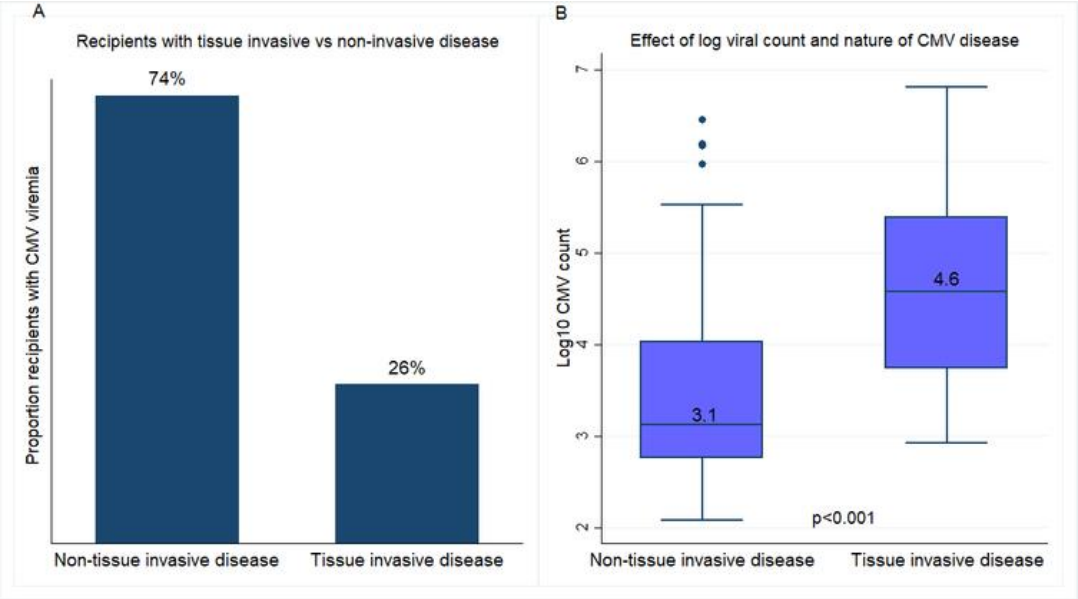


Figure 3: Effect of CMV viremia on graft (A) and recipient (B) outcomes adjusted for age baseline eGFR, donor type and history of acute rejection

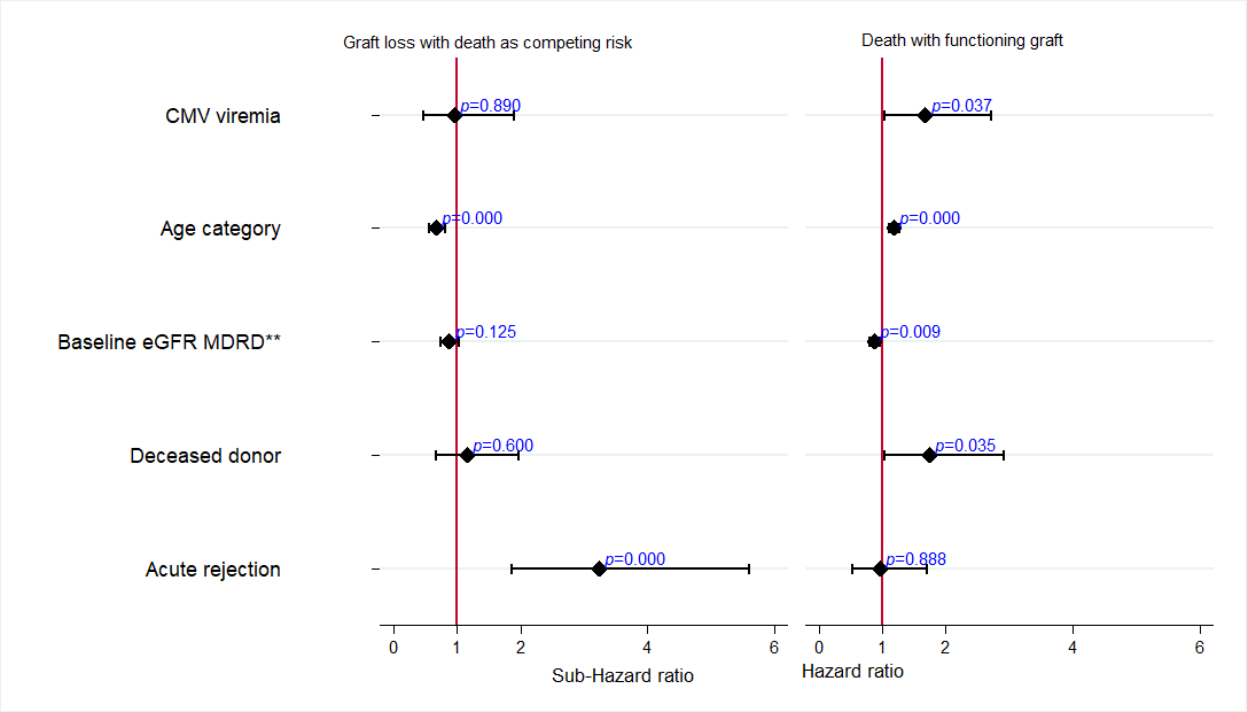
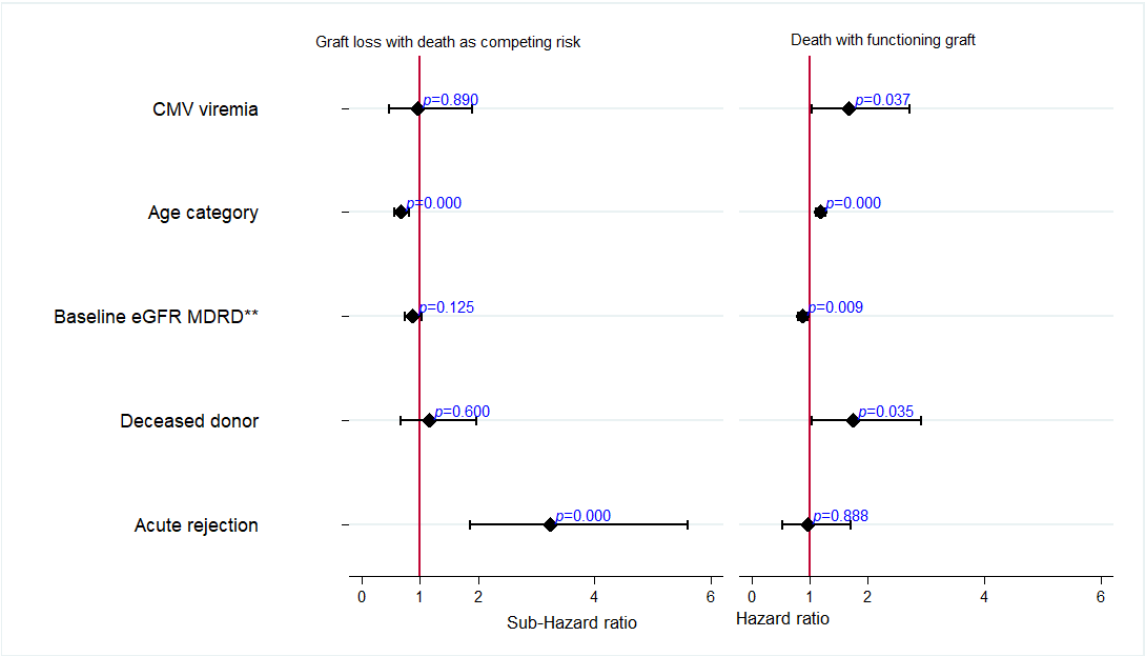


Figure 3: Effect of CMV viremia on graft (A) and recipient (B) outcomes adjusted for age baseline eGFR, donor type and history of acute rejection



Tuesday 6th June 12:15 – 13:15

Track R3 – Transplantation 3

Poster: 397
Submission: 079

Observing Chemokine and Chemokine Receptor Expression in Acute Allograft Rejection – A Retrospective on Human Renal Transplantation and Transplant Immunobiology

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Introduction: There are now extensive data and studies on the observation of many chemokine and chemokine receptors in human renal transplantation that show their increased expression in AAR. The chemokine receptor CXCR3 has been established as a significant immunological component in acute renal allograft rejection. In patients who develop AAR, circulating CXCR3 expression is significantly up-regulated (by Day 3 post-transplantation). CXCR3 +ve, activated T-cells are present in the cellular infiltrates in acute renal allograft rejection. CXCR3 +ve T-cell infiltrates are localized to sites of high IP-10/CXCL10 expression. Published figures vary from 30-90 %.

Literature: Laboratory investigations have informed that in human renal transplantation there are alternative pathways that promote the development of a pro-trafficking phenotype of T-cells in recipients that have received anti-CD25. The hypothesis was addressed by using a T-cell culture system to analyse the effects of anti-CD25 on the expression of CXCR3 and other significant chemokine receptors on the surface of T-cells.

Aims/ Objectives: This work seeks to provide a retrospective overview of Observing Chemokine and Chemokine Receptor Expression in Acute Allograft Rejection (AAR) in context of Human Renal Transplantation and Transplant Immunobiology.

Discussion: In contrast to the escalating data from analysis of the roles of chemokine pathways in AAR, exploration of the role of chemokines in mediation of chronic rejection research is still in its infancy, primarily because of the unsatisfactory nature of laboratory models of allograft rejection.

Conclusion: Research retrospectively informs that there are direct effects of chemokines on recruitment, proliferation, and activation of vascular smooth muscle and other non-haemopoietic cells, in addition to mediation of leukocyte recruitment. Induction of CXCR3 and IP-10 mRNA has been associated with AAR aligned to Human Renal Transplantation and Transplant Immunobiology.

Keywords: Acute Allograft Rejection; Chemokines; Chemokine Receptors; CD25, CXCR3; Renal Transplantation; Immunobiology

Tuesday 6th June 12:15 – 13:15

Track R3 – Transplantation 3

Poster: 398
Submission: 179

The POWERED study: a randomised placebo-controlled trial examining early prophylaxis with metformin to prevent PTDM

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Advances in immunosuppression have improved kidney transplant outcomes. However, calcineurin inhibitors, steroids, and other transplant-specific and general diabetogenic risk factors, contribute to the development of post-transplant diabetes mellitus (PTDM). PTDM is associated with increased cardiovascular morbidity and mortality, graft loss and infection. Despite its clinical relevance, there has been a historic lack of diagnostic criteria or clear management strategies. Rather than treating patients who have already developed PTDM, new trials are focusing on prevention.

We present the results of a single-centre prospective randomised placebo-controlled trial comparing metformin vs placebo in kidney transplant recipients in the first 3 months post-transplant. 60 patients who passed screening within 10 days of transplant, including eGFR >/=30ml/min and 2hr oral glucose tolerance test (OGTT) <11.1 mmol/L, were randomised to either metformin 500mg OD (n=30) or placebo (n=30). They returned at 3, 6 and 12 months post-transplant for fasting bloods, including OGTT.

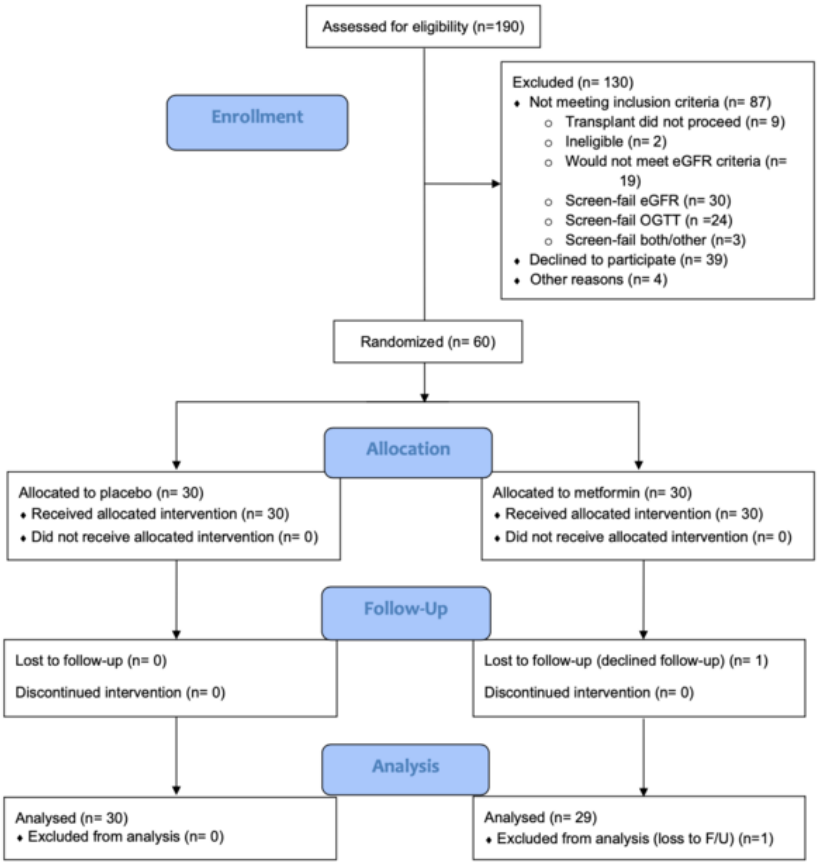

Figure 1: CONSORT diagram for POWERED study

The primary endpoint was a diagnosis of PTDM, as defined by a positive OGTT. Secondary endpoints included the effect on HbA1c, HOMA-IR, impaired glucose tolerance or elevated fasting plasma glucose, renal function, graft/patient survival and safety.

The groups were well-matched for baseline demographics including age, ethnicity, BMI, cause of ESRF, co-morbidities, immunological risk and induction. There was no significant difference in PTDM development survival curves for positive OGTT (log-rank p0.53). There was no difference in renal function, HOMA-IR or in safety signal. Whilst glycaemic parameters changed over time, there was no difference between the two groups.

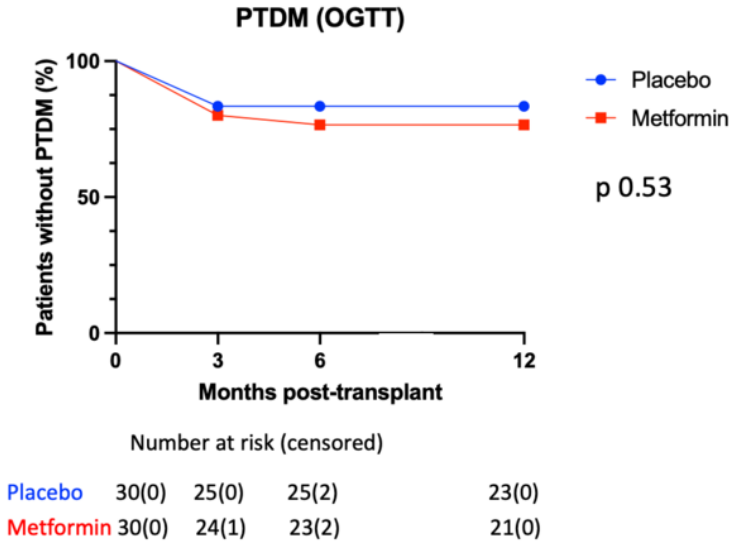

Figure 2: number of patients without PTDM as defined by positive 2 hour OGTT as analysed by Kaplan-Meier survival curve; number in brackets refers to patients censored due to lack of data at that time point and at subsequent timepoints

Metformin was not associated with a reduction in the diagnosis of PTDM at this dose. It is possible that we selected out a higher-risk cohort by excluding patients with a positive OGTT during the screening process. It should also be noted that this study was severely affected by the COVID-19 pandemic, especially with regards to missing data and visits. However, there is no contraindication to future studies which could include larger doses of metformin or patients with positive OGTTs at screening.

Tuesday 6th June 12:15 – 13:15

Track R3 – Transplantation 3

Poster: 399
Submission: 187

Human kidneys house tissue-resident B cells with a distinct anatomical location and phenotype that changes with age

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Background: B cells play a central role in humoral immunity but have also antibody-independent functions, important for generating local immune responses and tolerance. Kidneys are the most commonly transplanted solid organ worldwide but whether they harbor B cells in homeostasis and how they change with donor age has received little attention.

Methods: We examined the number, phenotype and clonality of B cells in human kidneys (donated for transplantation but not suitable for implantation) that were perfused to remove circulating cells, and in matched splenic tissue obtained from the same transplant donor (N=12, median age 56 years (range: 23–80). Suspensions from homogenized organs were analyzed using a 35-marker mass cytometry panel. B cells were also sorted for transcriptomic analysis, including BCR-sequencing.

Results: The frequency of B cells within kidney $CD45^+$ cells was lower than in spleen (8.8% vs. 26%, $P<0.005$). The renal cortex harbored ten times more B cells per gram of tissue than medulla. In contrast to spleen, B cell count and B:T cell ratio in renal cortex significantly increased with age. Kidney B cells were enriched for non-naïve ($CD27^+IgD^-$ and double-negative) subsets with innate-like characteristics when compared to spleen or younger donors. BCR analysis showed CDR3 repertoire differences between kidney and spleen, suggesting a specific antigenic exposure, but also clonotypes sharing between matched organs and across donors.

Conclusion: Our study shows that under homeostatic conditions, the extravascular compartment of human kidneys harbors both antigen-experienced and innate-like B cells, mirroring studies of murine tissue-resident T cells. These cells expanded with age and showed a specific anatomical location to the outer part of the kidney, an area specialized for filtration of blood. These kidney B cells may play a role in local immune defense or contribute to immunopathology (autoimmunity, organ rejection), and further studies on diseased tissues and murine models are underway.

Tuesday 6th June 12:15 – 13:15

Track R3– Transplantation 3

Poster: 400
Submission: 203

Evaluation of an MDT service for the screening and treatment of CMV infections in kidney and SPK transplant recipients.

Mr Robert Bradley, Mr Gareth Bryant, Dr Sarah Browne, Dr Pramod Nagaraja, Miss Alice Coles, Dr Jaisi Sinha, Dr Susannah Froude, Ms Samantha Ray, Mrs Sharon Warlow, Mrs Bethan Travers

Cardiff and Vale University Health Board, Cardiff

Cytomegalovirus (CMV) infection post kidney transplantation is a significant cause of morbidity and is associated with an increased risk of organ rejection and patient mortality. Those at highest risk of infection are seronegative patients receiving organs from seropositive donors (positive:negative). In 2016, we implemented a CMV prophylaxis and monitoring protocol, supported by a newly established transplant virology MDT, featuring virologist specialist input. The new protocol incorporated 3 months of CMV surveillance for high-risk positive:negative patients after completing 3 months of post-transplant chemoprophylaxis. This included fortnightly CMV PCR testing, rapid PCR reporting and faster review of results by the MDT. This approach allowed for prompt treatment initiation, whilst viraemia is low with minimal symptom involvement, using oral outpatient therapy. Prior to establishing this new protocol, CMV PCR testing was only performed upon symptom presentation. This resulted in admission for IV therapy, due to high CMV PCR levels and patients becoming clinically unwell. Previous research showed 88% of patients presented with symptoms of CMV disease and high viral loads, on an average of 2.4 months post chemoprophylaxis. This evaluation was carried out to demonstrate how our MDT works to provide early detection of CMV viraemia, early treatment and a reduction in patient admissions for IV therapy.

All patients who received treatment for CMV viraemia were included in this analysis. Data were retrospectively collected from CMV treatment proformas, which were developed alongside the new protocol. These proformas were used to document the timing and type of treatment, CMV PCR levels, symptoms and hospital admissions.

Data were collected from August 2016 to August 2022. Over this period 70 patients received treatment for CMV viraemia. 59 (84%) of these patients were positive:negative. The total number of positive:negative patients transplanted over this period were 140, showing a 42% infection rate.

Time until treatment initiation for positive:negative patients (n=59)	During the prophylaxis period	In the 3-month surveillance period	Post-surveillance period up to 1 year after transplantation
Number of patients	2 (3%)	43 (73%)	14 (24%)
Mean PCR on treatment initiation[a]	108,228	142,646	434,139
Mean peak PCR level[a]	128,162	362,968	455,746

Number of patients experiencing symptomatic tissue invasive disease[b]	1 (50%)	5 (12%)	9 (64%)
Number of patients admitted to hospital for treatment[c]	2 (100%)	10 (23%)	8 (57%)
Average treatment duration (days)[a]	87.5	49	53.64
	[a]$p>0.5$, [b]$p<0.01$, [c]$p<0.05$		

These results demonstrate that by using the new MDT approach, the majority of infections in high-risk patients are being detected within the 3-month surveillance period. 77% of those were managed as outpatients, proving that proactive early treatment of CMV, with oral therapy, enables us to minimise viral loads and avoid patients experiencing tissue invasive disease, leading to hospital admission for IV therapy. Results from the post-surveillance period show that without further surveillance, patients experience higher levels of viraemia and therefore symptomatic disease with more hospital admissions. These results indicate that longer periods of surveillance with further MDT involvement could be beneficial. Furthermore, weekly monitoring could demonstrate even lower viraemia at treatment initiation.

Tuesday 6th June 12:15 – 13:15

Track R3 – Transplantation 3

Poster: 401
Submission: 205

Seroprevalence and management of Strongyloides stercoralis at a Large Tertiary Kidney Transplant Centre in London, UK

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Imperial College London, London

Introduction: The soil transmitted helminth Stronglyoides stercoralis is endemic across the tropics and causes pauci/asymptomatic infection which persists for decades when no longer living in an endemic area. In individuals who receive corticosteroids and/or organ transplantation, rapid replication and dissemination of larvae can result in Strongyloides hyperinfection syndrome (SHS), a severe multi-system illness with high mortality. This study aimed to determine the seroprevalence of Stronglyoides stercoralis at our centre and assess whether screening and pre-emptive treatment may be beneficial.

Methods: Kidney transplant candidates (currently on haemodialysis) registered at our institution in West London between July-November 2021 were tested for Stronglyoides stercoralis IgG/IgM (NovaLisa® ELISA, Eurofins Biomnis Laboratory). Results were obtained from 5 different haemodialysis units. Those with positive results were reviewed by the Infectious Diseases and/or Nephrology team.

Results: 133 individuals were included. The mean age of the cohort was 52 years (range 19-79). 64% were male. 32% were Asian, 29% White, 24% Black, 13% Other, 2% Mixed. The most common underlying renal pathologies were Diabetes (30%), Unknown (21%), Glomerulonephritis (18%) and Hypertension (7%). 8/133 (6%) were found to be Stronglyoides stercoralis seropositive. 7/8 of these individuals were born or had significant travel in the tropics but 1/8 had no identifiable epidemiological risk factors. Upon clinical review, 1/8 individuals had symptoms which were potentially attributable to strongyloidiasis, and 3/8 had eosinophilia. 7/8 were treated with ivermectin. 1/8 was concluded to be a false positive, most likely due to previous Taenia solium infection, and therefore was not treated. 5/8 individuals had previously undergone kidney transplantation and were at risk of SHS.

Discussion: This study found a high Stronglyoides stercoralis seroprevalence among renal transplant candidates. These individuals may be at risk of SHS upon receiving immunosupression. Targeted screening and pre-emptive treatment is likely to be beneficial.

Tuesday 6th June 12:15 – 13:15

Track R3 – Transplantation 3

Poster: 402
Submission: 207

The Kidney Failure Risk Equation to Predict Kidney Allograft failure in those with an eGFR<30 – A UK Renal Registry External Validation Study

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[4]London School of Hygiene and Tropical Medicine, London

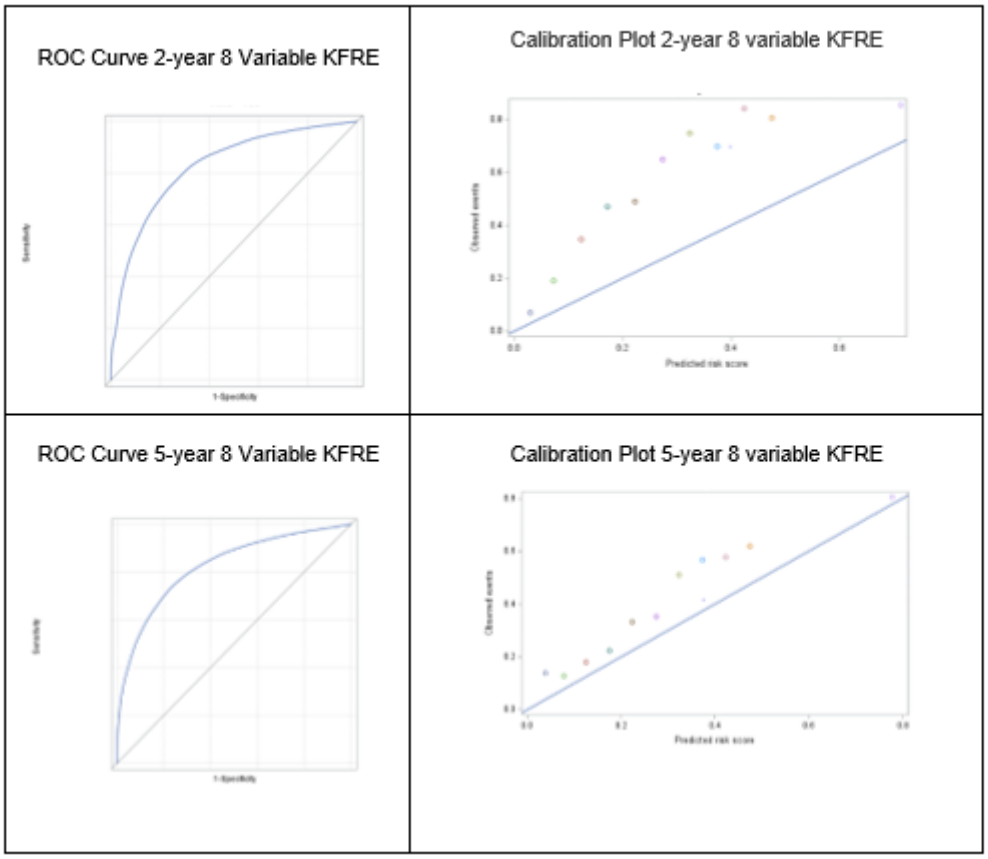
Introduction: Predicting allograft failure in kidney transplant recipients can help guide kidney replacement therapy and patient clinician communication. The widely validated Kidney Failure Risk Equation (KFRE) which predicts risk of end stage kidney disease has now been incorporated in NICE guidance. Whilst many kidney transplant failure algorithms exist, the KFRE can be calculated at any timepoint, and requires only routinely collected biochemical data. It has been validated in North American transplant populations but to our knowledge has not yet been tested in a large UK transplant population. In this study we set out to ascertain whether the KFRE can accurately predict kidney allograft failure in patients with failing grafts defined as eGFR<30 derived from UK Renal Registry (UKRR).

Methods: We conducted a retrospective analysis of UKRR adult transplants recipients with an eGFR<30 (2009 CKD-EPI equation), and grafts at least 2 years old between 2009 and 2018. Both 2-year and 5-year 8 variable KFREs were calculated. Where only urine protein creatinine ratio was available this was converted to albumin creatinine ratio using methods previously described. Those without sufficient proteinuria data were compared to recipients included in the cohort. The primary outcome was death censored graft failure, defined as dialysis initiation or re-transplantation. Area under receiver operating characteristic (ROC) curves and Harell's C statistic were used to assess discrimination. Calibration was assessed using calibration plots, which were also stratified by age of graft 2-5, 5-10, >10 years, deceased versus living donor grafts and historical AKI episodes of any cause coded within Hospital Episodes Statistics (HES).

Results: There were 3066 patients included in study with a mean age 52 (±14.2) years. The majority were Caucasian 2399 (78%), 1st kidney transplant recipients 2722 (89%) and deceased donor recipients 2,077 (68%). 5034 recipients were excluded due to insufficient data but had similar baseline characteristics to the cohort. The 8 variable 2-year and 5-year KFRE had excellent and good discrimination respectively, C statistic of 0.81 (95%CI 0.79-0.82) and 0.77 (95%CI 0.76-0.79). Both, underpredicted risk of graft failure (Figure 1). Stratification by age of graft, type of transplant and historical AKI episodes did not improve calibration of KFRE. However, sensitivity analyses using AKI alert data indicated that only 57% AKI stage 2 or greater were coded in HES.

Discussion: As in previous studies, the 5-year and 2-year KFRE had good and excellent discrimination respectively. Using a more restricted cohort with an eGFR<30, we found the KFRE underpredicted the risk of graft failure. An alternative well calibrated model is the iBOX, which comprises 8 functional, histological, and immunological variables but remains under exclusive license and not widely available in UK. Within our study, stratification by historical AKI episodes did not improve accuracy of KFRE. However, transplant AKI was poorly coded compared to native AKI. The 5-year KFRE was better calibrated, suggesting an adjusted model could be useful for service planning but further validation, particularly of clinical utility is required.

Figure 1 -ROC Curves and Calibration Plots for 2-year and 5-year 8 variable KFRE



Tuesday 6th June 12:15 – 13:15

Track R4 – Transplantation 4

Poster: 403
Submission: 236

Outcomes following arterio-venous fistula ligation in kidney transplant recipients

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[2]Imperial College Healthcare NHS Trust, London

Introduction: Cardiovascular disease remains one of the leading cause of death post-kidney transplantation. Recent evidence suggests an improvement in functional cardiovascular tests following ligation of arterio-venous fistulae (AVF). Ligation of AVF post-successful transplant could improve outcomes; however, this needs to be balanced against removal of vascular access, which may be needed should the transplant fail.

This investigation aims to:

1. Describe the outcomes following AVF ligation in kidney transplant recipients (KTR), n=190.
2. Compare allograft outcomes against a control group of KTR without AVF ligated, n=380 (1:2 cases:controls)
3. Identify risk factors associated with return to dialysis following AVF tie-off

Methods: Patients and outcomes were identified from a prospectively maintained transplant database. Ligation episodes were captured from health records. All patients, irrespective of indication for ligation were included.

Results: 190 patients (70% males, median age 50(40-59) years, 33% white, 76% receiving a deceased donor transplant and 19% with diabetes) underwent AVF ligation at a median time of 2.5 (2.0-3.3) years post-transplant. Median follow up was 6.4 (5.2-7.1) years post tie-off. 5-yr all-cause and death censored allograft survival was 71.9% and 81.8% respectively.

Risk adjusted cox-proportional hazards regression for; a. all-cause allograft survival, showed fistula excision was independently associated with improved risk of all-cause allograft loss, HR 0.44 (0.2-0.61), p<0.0001; b. death-censored allograft survival, showed fistula excision was independently associated with improved risk of death-censored allograft loss, HR 0.35 (0.23-0.53), p<0.0001.

A diagnosis of diabetes (HR 2.13 (1.23-3.369), p=0.007) and time to tie-off post-transplant (HR 1.09 (1.02-1.16), p=0.008), associated with all-cause graft loss. Time to tie-off (HR: 1.19 (1.10-1.30), p=0.0001 and receipt of a living donor transplant (HR 0.33 (0.11-0.98), p=0.045) impacted on risk of death censored allograft loss.

Discussion: AVF ligation post-transplant may have potential graft and patient benefits with careful timing and patient selection.

Tuesday 6th June 12:15 – 13:15

Track R4 – Transplantation 4

Poster: 404
Submission: 266

Anticipating and Managing Bacteria Infection related Morbidity and Mortality in the First 30 days Post Kidney Transplantation

Dr Chin Lin Ng[1], Dr Okpela Iseko[2], Dr Tony Lopez[1], Dr Peter Riley[3], Mr Abbas Ghazanfar[4], Dr Joyce Popoola[1]

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[3]Microbiology Department St George Hospital, London.
[4]Transplant Surgical Department St George Hopsital, London

Background: Kidney Transplantation is the most, commonly performed solid organ transplant in the United Kingdom. Infection is a particular contributor due in part to the high immunosuppressant burden at this stage of the transplant. Here we audit potential contributing factors and outcomes of the transplants performed on re-opening our transplant program post pandemic.

Methods: The primary study end point was to assess the incidence of bacterial infections in the first 30 days. While secondary end points included prevalence and impact of receiving a perfusion positive culture organ versus a perfusion negative organ with associated morbidity and mortality on solid organ recipients. We reviewed perinephric collections, microbiology sample sent from transport fluid and perinephric collection and urine, the type of organisms grown, patient and graft outcomes and potential confounding factors. Study period analysis so far January 2021 to October 2022. Data was collected from electronic patient records, discharge summaries, operation notes, microbiology laboratory and NHSBT donor records. Inclusion criteria included all transplants occurring in the period.

Results: A total of 221 (125 (57%) male: 96 (43%) female). Ethnic mix Caucasian (52%), Asian (20%), black (14%), others (14%) and age range 21-75 years , mean age 52 years . Patient demographic was not associated with increased infection. Infection diagnosed in only 1 of 23 patients with diabetes mellitus. DBD transplant (101), DCD transplant (77), Living donor transplant (43). There were 153 (69%) stratified as low immunological risk and 68 (31%) high immunological risk recipients. Positive Fluid Culture rate for low immunological risk and high immunological risk , was 18% and 19 % respectively .

Total 161 (73%) patient had immediate graft function, 56 (26%) patients had delayed graft function, 2 (1%) patient had a transplant nephrectomy and 2 (0.7%) mortalities in post transplantation period. Positive fluid cultures were associated with 38% of delayed graft function and mortalities. Commonest cultured organisms were Staphylococcus Warneri (27 %) followed by Staphylococcus Epidermidis (12 %) and Serratia Marcescens (7%).

There were 186 (84%) samples of transport fluid sent for culture and sensitivity and 32 transplant recipients operations were complicated with perinephric collections, 60% of perinephric fluid cases

cultured had positive cultures and were associated with significant morbidity and/or mortality. There was also a significant association with culture positive perfusion fluid.

Discussion: Perinephric fluid collections are common surgical complication postrenal transplant. Transplant recipient are at increased risk of developing perinephric collection infection. In this study, none of the following ethnicity, age, immunological risk or diabetes mellitus were associated with a higher infection rate. However, the presence of a positive culture of transport fluid and perinephric collections were associated with an increased incidence of bacterial related co-morbidity and/or mortality. Positive transport fluid may lead to a subsequent infected perinephric collection hence due consideration should be given to treating pre-emptively as may present a real risk to organ recipients. Sampling perinephric collection for microbiology assessment especially in those patient with positive cultures in transport fluid may provide a strategy in censoring bacterial infections contributing to morbidity and/or mortality in solid organ transplant recipients.

Tuesday 6th June 12:15 – 13:15

Track R4 – Transplantation 4

Poster: 405
Submission: 276

Safety Profile of SGLT2 Inhibitors in Renal Transplant Patients

Dr Komal Moqeem, Ms Natasha Moore, Ms Aisha Riaz, Prof Luigi Gnudi, Dr Elham Asghari, Dr Caroline Dudreuilh

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Introduction: SGLT2 Inhibitors (SGLT2is) are a class of drugs that in recent years have been recognised for their prognostic benefits in patients with chronic kidney disease. These agents slow down the decline in kidney function by reducing glomerular hypertension mediated through tubuloglomerular feedback which is independent of their anti-glycaemic properties. However, the efficacy and safety profile of SGLT2is in kidney transplant patients have not been determined. SGLT2is increase glucose excretion in the urine raising concerns of their side-effects such as urinary tract infections (UTIs) and genital thrush which may preclude their use in transplanted patients taking immunosuppression. We aim to further evaluate the impact, in particular the safety of SGLT2i initiation in patients with a kidney transplant who have diabetes.

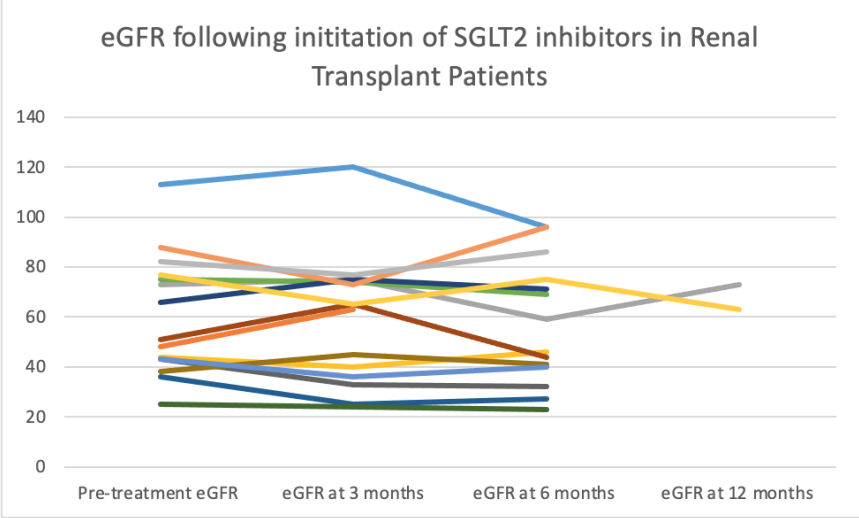
Methods: From a database of 1494 transplant patients followed-up at our centre, a list of patients who had been prescribed an SGLT2 inhibitor was obtained from the pharmacy services. Data regarding kidney function and complication rates following SGLT2i initiation was retrospectively collected using electronic patients notes. A data extraction table was used to record patients' creatinine and eGFR values at baseline and at the following months post SGLT2 initiation: 1 month, 3 months, 6 months, 12 months. Data on complication rates including UTIs and concurrent use of ACE inhibitors (ACEi) or angiotensin receptor blockers (ARBs) was also collected.

Results: 19 kidney transplant patients had SGLT2is prescribed. 3 of these patients had this prescribed but did not initiate treatment. Out of a total of 16 patients [mean age 60.1 years (SD ± 12.75); 62% male] who initiated treatment, the mean time since renal transplant was 8.31 years (SD ± 5.58) and median duration of SGLT2i treatment was 9 months (range 3 months to 5 years) (Table 1). 1 patient developed a UTI and Diabetic Ketoacidosis (DKA) in the context of covid pneumonitis requiring intensive care. A second patient had to cease SGLT2is therapy due to a UTI, however SGLT2is was later restarted following a rigid cystoscopy and urethral dilatation with nil further UTIs. No patients developed genital fungal infections, rejection episode or need for amputation. Renal function appears to remain stable following SGLT2 initiation (Figure 1). 60% of patients were prescribed concurrent ACEIs or ARBs.

Table 1. Clinical characteristics of patients receiving SGLT2i

Demographics (n =16)	
Sex (%) male; female	62.5% (10/16); 37.5% (6/16)
Mean age (years)	60.1 (± 12.75)
Mean time since renal transplant (years)	8.31(± 5.58)
Median duration of SGLTis treatment (months)	9 (IQR 6-11)
Transplant Related Diabetes (%)	43.8 (7/16)
Pre-Transplant Diabetes (%)	56.2 (9/16)
Cause of ESRF (%)	
• Diabetic Nephropathy	37.5 (6/16)
• Hypertensive Nephropathy	12.5 (2/16)
• Immune-mediated	31.3 (5/16)
• Inherited	12.5 (2/16)
• Cause (unknown)	6.2 (1/16)

Figure 1: eGFR following initiation of SGLT2i in Renal Transplant Patients



Discussion: Our findings suggest that overall complications rates were low. All the three recorded complications (2 UTIs and 1 DKA) occurred in the context of other clinical issues (severe covid pneumonitis and urethral stricture) which could potentially confound the data on complication rates independent of SGLT2i use. Considering urine infections are common in kidney transplant population, comparison with a control group would help us understand if the infections are associated with SGLT2i treatment. Although, our sample size and recorded treatment duration was too small to evaluate any impact on kidney function, the eGFR remained stable and did not decline following SGLT2i treatment initiation. Further large-scale multi-centre studies are needed to evaluate if there is a prognostic benefit for kidney transplant patients similar to the DAPA-CKD and EMPA-KIDNEY trials.

Tuesday 6th June 12:15 – 13:15

Track R4 – Transplantation 4

Poster: 406
Submission: 355

Progression of vascular changes in kidney transplant patients and its relationship with traditional risk factors

Mr Isaac Chung[1], Dr Dan Murphy[1], Dr Joey Junarta[1], Dr Nina Hojs[1], Dr Robin Ramphul[1], Dr Racquel Lowe-Jones[1], Dr Juan Carlos Kaski[2], Dr Irina Chris Ster[3], Professor Debasish Banerjee[1,2]

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[3]Infection and Immunity Research Institute, St George's, University of London, London

Introduction: Chronic kidney disease [CKD] patients are at higher risk of cardiovascular disease and mortality, which partially improves with kidney transplant but remain elevated compared to general population. This study aims to explore if the progression of vascular structure and function in kidney transplant patients if present is related to any of the traditional risk markers.

Methods: Traditional risk factors measurements, Carotid intima-medial thickness [c-IMT] and brachial artery flow mediated dilatation [ba-FMD] were measured at baseline, approximately 3-months, and 1-year follow-up.

Results: There was some evidence that Ba-FMD decreased with time during follow-up in kidney transplant patients (-0.153, p = 0.006, 95% CI -0.262 - -0.045) (Figure 1). Ba-FMD has been negatively associated with dyslipidaemia (-3.217, p = 0.006, 95% CI -5.521 - -0.912, body mass index [BMI] (-0.234, p = 0.030, 95% CI -0.447 - -0.022) and pack-years of smoking (-0.171, p = 0.012, 95% CI -0.304 - -0.038) and there was no evidence for an association with age (-0.084, p = 0.091, 95% CI -0.181 - 0.013).

c-IMT has shown some evidence of positive association with time (0.049, p < 0.001, 95% CI 0.027 - 0.070) (Figure 2). Higher c-IMT was positively associated with dyslipidaemia (0.716, p = 0.036, 95% CI 0.048 - 1.384), BMI (0.066, p = 0.026, 95% CI 0.008 - 0.124) and age 0.037, p = 0.002, 95% CI 0.014 - 0.060).

Discussion: Ba-FMD and c-IMT markers of atherosclerosis worsened with time and related to traditional risk factors.

Figure 1 *Graph showing trend of ba-FMD against time in kidney transplant patients.*

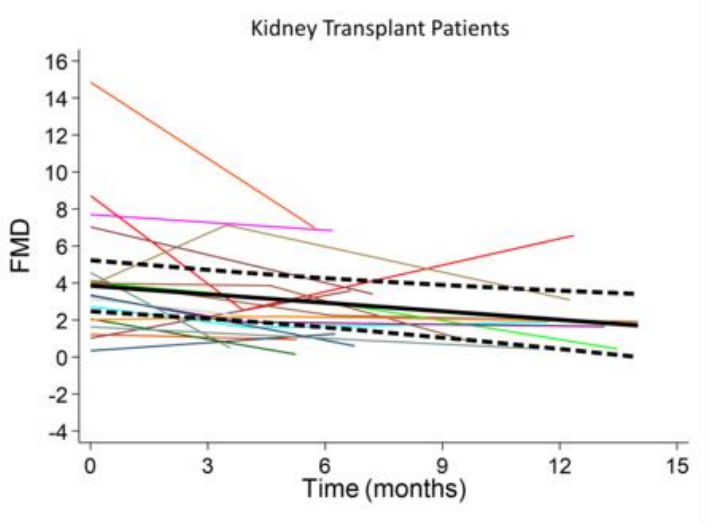
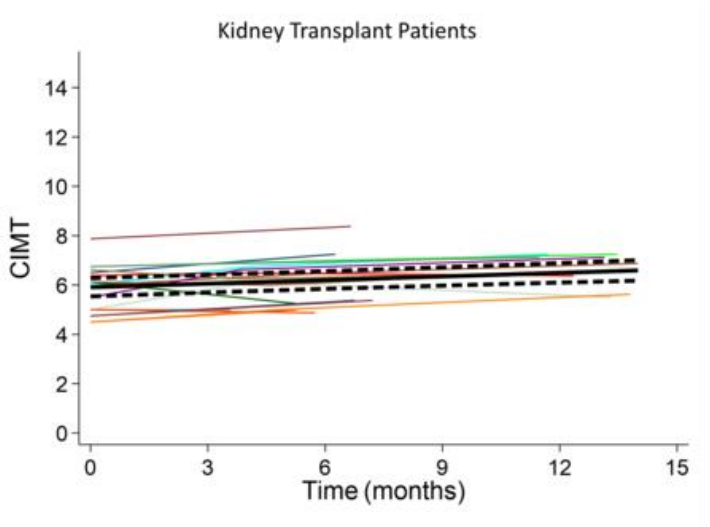


Figure 2 *Graph showing c-IMT against time in kidney transplant patients.*



Tuesday 6th June 12:15 – 13:15

Track R4 – Transplantation 4

Poster: 407
Submission: 377

Mismatched HLA-B Antigens between blood donors and waitlisted transplant patients leads to transfusion specific HLA-B antibodies

Dr Katrina Spensley[1,2], Dr Sevda Hassan[1], Dr Colin Brown[3], Professor David Roberts[3,4], Dr Fiona Regan[3], Dr Michelle Willicombe[1,2]

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[3]NHS Blood and Transfusion, London.
[4]Oxford University, Oxford

Introduction: Sensitisation to HLA (human leucocyte antigens) is a barrier to access to kidney transplantation; the median wait time for highly sensitised patients (calculated reaction frequency > 85) is twice that of unsensitised patients. Prevention of sensitisation is therefore crucial for potential recipients. Red blood cell transfusion has been shown to provoke alloimmune anti-HLA antibodies and is a potentially modifiable source of HLA sensitisation. However, disparities in HLA between blood donors and recipients is not considered when transfusions are carried out as it has previously only been demonstrated that transfusion causes broad sensitisation. Here we demonstrate that transfusion can cause transfusion specific antibodies (TSAs) and degree of mismatch at HLA-B predicts the formation of HLA-B antibodies.

Method: We identified waitlisted kidney transplant candidates at our centre who had received a blood transfusion prior to transplantation. The corresponding blood donors were identified, contacted and retrospectively HLA typed (REC 18/WM/0161). Donors and recipients were typed using either sequence-specific oligonucleotides (Luminex LABType® SSO typing kit) or next-generation sequencing (NGS-GenDx kit – NGSgo). All were converted to split specificity antigens. We compared HLA antibodies, as determined by single antigen bead assays (LABScreen Single Antigen), pre- and post- transfusion and identified the transfusion specific antibodies (TSA) against donor antigens.

Results: We identified 55 patients who received 111 typed blood transfusions (median 2, range 1-5). Seventeen patients (30.9%) had HLA antibodies prior to transfusion. Following transfusion, 36 patients (65.5%) had at least one new HLA-antibody specificity post transfusion; all 17 of the pre-sensitised patients and 19/38 (50.0%) with no known prior sensitisation.

Twenty-one patients (38.1%) developed at least one TSA. The mean number of transfusion specific antibodies was 1.95 (± 1.43). Of the 41 TSAs which developed 11 (26.8%) targeted class II antigens. The most common locus targeted was HLA-B, with 9 patients (16%) developing 17 HLA-B antibodies.

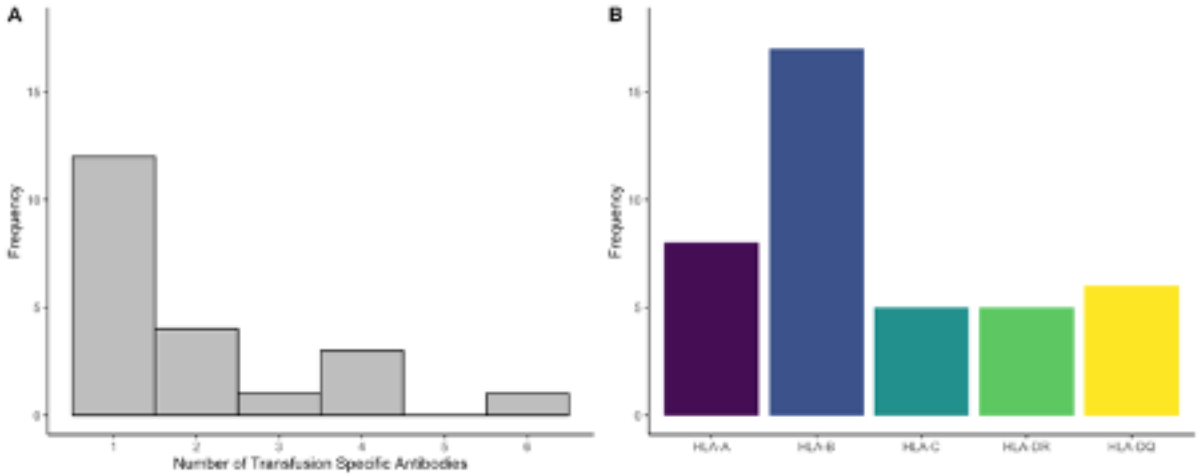

Figure: Barplots showing the number of TSA an individual developed (A) and HLA locus targetted by the TSA (B)

The mean total HLA-A, HLA-B, HLA-DR and HLA-DQ mismatch was 5.87 (±1.26). The HLA mismatch at HLA-B was predictive of developing at least 1 HLA-B TSA, with a mean mismatch of 1.88 in those who developed a TSA compared with 1.63 in those who didn't (p=0.026). The numbers of antibodies targeting other loci was too small to assess the impact of mismatching.

Discussion: We have shown that red cell transfusion leads to a significant increase in HLA-sensitisation in waitlisted patients. In our cohort the blood transfusions were all poorly matched and resulted in a large proportion developing at least 1 TSA. Whilst most TSAs targeted Class I HLA, as would be expected, a significant proportion targeted Class II. Class II antibodies are known to be typically more persistent so this will impact listing. The degree of mismatch between blood donor and recipient predicts HLA-B antibody formation. The use of HLA matched red cells may help mitigate this effect.

Tuesday 6th June 12:15 – 13:15

Track R4 – Transplantation 4

Poster: 408
Submission: 389

The UK Kidney Donor Risk Index poorly predicts long-term transplant survival in paediatric kidney transplant recipients.

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Background: The UK Kidney Offering Scheme introduced a Kidney Donor Risk Index (UK-KDRI) to improve the utility of deceased donor kidney allocations. The UK-KDRI was derived using adult donor and recipient data. We assessed the UK-KDRI in the respective paediatric cohort from the UK Transplant Registry.

Methods: We performed Cox survival analysis on first kidney-only donation after brain death (DBD) transplants in paediatric (<18 years) recipients from 2000 to 2014. Primary outcome was death-censored renal allograft failure >30 days post-transplant. The main study variable was UK-KDRI derived from seven donor risk-factors, categorised into four groups (D1-low risk, D2, D3 and D4-highest risk). Follow-up ended on 31 December 2021.

Results: 35% (319/908) patients experienced renal allograft loss with rejection as the main cause (55%). The majority of paediatric patients received donors from D1 donors (64%). There was an increase in D2-4 donors during the study period while the level of HLA mismatching improved. The KDRI was not associated with allograft failure. In multi-variate analysis, increasing recipient age [adjusted HR and 95%CI: 1.05(1.03-1.08) per-year, $p < 0.001$], recipient minority ethnic group [1.28(1.01-1.63), $p < 0.05$), dialysis before transplant [1.38(1.04-1.81), $p < 0.005$], increasing donor age [1.01 (1.00-1.01) per year, $p = 0.05$], donor height [0.99 (0.98-1.00) per centimetre, $p < 0.05$] and level of HLA mismatch [Level 3: 1.92(1.19-3.11); Level 4: 2.40(1.26-4.58) versus Level 1, $p < 0.01$] were associated with worse outcome. The level of HLA mismatch modulated the risk within UK-KDRI groups [Figure1]. Donor hypertension, smoking, CMV, terminal GFR and cause of death were not statistically significant.

Summary: Adult donor risk scores were not associated with long-term renal allograft survival in paediatric patients. The level of HLA mismatch had the most profound effect on survival. As prediction

models become more complex and are used in organ allocation, we advocate that children and young people should also be included in the model development.

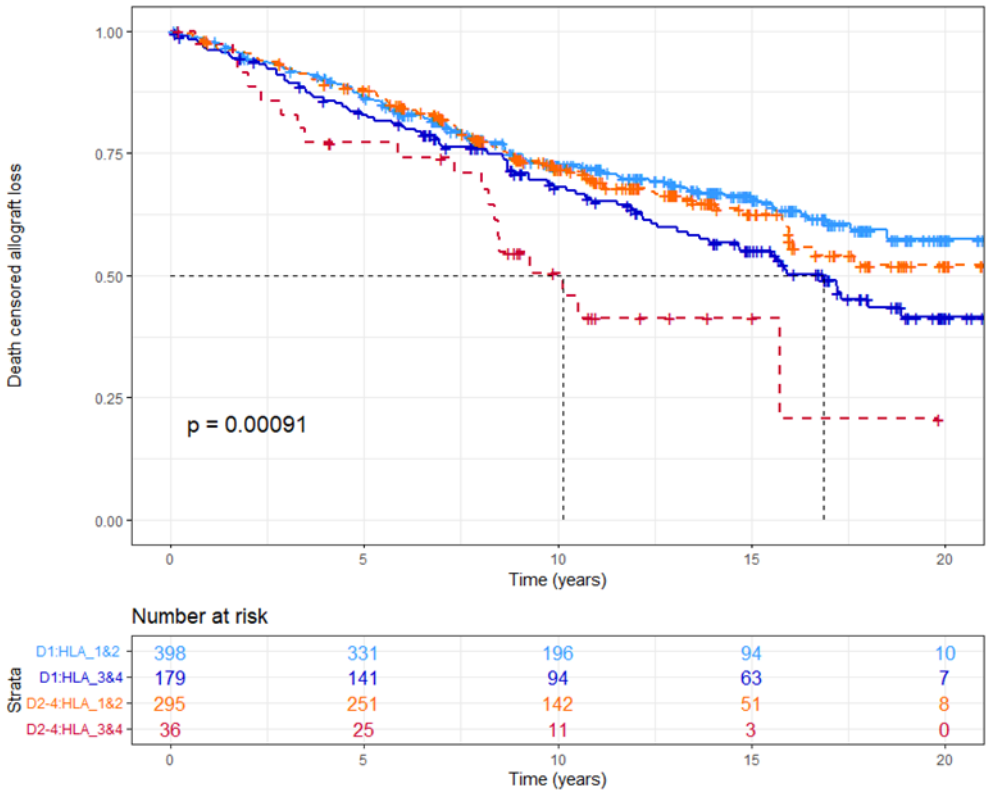

Figure1: Kaplan-Meier curve of death-censored allograft survival dependent on UK-KDRI (D1 v D2,3,4) and HLA mismatch level (L1&2 v L3&4).

Tuesday 6th June 12:15 – 13:15

Track R4 – Transplantation 4

Poster: 409
Submission: 398

HCMV encoded interleukin-10 (vIl-10): investigating its suitability as a novel marker of viral reactivation in renal transplant patients

Mrs Lauren Jones[1,2], Professor Eddie Wang[2], Professor Richard Stanton[2], Professor Ian Humphreys[2], Dr Rebecca Aicheler[1]

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The incidence of HCMV disease is between 8 and 32% in renal transplant patients(1), current clinical approaches to HCMV management include monitoring of DNAemia by qPCR and antiviral treatment strategies(2). However, ~50% of donor positive, recipient negative (D+R-) renal transplant patients develop detectable HCMV viremia, requiring antiviral treatment, though in severe cases, subsequent HCMV disease can increase the risk of organ rejection and mortality(3). Therefore, the ability to identify patients at risk viraemia and HCMV mediated disease could significantly improve the clinical management of this patient cohort. The HCMV UL111A gene encodes for HCMV viral IL-10 (vIL-10), a homolog of human IL-10 with 27% sequence homology(4). During lytic infection vIL-10 is secreted from HCMV-infected cells and has been detected in plasma samples of healthy HCMV+ blood donors, suggesting vIL-10's potential as an alternative measure of viral reactivation.(5)

To determine whether vIL-10 can be used as a biomarker for HCMV viraemia, indicated by the presence of HCMV DNA, plasma from 58 D+R- and 31 D-R- transplant patients were tested by enzyme-linked immunosorbent assay (ELISA) for vIL-10 at various timepoints prior to, and during viraemia.

vIL-10 was detectable in 24% D+R- who did not go onto develop viraemia (exposed), 21% (6/28) those who developed viraemia (viraemic) and in 16% D-R- control group. Detectable vIL-10 levels were variable; high and low expression of vIL-10 was found across all cohorts. No correlation was found between high/low vIL-10 levels and the onset of viraemia.

These data indicate that vIL-10 is not a suitable clinical marker of HCMV viral reactivation and/or primary infection in renal transplant patients, however we are currently investigating another novel soluble viral protein as a potential biomarker for HCMV infection.

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Tuesday 6th June 12:15 – 13:15

Track R4 – Transplantation 4

Poster: 410
Submission: 467

MCP1 and CD40L immune modulatory cytokines may help us understand cytomegalovirus associated graft injury post kidney transplantation

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Introduction: Human cytomegalovirus (HCMV) is a clinically significant pathogen, that potentially leads to graft rejection, morbidity and mortality in kidney transplant recipients. HCMV reactivation is most common in HCMV seronegative organ recipients (R-) who receive an organ from an HCMV seropositive donor (D+), with ~50% experiencing HCMV reactivation, despite antiviral prophylaxis. Cytokines play key roles in anti-HCMV immunity through modulation of the function and recruitment of immune cells. Once modulated by HCMV, cytokines can drive the pathogenesis of graft rejection. Thus, assessing cytokines following HCMV infection is vital to furthering our understanding of kidney graft injury and rejection.

Methods: A clinical research study (Cytomegalovirus Immune Regulation – CMVIR) has been setup to bio-bank a longitudinal prospective collection of plasma, peripheral blood mononuclear cells, DNA, and urine, from D+/R- kidney transplant recipients, following the completion of three months antiviral prophylaxis. Samples were also bio-banked from D-/R- kidney transplant recipients as controls. Linked anonymised clinical data was collected for all study participants.

Using Human Magnetic Luminex assays, plasma cytokines were measured pre-viraemia, once HCMV reactivation had occurred, and post viraemia, and further validated using ELISAs. Urinary cytokines associated with graft injury will be measured in patients' urine, and correlated with longitudinal clinical data. Cytokines were analysed to see if any cytokines help predict graft injury and longitudinal changes to graft function.

Results: MCP1 and CD40L immune modulatory cytokines may help us understand cytomegalovirus associated graft injury post kidney transplantation. In our viraemic patients, HCMV directly modulates MCP1 secretion (P Value 0.02). Similarly, HCMV induces CD40L secretion in the viraemic patients (P value 0.03). Both cytokines persistently remain elevated despite viral control.

Discussion: MCP1 is known to drive pathogenic cellular responses, and have been demonstrated to play a key role in kidney graft rejection. CD40L is primarily expressed on activated CD4+ T Cells but also present in a soluble form (sCD40L). CD40-CD40L costimulatory signaling plays a pivotal role in the effector mechanisms of transplant graft rejection. Undergoing work is being undertaken to assess longitudinal changes to graft function and urinary expression of these cytokines. Our preliminary experiments are the first to highlight that MCP1 and CD40L are directly induced by HCMV infection following kidney transplantation, and thus may help explain the mechanisms of HCMV induced kidney graft injury.

Tuesday 6th June 12:15 – 13:15

Track R4 – Transplantation 4

Poster: 411
Submission: 496

Assessing cardiovascular outcomes, in context of cardiovascular risk factors, for patients receiving a Simultaneous Liver Kidney at a major transplant centre

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King's College Hospital, London

Introduction: Cardiovascular disease is the leading cause of mortality in chronic kidney disease, and even after kidney transplantation may account for up to 20% of deaths with a functioning graft. In a similar fashion, liver transplant recipients may suffer a cardiovascular event in up to 30% of cases within the first year post transplant. Moreover, the surgical and anaesthetic stress is a well recognised risk factor for peri-operative cardiovascular events.

Over the last few decades, simultaneous liver and kidney transplantation (SLKT) has emerged as the treatment of choice for concurrent end-stage liver and renal disease, as well as rarer conditions such as type 1 primary hyperoxaluria.

Little is however known about the short and long-term cardiovascular risk profile of SLKT recipients.

Methods: We retrospectively examined the records of consecutive patients who underwent SLKT from December 2013 to July 2022. We recorded data on demographics, cardiac risk assessment investigations and cardiovascular risk factors. Primary endpoints recorded were: peri-operative cardiovascular events (within 4 weeks; ischaemic or non-ischaemic aetiology) and acute coronary events, stroke/transient ischaemic attack (TIA), new diagnosis of heart failure, new diagnosis of coronary heart disease and hospitalisation for heart failure after 4 weeks from SLKT.

Results: Data for 39 consecutive SLKTs recipients were recorded. 41% (n=16) were male, and 77% (n=30) white. The median age at time of SLKT was 55 years (20 – 67). The most common indication for SLKT was polycystic kidney and liver disease (67% (n=26)). 83% (n=32) of patients had hypertension (HTN), 5% (n=2) diabetes , 31% (n=12) hyperlipidaemia and 13% (n=5) were clinically obese. 10% (n=4) had an excessive alcohol history and 10% (n=4) had a smoking history. Two patients had a history of stroke / TIA.

26% (n=10) had a coronary angiogram prior to surgery. One had a severe left anterior descending stenosis that required stenting, whilst 5 patients showed mild to moderate coronary artery disease - which did not need intervention. Cardio-pulmonary exercise tests (CPEX) was performed in 35 patients (89%) with only one reported as abnormal. The subsequent angiogram showed moderate CAD.

Echocardiograms were performed in all transplant candidates with 28% (n=11) reporting cardiac muscle architectural change mostly related to concentric hypertrophy. One patient had a diagnosis of heart failure (right heart failure), and 13% (n=5) had diastolic dysfunction.

The primary endpoint occurred in 8 patients (20%). Three patients suffered a cardiac arrest on the operating table and were successfully resuscitated. Two had a non-fatal type 2 myocardial infarction at 6 and 51 months. Two patients developed heart failure at 35 and 42 months. One patient had a TIA at 35 months. 7% (5) patients developed post-transplant diabetes. After a median follow up period of 63 months (range 5 – 108 months), one death had occurred due to post-transplant lymphoproliferative disorder.

Conclusion: SLKT is associated with an increased peri-operative cardiovascular risk. In our cohort, all patients were successfully resuscitated. Long-term cardiovascular prognosis is acceptable with no fatal cardiovascular events noted in our patient cohort. Careful patient selection is imperative to clinical outcomes.

Tuesday 6th June 12:15 – 13:15

Track S – Vascular Access

Poster: 412
Submission: 092

Fistula vs Graft: a retrospective comparison of outcomes of AVF and AVG created in Wales.

Dr Mark Davies[1], Dr James Chess[2], Mr Michael Stephens[1], Dr Jamie Macdonald[3]

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[3]Bangor University, Bangor

Introduction: Usual practice in Wales, as elsewhere, prefers creation of an arteriovenous fistula (AVF) over arteriovenous graft (AVG), provided the patient has an adequate vein diameter. It is generally considered that AVF have longer patency and lower complication rates. There is some evidence for this (1), though the evidence quality has been questioned (2) and AVF superiority not universally demonstrated. Studies have demonstrated patient selection significantly accounting for differences in outcomes between AVF and other access types (3), whilst others show comparable, or even better outcomes, in AVG than AVF in certain populations (4–6). There is also a recognition that certain patient characteristics, including increased age, are risk factors for primary fistula failure (7–9). Primary research in this field is also reconsidering the "Fistula first" adage, with a first randomised trial of AVF vs AVG in patients over the age 65 having recently reported: primary access failure and intervention rates were similar between groups (10).

We aimed to assess the lifespan (length of time from first to last use), patency (whether usable) at 6, 12 and 24 months and intervention rates for AVF and AVG formed within the Welsh Kidney Network (WKN), using anonymised data. The aim was to improve our understanding of vascular access patency within the Network, with potential important use for informing patients and highlighting regional variations, as well as informing future research.

Method: The audit was registered in all three Welsh health boards where vascular access surgery is performed. Anonymised data was provided from the renal database used in WKN (VitalData). The data included all vascular access entries for all patients who had access surgery in Wales between Jan 2014 and August 2021. We analysed accesses created between Jan 2014 and Dec 2019, with at least 12 months' follow up data available for all accesses.

Results: There were a total of 2495 patients in Wales who had an AVF or AVG formed, with 3249 AVF and 177 AVG. A higher proportion of AVF than AVG were never used (Table 1). Patency is shown in Figure 1. In a more limited dataset where access use was recorded, AVF had longer usable lifespan (Table 2). When comparing the characteristics of patients who had AVG compared with those who had AVF, prevalence of comorbidities were similar, but AVG were used in patients who had a higher number of previous access formed (Table 3). Regional variations in access patency were seen (not shown).

Table 1: Total AVF and AVGs and percentage never used

Access_Type	Total	Not used % (n)
AVF	3,249	14.2 (461)
AVG	177	1.1 (2)

Table 2: Lifespan of AVF and AVG

Access_Type	Total	Never usable % (n)	Median usable lifespan (months)	Max lifespan (months)
AVF	1,556	19.4 (302)	21.8	87.74
AVG	99	27.3 (27)	8.8	75.03

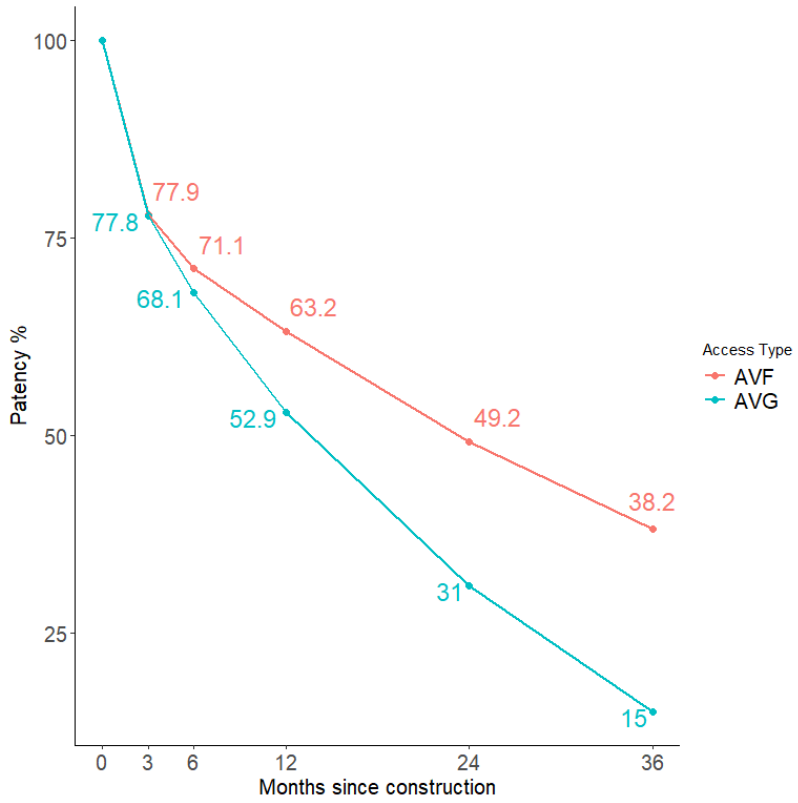

Figure 1: Functional patency of AVF and AVG at various timepoints

Table 3: % of access with previous AVF or AVG attempts

Access_Type	1+ previous (%)	2+ previous (%)	3+ previous (%)
AVF	34.4	11.1	3.7
AVG	83.6	45.2	24.9

Discussion: In this retrospective analysis of 5 years' data from a network wide database we found a lower patency of grafts vs fistulae, but graft use in Wales is limited to patients with multiple previous access attempts. Use of a whole network database is a powerful tool for understanding vascular access lifespans, with potential important use for informing patients and clinicians and highlighting regional variations in outcomes to plan future services.

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Tuesday 6th June 12:15 – 13:15

Track S – Vascular Access

Poster: 413
Submission: 168

What can we learn about clotted vascular access from seven years retrospective analysis?

Mrs Alison Swain, Dr Emma Vaux

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Introduction: The aim was to investigate and identify if there any predictive factors influencing clotted access and determine whether any lessons can be leant for managing these patients going forward.

Retrospective analysis was carried out on 7 years' worth of data.

The Berkshire Kidney Unit have 360 prevalent patients on Haemodialysis. From 2016 to 2022, there were 133 cases of clotted vascular access. These occurred in 80 patients, with some patients clotting more than once. The rate averaged 19 cases per year or 5.2% of all patients.

Methods: Access data is already reported regularly at our Clinical Governance meetings. Other relevant factors were identified for study. These were collected by interrogation from our CV5 Renal Information system. These included, time of clotting, whether a patient was waiting for fistuloplasty or had previous interventions, cannulation, Haemoglobin, Haematocrit, Platelets, venous pressures, fistula flows, and anti-coagulation therapy.

Results:
41 arterio-venous fistulae, 36 arterio-venous grafts, and 6 HeRO grafts were analysed.

55 episodes were in AV fistulas and 78 in AV grafts.

75% had undergone previous plasty or de-clotting, so could be more likely to need repeat procedure.

53% were during the warmer months of the year – from April to September.

Cannulation methods were studied. In AV fistulas, 80% were using sharp needling compared to 20% buttonhole. The AV grafts were all sharp needling.

1. Haemoglobin levels ranged from 70 to 159 with a mean of 110
2. 35% of patients were above the target Hgb range of 120
3. Haematocrit ranged from 0.207 to 0.475 – the mean was 0.339
4. Platelets ranged from 92 to 500 with a mean of 213
5. Fistula flows ranged from 100 to 2510. The mean was 810ml/hr.
    - On 49 occasions (37%) there had been no recent measurement recorded within the previous month
    - Only 16 patients (12%) were waiting for fistuloplasty at the time of clotting.

6. Venous pressures ranged from 78 to 500 with a mean of 174

Discussion & Conclusion: Haemoglobin levels are on the higher side of normal range for ESRD patients. This may be a factor for consideration as 35% of patients had Hgb levels above the upper limit of 120 g/dl

UKKA reports a median of 111g/l for Hgb in 2020. 56% of our patients had higher levels than this. Clinical Audit and early awareness of these indicators, with appropriate titration of EPO, may have been of value in preventing these patients from clotting.

Fistula flow measurements are a clear indicator of deteriorating function. However, only 26 % of patients had readings under 600 ml/min – the accepted lower limit. Thus measured fistula flow may not always a reliable indicator. 37% had not had their fistula flows measured recently and this is a lesson we can learn and focus on in the future. Early referral to the vascular access team is key.

Introduction of a measurement tool to identify higher risk patients, such as those with high Hgb, low fistula flows and previous interventions, could be of clinical benefit.

Tuesday 6th June 12:15 – 13:15

Track S – Vascular Access

Poster: 414
Submission: 228

Development of the Needling Patient Reported Experience Measure (NPREM): Results from the pilot phase

Dr. Currie Moore[1], Miss Rebecca Flanagan[1], Mrs. Amanda Busby[1], Dr. Helen Ellis-Caird[1], Mr Faizan Awan[2], Mr. Tarsem Paul[3], Ms. Catherine Fielding[4], Dr. Kieran McCafferty[5], Dr Sabine van der Veer[6], Dr. Ken Farrington[7], Dr. David Wellsted[1], Dr. Janine Hawkins[1]

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Introduction: People on haemodialysis rely on having reliable access to their vascular system, often via surgically created arteriovenous fistula or graft. At the beginning of each dialysis session, needles must be inserted. While 'needling' is a key step, the annual Kidney PREM shows that needling is one of the lowest scoring areas of reported experience for individuals receiving haemodialysis in a kidney centre or satellite unit. However, no validated measures exist which assess patient reported experience of needling. The aim of this multi-phase study was to develop a questionnaire which reliably measures needling experience. We will report the results from the pilot phase of the Needling Patient Reported Experience Measure (NPREM).

Methods: Five kidney centres in England participated in the pilot phase. Each centre had a recruitment target of 30-50 participants (N= 150-200). Individuals could participate if they currently had a working fistula or graft for haemodialysis and were over 18 years old. Participants completed the questionnaire pack (NPREM = 48 items, Sociodemographic/clinical = 17 items, General = 5 items) between October-December 2022. Analysis included psychometric evaluation of each item across key variables (descriptive statistics, response scale patterns) and overall measure characteristics (internal consistency, inter-item correlations, exploratory factor analysis).

Results: A total of 183 people participated in the pilot phase of the NPREM (sample characteristics: male 63%, mean age 64 years (SD 14 years), White 71%, access: fistula 92%, graft 8%). Of the 48 NPREM items, completion rates were good, with participants utilising 'Not applicable' and 'Don't know' options when a response along the 1 and 7 response scale did not match their experience. Overall, the NPREM showed good internal consistency (Cronbach's alpha = 0.951) and moderate to strong inter-item correlations. The exploratory factor analysis indicated that needling experience may be a unidimensional construct, as there was a strong, main factor. The research team also examined two and three factor models, and a multi-factor model did not change the retained items. Of the 48 items tested, 13 items

displayed significant psychometric issues (ceiling effects, low standard deviation, low correlations, poor model fit). The research team and patient steering group reviewed all items and discussed any issues, resulting in one item being added, three items requiring minor re-phrasing and 31 items requiring no changes. Items were approved by consensus for inclusion in the validation version of the NPREM.

Discussion: Results from the pilot phase indicated that the items in the NPREM address the key areas important to needling experience. The pilot version of the NPREM was amended to remove items which performed poorly and reduce participant burden. On the basis on this data, the NPREM will commence a validation phase which will confirm the structure and assess the validity and reliability over time. The robust and rigorous testing of the NPREM ensures it will offer a reliable and meaningful way for kidney care providers to measure people's experience of needling.

Tuesday 6th June 12:15 – 13:15

Track S – Vascular Access

Poster: 415
Submission: 260

Is fluoroscopy a requisite for percutaneous peritoneal dialysis catheter insertion? - a single centre experience

Dr Usama Butt, Dr Sivakumar Sridharan

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Introduction: One of the key determinants of successful PD program is timely and durable access to peritoneal cavity. PD catheter insertion can be performed through percutaneous, laparoscopic or open surgical techniques. International society of peritoneal dialysis (ISPD) recommends complementing percutaneous technique with imaging such as Ultrasonography and Fluoroscopy to avoid complications and to achieve pelvic position of catheter tip. The use of additional imaging techniques such as fluoroscopy to aid percutaneous catheter placement is resource intensive and restricts the availability of procedure spaces. Using such resource intensive techniques can have negative impact on the uptake of PD.

In our centre, we have been doing percutaneous PD catheter insertion without additional imaging support since 2018. We set out to analyse the outcomes of percutaneous PD catheters inserted without any additional radiological guidance.

Method: We collected prospective data for all percutaneous PD catheters done in our centre from March 2022 to December 2022. All these were done without fluoroscopy by a trained nephrologist. Post procedure abdominal X-ray was performed immediately after the procedure to assess the catheter position. No intervention was done based on the X-ray position of the catheter tip alone. During the follow up period we recorded all PD catheter related events i.e. Catheter dysfunction, PD leak and infections.

Results: 13 patients had Percutaneous PD catheter insertion without fluoroscopy in the study period. Median follow up was 86 days (interquartile range 34 – 230). There was no procedure related complication such as bleeding or bowel perforation. In 7 (53.4%) patients, the PD catheter tip was located in a satisfactory position in pelvis on post-procedure imaging. Rest of the patients were found to have catheter tip in different abdominal regions including iliac fossae, lumbar region and hypochondrium. There was no persistent catheter dysfunction reported during the follow up duration in any of the patients. 2 patients with catheters not sited in pelvis and 1 with catheter in pelvic position experienced transient drain dysfunction related to constipation, which resolved completely after laxatives. 2 patients switched to haemodialysis (HD) for non-catheter related reasons with both these patients having catheter tip in pelvis post-procedure. There was no increased incidence of peritonitis in patients with catheters in non-pelvis position.

Discussion: Our single centre study shows that just over half of the patients who had Percutaneous PD catheter insertion without fluoroscopy had catheter tip in satisfactory position in the immediate post

procedure period. However, no specific intervention was required for successful functioning of those catheters not in the pelvis and there were no early technique failures due to displaced catheter tip. While fluoroscopy imaging has its place in complicated catheter insertions, use of this imaging support is not an absolute requirement for routine procedures. This will enable better and timely access to percutaneous PD catheter insertions and facilitate higher uptake of home dialysis therapies.

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Track S – Vascular Access

Poster: 416
Submission: 329

Did stopping ultrasound surveillance during COVID-19 result in an increase of the dialysis access thrombosis rate?

Ms Karen Allsopp

North Bristol Trust, Bristol

Purpose: The COVID-19 pandemic resulted in cessation and subsequent reduction of routine care including the outpatient ultrasound surveillance of AVF. This un-planned service disruption allowed evaluation of effectiveness of US surveillance in reducing AVF/AVG thrombosis.

Methods: This study was a secondary data analysis of monthly access patency for all in-centre patients receiving haemodialysis using an AVF or AVG over a two-year period (April 2019- March 2021). The study included 298 patients with age, access type, patency and COVID status measured as variables. Thrombosis rates for the 12 months prior to COVID-19 and then during the first 12 months of the pandemic were also measured. Statistical analysis to assess mean and standard deviation for relevant variables was used. A p-value of <0.05 was deemed significant.

Results: At the end of the study an increase in thrombosis rate (%) in the non-surveillance year was observed. (1.20) thrombosis/patient/year in the surveillance group vs (1.68) thrombosis/patient/year in the non-surveillance group). Monthly mean of thrombosed access during surveillance (M= 3.58, 95%Cl 2.19-4.98, SD = 2.193) and non-surveillance (M=4.92, 95% Cl, 3.52-6.31, SD=2.19); t (7148) =2.051, p = 0.038.

Conclusion: Reduction in routine Ultrasound surveillance was associated with a significant increase in access thrombosis rate. This association was independent of SARS-CoV-2 infection status. Clinical teams should consider alternative service delivery options including out-reach, bedside surveillance to balance risks of access thrombosis versus reducing the risk of nosocomial infection with hospital visits.

Keywords: Access, Arteriovenous Fistula, Burden, COVID-19, Surveillance, Thrombosis, Ultrasound

Tuesday 6th June 12:15 – 13:15

Track S – Vascular Access

Poster: 417
Submission: 415

Ultrasound guided right internal jugular tunneled catheter insertion for hemodialysis- Practices and outcomes from a single centre

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Introduction: Internal jugular vein tunneled catheters are important vascular access for hemodialysis (HD). In our practice Left-sided internal jugular (LIJ) catheter insertion is performed in radiology under direct X-ray screening. Most right-side internal jugular (RIJ) catheters are inserted under ultrasound guidance in dedicated renal procedure rooms. Vascular access can become challenging with the potential for venous stenosis and thrombosis with catheter use.

Objectives: To evaluate our practices and outcomes of ultrasound guided RIJ tunneled HD catheter insertion and to investigate the predictors of procedure failure.

Methods: 200 successive RIJ tunnel HD catheters inserted from June 2016 under ultrasound guidance at our centre was included in this analysis. Data including demographics, co-morbidities, first or higher order insertion, outcome (success or failed attempt), and immediate complications were collated from electronic patient records. Binary logistic regression analysis was conducted to investigate the predictor for failure in catheter insertion.

Results: Of the 200 patients, 152 (76%) were first-time insertions and 48 (24%) were second or higher-order insertions. The median age of our cohort was 58 years, with a predominance of males (68%) and white ethnicity (82%). 36.5% were diabetic, with 37.5% having a history of cardiovascular disease. Nearly 30% of patients were on an antiplatelet agent, and 8% were on anticoagulants, which were appropriately managed before line insertion. Pre-operative median haemoglobin was 93 g/dl, with clotting screen and platelet counts in the target range.

There was a statistically significant difference in the success of insertion, depending on the insertion being first or subsequent (96.1% vs 81.2%; p=0.001). The reason for failure in insertion included on-table observation of small calibre vein on ultrasound or failure to thread wire/dilator due to possible stenosis or thrombosis. All line rewire (12/48) procedures were performed successfully. Immediate complication (<1 week) was recorded in 9% of patients, predominantly tunnel bleeding (n=7) and malposition (deep or high; n=7) (Table 1). Second or higher-order RIJ catheter insertion showed a higher risk for failure in a multivariable binary logistic regression analysis. (OR: 6.4; P=0.002) (Table 2). Of the 48 higher order insertions, longer the duration between the first and subsequent catheters showed a higher risk for failure (OR:1.19; CI-1.04-1.4; p=0.010).

Conclusion: Second or higher-order catheter insertions with a longer duration between the first and the subsequent insertion carry a significant risk of failure due to vein stenosis and thrombosis. Therefore, a careful case-to-case triaging of patients based on previous access history is warranted before listing patients for routine ultrasound-guided insertion.

Table-1

Variable	Total (200)	First catheter (152)	Second or higher (48)	p-value
Age	58 (45-71)	58 (49-73)	55 (41-70)	0.135
Gender (Male)	136 (68%)	107 (70.4%)	29 (60.4%)	0.196
Ethnicity (White)	164 (82%)	125 (82%)	39 (81%)	0.877
Diabetes	73 (36.5%)	55 (36.2%)	18 (37.5%)	0.869
Successful insertion	185 (92.5%)	146 (96.1%)	39 (81.2%)	0.001
Immediate minor complications	18 (9%)	16 (10.5%)	2 (4.2%)	0.180

Table-2

Variable	OR (95%CI)	p-value
Second or higher	6.4 (2.1-20.5)	0.002
Age	0.98 (0.95-1.2)	0.54
Diabetes	2.12 (0.64-7.1)	0.22
Cardiovascular disease	2.5 (0.6-9.5)	0.18

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Track S – Vascular Access

Poster: 418
Submission: 416

Vascular access in incident haemodialysis patients – a single-department audit

Dr Emma Aspinall, Dr Simon Williams, Dr Amardeep Sahota

Royal Liverpool University Hospital, Liverpool

Introduction: The UK Kidney Association guidelines for vascular access in dialysis patients states that >60% of incident patients commencing haemodialysis (HD) should start with a functioning arteriovenous fistula (AVF) or graft (AVG). The UK Renal Registry Report 2020 reviewed all incident HD patients over a period of a year, recording dialysis access in relation to age, primary kidney disease and timing of presentation. They found that nationally, 35.9% of patients started HD with an AVF or AVG. Following this publication, Liverpool University Hospital NHS Foundation trust (LUHFT) renal department evaluated local data to identify the reasons why the national targets were not being met and how the process of creating definitive access could be streamlined.

Method: A retrospective data analysis was carried out for all patients meeting the renal registry inclusion criteria. Data was collected for 124 patients starting haemodialysis in 2022 in all centres across the trust. Patients were excluded if they had previously had peritoneal dialysis or had a failing transplant. Those with acute kidney injury that recovered function within 90 days were also excluded. Data variables collected included each patient's starting dialysis access, dialysis access after 3 months, timing of relevant referrals, imaging, clinics, and surgery related to fistula or graft creation, and reasons given for not starting with an AVF or AVG.

Results: The data showed that 41.1% (n=41) of patients started dialysis with an AVF or AVG, the remaining patients started with a tunnelled line (47.6%, n=59) or a temporary line (19.4%, n=24). Patients referred to advanced kidney care clinic (AKCC) made up 59.7% (n=74) of the population and started dialysis an average of 434 days later, the average eGFR at time of referral was 13. The proportion of patients who had both a venous mapping ultrasound requested and referral to vascular access was 71.8% (n=89) and the average eGFR at the time of referral to vascular access clinic was 11. It took an average of 335 days from the vascular access referral until the AVF/AVG was ready to use. The two most common reasons for starting dialysis with a tunnelled or temporary line were patients awaiting surgery (15.3%, n=19), and patients presenting with acute kidney injury (9.7%, n=12).

Discussion: From the evaluation of data, it was shown that reasons for starting haemodialysis with a venous catheter were multifactorial, however, significant delays at key moments in the patients' journey were identified. Development of an advanced kidney care electronic proforma and checklist will timeline patients referred for dialysis planning, act as a prompt to clinicians reviewing patients in our AKCC of outstanding issues and provide automated quarterly reports of the department's performance within critical aspects of the AKCC for ongoing audit and evaluation. Engaging surgical colleagues will also aim to address the surgical pathway for fistula formation. This has created a starting point to address

identified delays in securing definitive vascular access and highlight areas of further work to achieve the standard recommended by the UK Kidney Association.

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Track S – Vascular Access

Poster: 419
Submission: 433

Remote monitoring of haemodialysis vascular access for risk prediction for vascular events

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Introduction: Early identification of dysfunctional arteriovenous haemodialysis (HD) vascular access (VA) is important for timely referral and intervention. Here we evaluate the accuracy of remote monitoring technology of VA that uses access flow data routinely collected during HD treatment to predict stenotic/thrombotic vascular events.

Method: We retrospectively calculated access risk score in a blinded fashion using Vasc-Alert vascular access surveillance technology from all HD treatments sessions in 2 satellite HD units for 12 months1. We only included in the analysis HD patients dialysing with arteriovenous fistula or graft. The Access Risk Score was calculated as average of the scores for every 3 consecutive HD treatments and a high-risk score (HRS) was defined as ≥ 7 (4 to 5 values were generated per month for each subject)[1]. From the electronic patient records, we identified patients with significant vascular access events (thrombosis, angiographic stenosis requiring angioplasty or doppler with > 50% stenosis) and without vascular access event. Information for clinically detected malfunctioning fistula was retrieved from the last clinic letter and the last vascular access multidisciplinary meeting notes prior to the vascular event. For the event positive patients, we included in the analysis the Vasc-alert data 2 months prior to the event. For the event negative group, we included Vasc-alert data for 5 consecutive months with 1 month follow up. For the analysis we considered HRS positive if ≥2 HRS were generated.

Results: Out of 141 patients with available Vasc-alert data there were 60 patients dialysing via a tunnelled line and 81 patients with arteriovenous fistula or graft. Vasc-alert data for ≥ 2 months was available for 58 patients (Figure 1). Out of 12 event positive patients (4 patients with thrombosed access, 6 patients with stenosis requiring angioplasty and 2 patients with >50% on doppler referred and awaiting fistulogram),10 (83%) had ≥2 HRS generated 2 months prior to the vascular event (Median 8, IQR 6.75-8). Out of the 46 patients without vascular events, 15 patients (32.6%) had HRS ≥ 2 and 4 patients had only one HRS score. (Figure 1). Patient characteristics by vascular event are presented in Table 1. The sensitivity and specificity of HRS ≥2 for detecting future vascular events were 83.3% and 67.4%, respectively. The positive and negative predictive value of HRS ≥2 was 40% and 93.9% respectively . History of prior access stenosis and clinically detected malfunctioning fistula were significantly associated with vascular access events (Table1), and high HRS (P value 0.007 and 0.005 respectively). Within the patients with thrombosed access , 2 patients (50%) detected by HRS were not detected with clinical monitoring

Conclusion: Our results suggest that vascular access risk score can be a useful screening tool to assist clinical decision making for VA risk stratification. Prospective studies are required to evaluate its utility in the VA surveillance pathway.

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Track T – Staff Education

Poster: 420
Submission: 074

UKKW 2022 Interventional Nephrology Workshop

Dr Fiona Trew[1], Dr Jessica Selwood[1], Dr Mohana Das[1], Dr Rauri Clark[1], Dr James Andrews[1], Dr Pritpal Virdee[2], Dr Brighu Sood[2], Dr Subash Somalanka[2], Dr Rebecca Ryan[1], Dr Jamie Willows[3], Dr Muhammed Nadeem[4], Ms Debra Sweeney[1], Ms Carol Allan[1], Ms Tamasin Stevenson[5], Ms Heidi Jiminez[5], Dr Saeed Ahmed[1]

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Background: Interventional nephrology (IN) is a relatively new subspecialty that has gained momentum within nephrology, with nephrologists taking the reins in procedural aspects of the specialty. There are many benefits of this, including less reliance on vascular surgery and the associated waiting lists with access intervention, expedited investigation and management of access dysfunction, and new growth of a skill set for nephrologists. Sunderland Royal and St Helier Hospitals set up a multi-professional IN workshop for delegates at UK Kidney Week (UKKW) 2022. This offered drop-in sessions, either one-on-one or small group, with facilitators at multiple stations.

Methods: Facilitated stations were held on peritoneal dialysis (PD) medical catheter insertion; tunnelled line insertion using a simulation head and neck model (Hemocleanse IJ model); ultrasound-guided renal biopsy model; Venous excess ultrasonography score (VExUS) with volunteers; educational ultrasound simulation model (Body Works Eve model) for abdomen, thorax and heart; fistula scanning with volunteer renal patients; and Sunderland Diagnostic Interventional Nephrology business case and wire technology.

Questionnaires were created to assess delegates' prior exposure and experience of IN, and assessed their subjective pre- and post-session confidence in these procedures using a Likert 5 point scale.

Results: 107 participants who attended the workshop completed the questionnaire, mainly composed of UK based renal trainees (31.8%) and consultants (26.2%). 63.6% had never received any IN training, of those that had, this was mainly ad-hoc teaching throughout registrar training. 43.9% could perform tunnelled dialysis catheter insertion, and 42.1% could perform a renal biopsy independently; however 25% could perform none of the procedures independently.

Mean confidence pre-session across all procedures was 1.93. Participants were least confident at central vein angioplasty (1.34) and VExUS (1.40). Participants were most confident at tunnelled dialysis catheter insertion (2.74), followed by renal biopsy (2.72).

Afterwards, mean overall confidence increased by 23.95% to 2.39 and all procedures showed an increase in mean confidence. Participants were most confident renal biopsy (3.14) and tunnelled dialysis catheter insertion (3.12); but remained least confident with central vein angioplasty (1.79). 103 (96.3%) wanted to attend more IN workshops in the future.

Discussion: These results highlight a plethora of opportunities for the teaching of IN, directed towards both trainees, consultant nephrologists and the multi-professional team, and predict a high level of engagement with a formalised course. Using this feedback, a dedicated IN course has been planned for UKKW 2023, facilitated by a new UK diagnostic IN Specialist Interest group within the UK Kidney Association (UKKA). Additionally, an IN workshop is due to be hosted by the UKKA Renal Specialist Registrar Club in 2023.

Furthermore, a postgraduate certificate in IN hosted by Newcastle University has been developed by a group of consultant interventional nephrologists from South Tyneside and Sunderland NHS Foundation Trust

Whilst there is still significant work needed to integrate IN into renal pre- and post-CCT practice, the enthusiasm and positive feedback received and subsequent workshops and courses suggest its sustainability for the future.

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Track T – Staff Education

Poster: 421
Submission: 089

An implementation project aimed at broadening research involvement and experience across the nursing, pharmacy and allied health professional team within the kidney unit.

Mrs Deborah Grove, Dr Sheera Sutherland, Mrs Sarah Crosbie, Dr Matthew Bottomly

Oxford University Hospitals NHS Foundation Trust, Oxford

Introduction: Research involvement is increasingly being promoted as an essential aspect of routine clinical practice, with greater research activity associated with improved patient satisfaction and outcomes[1] . Recently published data from the UK suggests that there are barriers that prevent early career practitioner involvement in clinical research in nephrology [2]. We therefore implemented a project to broaden research engagement and to support the development of relevant skills across the nursing, pharmacy and allied health professional (AHP) team within the Kidney Unit.

Methods: A series of research focus groups were open to all nursing and allied health professionals in the unit to identify knowledge or practice gaps amenable to service/quality improvement (QI) or research. The output of the focus groups was shared with an existing patient panel for patient involvement and co-development of local research priorities. Follow-up focus group meetings were held to review feedback, identify common themes, and refine ideas.

Results: There was great enthusiasm for the project and participation was multiprofessional. Several QI and research themes emerged from the focus groups.

An initial single project was chosen for a coordinated approach to service improvement. A research support group was formed that included physicians, nurses and AHP's with expertise in research delivery to provide mentorship, support, and guidance regarding methodology and data analysis to a project implementation team. The aim being to foster experience and skillset development which would subsequently be applicable to research.

Alongside the initial project, a parallel work stream was developed to increase patient engagement and involvement in defining the unit research strategy.

Staff keen to pursue research but unsure how to proceed were signposted and mentored to apply for early career grassroots support with successful applications. Patient involvement within research has increased with expansion of the patient advisory group.

Discussion: Our approach to improving local research engagement has been enthusiastically received. Sharing ideas and identifying common themes promoted 'ground up' formation of a research support group to drive forward improvements in patient participation in research, and innovations in patient care.

The importance of sustaining interest in the group was discussed and regular but not exhaustive meetings to review, support and feedback on success are planned over the coming 12 months. After successful completion of several projects a unit and patient showcase event is planned to share and promote the work streams.

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Track T – Staff Education

Poster: 422
Submission: 143

The Advanced Clinical Practitioner (ACP) role in the clinical assessment and review of patients attending renal day case; a quality improvement project

Mrs Christine Budd[1], Mrs Sharon Huish[1], Mrs Mei Champ[2,3], Dr Rhian Clissold[1]

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Introduction: There is an absence of quality evidence assessing the role of non-medical health professionals in the clinical review of patients. The role of doctors and nurses has evolved yet there is limited data on how cost effective or beneficial this is and variation exists in terms of experience, training and competence of individuals, making it difficult to compare findings. Standard guidelines during the COVID-19 pandemic emphasised the need for clinically vulnerable patients to have additional precautions in place to ensure they can be reviewed safely and in a timely manner. This was difficult to achieve with a shortage of doctors so our aim was to assess the role of an ACP on our renal day case unit.

Methods: To identify any gaps in knowledge and assess the competence of the trainee ACP (tACP) ten renal-based competencies were developed; these were based on the Joint Royal Colleges of Physicians Training Boards ST3 programme (2010). The competencies addressed the following conditions: chronic kidney disease, renal anaemia, haemodialysis, peritoneal dialysis, renal transplant (long term care), acid base balance, renal bone disease, urinary tract infections, acute kidney injury and supportive care. Focus groups were formed; these consisted of clinical and non-clinical staff working on renal day case. A patient pathway was established and an algorithm of the review process was produced. This mirrored the Same Day Emergency Care (SDEC) pathway with the exception of the consultant post-take review. The tACP implemented this pathway for three months prior to undertaking an evaluation to determine its effectiveness and impact on both staff and patients. During this three-month trial, a training program was implemented to ensure the tACP met the required standard of assessment and they were regularly assessed through direct observation, case-based discussion and colleague feedback. A semi-structured questionnaire, focussing on the impact of the role on patient care and staff, was sent to all renal day case staff, specialist registrars and consultant nephrologists using non-probability convenience sampling.

Results: 30 staff were invited to complete the questionnaire; 22 responded (13 by paper and 9 electronically). 100% of responders felt the introduction of the ACP role benefited both staff and patients, including improving patient care through continuity, reducing waiting times and supporting staff. One third (33%) of respondents were unaware of the formalised process that the tACP followed but recognised it reduced the work load of senior medical staff, allowing them to concentrate on other tasks. All 10 renal competencies were achieved by the tACP.

Discussion: As a result of this quality improvement project, a structured ACP review process was developed and implemented on our renal day case unit. This was felt by staff to improve patient care.

Additional work is needed to look at patient outcomes and satisfaction plus cost-effectiveness of the role. The ACP role is safe and multifaceted. It brings diversity and flexibility to the wider renal team and can improve efficiency and patient care. It should be considered an option when recruiting staff or for service development.

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Track T – Staff Education

Poster: 423
Submission: 174

Delivering high standards of student training improves recruitment for the renal dietetic workforce

Mr Robert Fleming

East Kent Hospitals University NHS Foundation Trust, Canterbury

Introduction: Meeting the current and future needs of an organisation requires ongoing recruitment and retention of an effective workforce. Attracting potential new employees is challenging due to the geographical area in which our service is based. Renal is a specialist area which may seem intimidating to professionals with little experience and a perceived lack of effective on-the-job support and training. As this issue led to the service being understaffed for several years, a new strategy was required to attract potential new recruits to our service.

Method: In order to attract potential new recruits, we developed a stronger partnership with a nearby university student placement team. We worked to create greater involvement with the local student training network and developed an engaging and enjoyable training programme for students allocated to us, including a "student buddy" to support them during their placement. We reviewed our establishment of registered dietitians and converted a long-term Band 6 specialist post vacancy into a Band 5 specialist training post aimed at attracting former students back to our service.

Results: Between February 2021 and November 2022, 2 weeks of training was delivered for 2 Placement A students completing their first year at university and 12 weeks of training for 2 Placement C students, their last clinical placement before final assessments, including a repeat placement student. The 2 Placement C students on gaining their professional registration contacted the service regarding job vacancies and a former student was recruited to the role of Band 5 specialist in January 2022. Furthermore, feedback from the university student placement facilitators has placed our service as one of the highest rated placement providers for their students.

Discussion: Delivering a high standard of student training, especially in a specialist clinical area is a challenge which requires offering a varied and engaging training programme delivered by a dedicated team supporting students during their placement. This requires investment of time and effort by the placement provider. However, the potential reward for a placement provider is the creation of a "talent pipeline" for potential new employees looking to begin their career in a specialist clinical area. Offering a high standard of student training and creating a Band 5 specialist training post has enabled our service to recruit and achieve a full workforce.

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Track T – Staff Education

Poster: 424
Submission: 241

An exploration of the perceived educational value of renal and cardiac multi-disciplinary team (MDT) meetings

Dr Zahra Ladan, Ms Fiona Sharples, Prof Aine Burns

Royal Free London NHS Foundation Trust, London

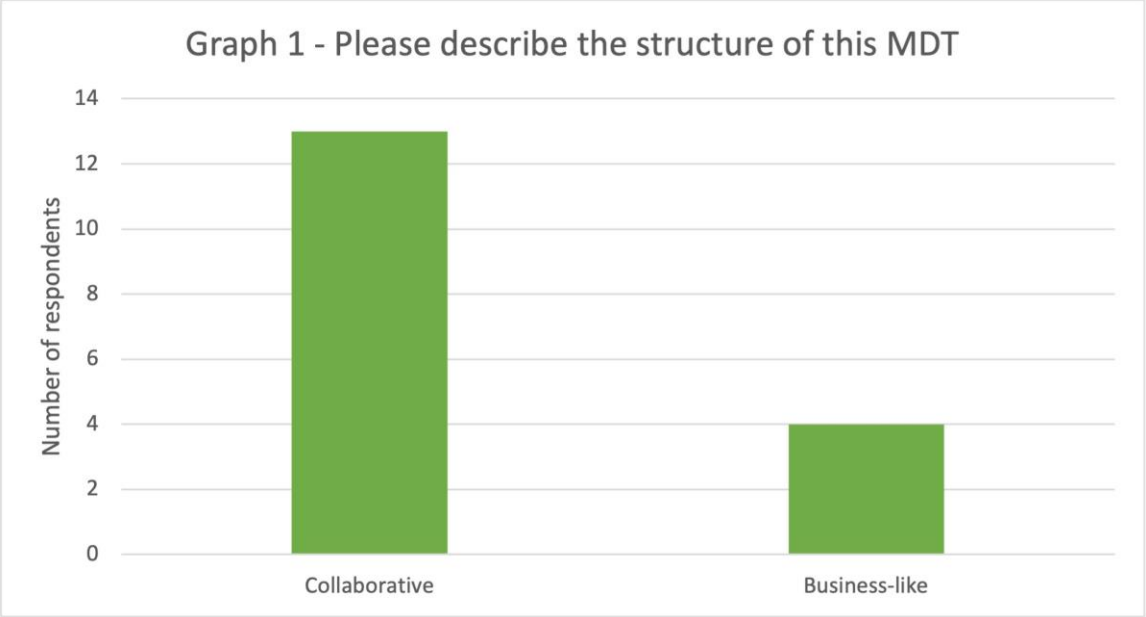
Introduction: MDTs are increasingly employed in the NHS to improve patient outcomes (1). There are many advantages including ensuring consistency of care, adherence to guidelines and decision making in complex cases (2). This is particularly true where input from multiple services is required. To date, available literature has centred around improving patient care and service delivery. There is little emphasis on the educational value of MDTs.

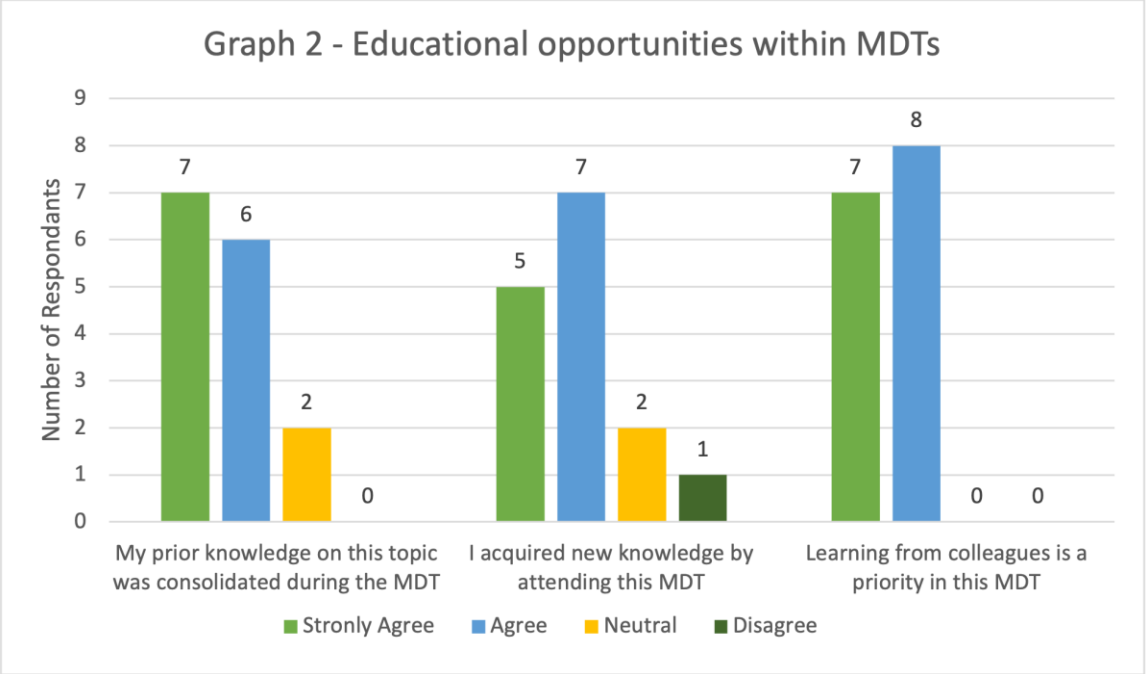
Our objectives were to determine 1) the number of MDTs in our trust, 2) whether attendees view MDTs as learning opportunities, 3) how the educational value of MDTs could be improved and 4) whether non-medical members of our MDTs felt they had the opportunity to contribute.

Methods: Clinical and nursing leads in a large teaching hospital were surveyed to identify the MDTs taking place within their clinical divisions. A map of MDTs was then generated. A survey was designed to determine the perceived educational value of MDTs and to explore ways of enhancing learning.

3 MDT meetings with attendees from multiple disciplines and different educational backgrounds were purposefully selected for detailed examination. 2 of the selected MDTs were attended and critically observed. The survey was distributed to MDT attendees after the meeting concluded.

Results: 33 MDTs were identified across 5 disciplines. 15 questionnaires were completed and returned from the 3 selected MDTs. The respondents consisted of 8 clinicians (6 consultants and 2 registrars), 5 specialist nurses and 2 members of administrative staff. MDTs were recognised as collaborative events (Graph 1) and individual contribution was valued. Respondents commented that their MDTs were highly educational (Graph 2). Respondents stated that '[MDTs] provide education through discussing case[s]' and learning was '[e]xcellent as [there are] significant educational discussions around each case'. Attendees remarked that learning was enhanced and deepened through multiple attendances. Amongst the suggestions for improvement were 'hav[ing] more junior staff attend' and '[allowing] 5-10 mins at the end of each MDT summarising important learning points'.





Discussion: When questioned, respondents were very positive about the educational value of MDTs. Many stated that the learning was valuable and sustained at each MDT. Respondents largely felt that their input was respected and valued by others attended. Collaboration and teamwork were identified as key factors. Respondents stated that detailed case-based discussions added significant educational value to MDTs.

We identified extensive learning opportunities through MDTs. This could likely be enhanced by ensuring regular attendance by senior trainees, ensuring clear learning objectives, outlining new guidelines, and closing meetings with a summary of the key learning points.

The small sample size means that these findings may not be truly representative. However, the overwhelming positive results suggests that MDTs carry valuable learning opportunities which have the potential to be exploited further.

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Track T – Staff Education

Poster: 425
Submission: 311

Teaching and Training Sustained Low Efficiency Dialysis (SLED) Treatment to Critical Care Professionals

Mrs Irene Opena, Mrs Angela Evans, Mrs Lovely Sorianosos, Dr Craig Morris, Mr Andy Muggleton, Prof Nick Selby

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Introduction: There are a number of reasons to provide intermittent renal replacement therapies (RRT) to critically ill patients in the intensive care unit (ICU). These include benefits to patients (e.g. easier planning of physiotherapy, imaging or surgeries); to facilitate procedures (e.g. tracheostomies, prone positioning); and to improve options for anticoagulation-free kidney replacement therapy (KRT). In addition, a recent driver for change has been the need to provide large increases in number of KRT treatments to deal with pandemic situations. This abstract describes a cross-speciality, multi-disciplinary programme of quality improvement to introduce sustained low-efficiency dialysis (SLED) into an ICU that had previously relied almost exclusively on continuous RRT.

Methods: The programme comprised of different elements. Renal and ICU consultants, senior ICU and dialysis nurses and nurse educators and chief renal technician formed a core group. This group meets weekly to discuss training and updates, technical support and maintenance, current patients requiring RRT, guidelines and protocols, and research.

A training program was developed to teach ICU nurses to perform SLED independently. This combined lectures (e.g. theory behind SLED, discussion of the advantages and disadvantages) and practical training (machine preparation and lining, programming SLED prescription, connection, safe management of patient during treatment, disconnection and troubleshooting). Different learning resources were made available via a QR code, including a SLED manual and training videos. The renal dialysis nursing competencies were adapted for ICU nurses, as were SLED prescription and nursing observation charts. Supernumerary shifts for ICU nurses in the renal dialysis unit were provided to gain more familiarity and experience to the dialysis machines.

Result: The implementation of this project took two years to be completed due to challenges of clinical workload and staff availability. However, total of 103 ICU nurses are now trained and competent to perform SLED independently. SLED has become the predominant form of RRT, resulting in significant cost savings. Dialysis machines are rotated from the main dialysis fleet to ICU, with maintenance overseen by renal technicians. Key learning includes: engagement and collaborative working at senior nurse and nurse educator level; enthusiasm from both nephrology and ICU consultants to make this work; the weekly meeting has helped engage a wider number of consultants and trainees; technical support is essential for machine maintenance and planning; accepting pauses and delays that were almost always due to clinical pressures that prevented training and roll-out (e.g. during the COVID-19 pandemic); and considering funding aspects.

Discussion: SLED in ICU is now the preferred RRT modality used in critically ill patients with AKI at our centre, including those with haemodynamic instability receiving vasopressors. Our experiences may help others who are considering similar projects.

Tuesday 6th June 12:15 – 13:15

Track T – Staff Education

Poster: 426
Submission: 361

Multi-disciplinary simulation session and improving knowledge and understanding of Acute Kidney Injury (AKI)

Mrs Karen Nagalingam[1,2], Mrs Clare Morlidge[1], Dr Pratik Solanki[1], Mrs Angelita Alcantara[1], Miss Faizah Ahmed[1], Miss Bethany Nicholl[1]

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Introduction: Education and training on Acute Kidney Injury is required to improve clinical outcomes of patients with AKI. By improving staff knowledge, patient management can be improved. Patient management is never in silo and therefore it is important to approach education on AKI as a multidisciplinary team (MDT) approach. A simulation session was developed in order to engage MDT staff in identifying management of AKI.

Methods: A simulation session involving 2 complex scenarios was created in liaison with a renal consultant, specialist renal pharmacist, AKI nurse specialist and the sepsis team. Staff were recruited from all over the hospital and the sessions were designed to include medics, pharmacists, nurses and healthcare assistants. There was a maximum of 8 participants per session and the sessions were delivered twice. Each participant was asked to rate on a Likert scale various questions pre and post sim, to ascertain knowledge, understanding and feelings around simulation.

Results: There were 16 participants in total, 4 pharmacists, 1 doctor, 10 nurses and 1 support worker. It was found that 81% (13) very much enjoyed the sessions and 88% (14) stated that simulation improved knowledge and understanding of sepsis and AKI. It was found that after the session most participants felt that their confidence levels improved in identifying and managing a patient with AKI. The majority of participants by the end of the session had improved their confidence levels with escalating a deteriorating patient. Participants stated that it was useful understanding and interacting with the MDT, and they enjoyed this approach to simulation. It helped understanding the MDT strengths and when to escalate.

Discussion: There are different ways of learning and simulation is a way of engaging audiences in a practical non-threatening setting. This is the first time that AKI MDT simulation has been undertaken in this trust, and it is clear that this is a very useful and positive way of engaging staff in AKI education.

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Track T – Staff Education

Poster: 427
Submission: 396

The role of Kidney Quality Improvement Partnership (KQuIP) in facilitating, training, and supporting QI in Yorkshire and Humber Kidney Network (YHKN)

Mrs Leeanne Lockley[1], Mrs Rachel Gair[1], Ms Ranjit Klare[1], Mrs Julie Slevin[1], Ms Gillian Dinsey[2], Dr Mark Wright[3]

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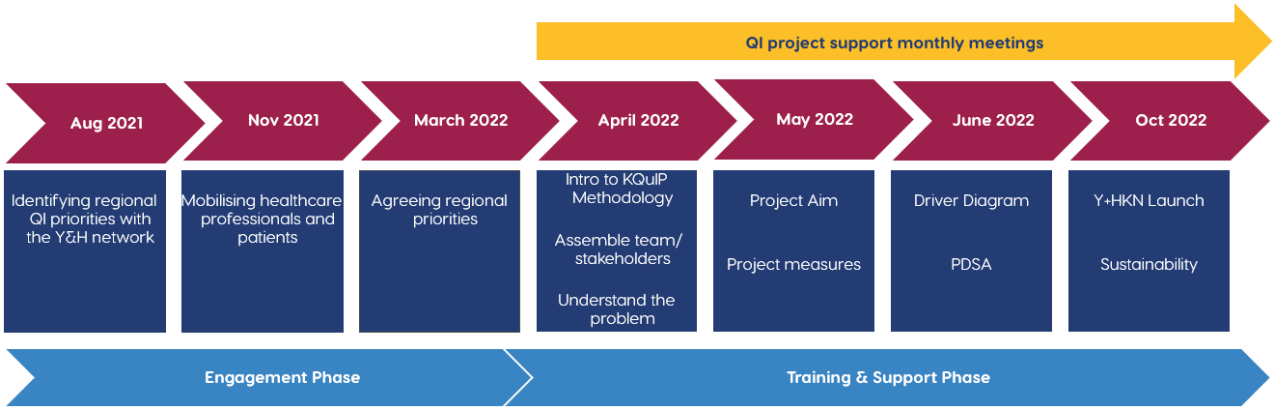
[3]LEEDS TEACHING HOSPITALS NHS TRUST, Leeds

Introduction: In March 2021, NHS England produced the Renal Getting It Right First Time (GIRFT) report. This report provided the kidney community with improvement recommendations. To make these improvements, the report states, "a regional approach to service transformation, QI co-ordination, project management, training and leadership is particularly important …" (1) In response, the NHS England YHKN, comprised of 6 units, agreed to work with KQuIP to support improvement within the region.

Methodology: Between Nov 2021 – Nov 2022, KQuIP facilitated 1 of a 2-year programme of Quality Improvement (QI) including engagement, training & support phases. The virtual engagement phase, over a 5-month period, supported the region to agree priorities and areas for improvement, focusing on dialysis access, kidney transplant and psychosocial care. The training and support phase comprised of three 3 hourly virtual workshops followed by project support monthly meetings (see Figure 1: A KQuIP QI Programme)

Figure 1: A KQuIP QI Programme



Each unit was encouraged to support a multi-professional, doctor and person with lived experience to attend all workshops where they were upskilled in QI tools and given time within breakout rooms to apply them to their chosen project.

Year 1 culminated in a F2F meeting with all centres and those with lived experience sharing their QI progress. Year 1 was evaluated using a series of feedback questions.

Results: Total attendance numbers in year 1 (Table 1)

Phases	HCP	Those with lived experience
Engagement: 3 x events	136	0
Training and Support x 3 events	81	3
F2F x 1 event	66	6

Feedback scores after 3 workshops (Table 2).

Questions	Average score (1=no confidence; 5=extremely confident)
To what extent did this workshop enable you to build positive relationships, collaborate and share ideas with others	4.3
To what extent did this workshop promote patient involvement?	3.7
To what extent did this workshop promote a collective learning environment among the multi-professional team	4.2
How useful and easy to understand were the quality improvement techniques and methods taught during the workshop?	4.1
How confident, at this stage do you feel you can put these principles into practice back at your unit?	3.5

Self-rated QI confidence (table 3)

Self-rated QI Confidence in:	Before workshops	After workshops
Using QI methodology	3	3.8
Ensuring QI project sustainability	48%	79%

By the end of Year 1, each QI priority had a project aim and measurement strategy (Table 4)

QI priorities	Projects aim	Project measurement	Baseline Data
Improving kidney transplant	All units in Y&H to achieve 60% pre-emptive transplant listing rates by end Nov 2023	Monthly percentage of patients who were pre-emptively listed.	(From 4 units) Jan 2022 – 21% Dec 2022 – 48%
Improving dialysis access	All units in Y&H to see a 10% reduction (34% to 24%) in CVC access for dialysis by end of Nov 2023	Measure 1 - Monthly Percentage of CVC access for dialysis Measure 2 - Monthly percentage of those who have CVC access, this is the only option (patient and medical choice)	(From 6 units) Measure 1 July 2022 – 34.2% Nov 2022 – 33.5% (From 5 units) Measure 2 July 2022 – 14.5% Nov 2022 – 18%
Improving psychosocial care Developing a regional peer support network	Improve staff self-rated confidence in providing psychosocial support in specific staff groups by Nov 2023 All 6 units in Y&H have a formal patient peer support group set up by end of Nov 2023	Not agreed No of units who have a formal peer support group	Not started Oct/ Nov 2022 – 1 Dec – 1 and 1 unit in the process of developing one
Improving patient involvement in QI	All QI projects have a patient voice contributing to the project.	No of patients who attend and contribute to QI projects	Engagement meetings – 0 QI workshops -3 In person event - 6

Conclusion: KQuIP delivered year 1 of a 2-year programme of QI within Y+H supporting priorities agreed by clinical teams, commissioners and patients. The programme provided a framework, designated time and skilled facilitation enabling teams to plan, deliver and share their improvement. This approach has resulted in improvements in outcomes and process and has developed the patient voice within the

network. It was evident that regional and local leaders need time and space throughout the QI process. Strong foundations are now in place to move to year 2 of the KQuIP QI programme .

1 Dr Lipkin G., and Dr McKane W., (2001) Renal Medical GIRFT Programme National Speciality Report

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Track T – Staff Education

Poster: 428
Submission: 431

Multidisciplinary renal simulation training improves specialty-specific knowledge, confidence in the escalation of unwell patients' care and multi-professional teamworking

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Introduction: Simulation training is a well-recognised, effective tool for delivering meaningful teaching and training that prepares individuals and teams for managing emergencies in clinical practice. The multi-professional simulation training programme in nephrology and transplant at our institution, designed to improve technical and non-technical skills, has recently been further developed. Here we report outcomes of our MDT simulation programme in nephrology and transplant.

Methods: A half-day multidisciplinary simulation session was carried out approximately bimonthly at our institution. Simulations were undertaken in a purpose-built simulation suite with high-fidelity elements. Simulation topics were designed to address common emergency scenarios relevant to participants' clinical practice, including anaphylaxis, pulmonary haemorrhage, flash pulmonary oedema and hypotension on dialysis, amongst others, and were chosen to compliment half-day nursing practice development sessions. A structured debrief and standardised multi-disciplinary education session followed every simulation. Faculty included a nephrology consultant, internal medicine trainee, senior nurses, clinical nurse specialists and simulation practitioners. Participants included staff nurses and senior nurses from nephrology and transplant inpatients, nephrology and transplant outpatients and outpatient dialysis units, alongside foundation doctors, internal medicine trainees, and nephrology registrars. Feedback was collated using a pre- and post-simulation questionnaire evaluating participants' perceptions of their technical and non-technical skills.

Results: Improvement was seen between mean pre- and post-simulation self-reported confidence scores across all domains; these included improved confidence in recognising an unwell patient (84.4% pre-sim to 95.6% post-sim), improved confidence in escalating an unwell patient's care (86.6% pre-sim to 97.8% post-sim), improved confidence in working with other members of the renal MDT (93.4% pre-sim to 97.8% post-sim), and improvement in feeling a valued member of the renal MDT (77.8% pre-sim to 95.6% post-sim).

All participants felt both the simulation in which they partook and the post-simulation structured debrief and education session were useful or very useful and improved their knowledge and confidence in managing acutely unwell renal patients.

Discussion: Our experience highlights the benefit of regular multidisciplinary simulation training in improving self-reported knowledge, confidence and teamworking skills in staff managing renal-specific emergency scenarios.

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Track T – Staff Education

Poster: 429
Submission: 462

UK Kidney History – A new and living archive

Professor John Feehally[1], Professor Neil Turner[2]

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Introduction: Understanding the history of our specialty

- explains how we came to be this way
- prevents repeating mistakes
- is inspiring!

The invention of practical dialysis, and of transplantation, transformed our specialty from a small group of people interested in kidney function and disease, into a revolutionary model of medical practice employing extraordinary new technology and concepts. To extend delivery as far and fast as possible, unique levels of patient engagement combined with the creation of unanticipated advanced roles for nursing and other staff.

The new order began to be felt from the early 1960s. In subsequent decades services have grown and further matured. Many of the early features remain embedded in our services. Treatment of kidney diseases has advanced with a parallel surge in research, in which the UK has played a significant part.

Interested people have written on elements of these developments, but we want to benefit future staff and patients by assembling reliable accounts could in one place.

Methods: A small group of nephrologists with a declared interest in their specialty's history agreed to pool resources and create a website.

The approach has been to point to existing content where it covers an aspect well, and to add content where it does not. We intend it should be illustrated as richly as possible.

Our aim to have a multimedia archive. As well as written media, the website will make available audio or video interviews with contemporary staff and patients, film documentaries and other records.

Results: At https://ukkidneyhistory.org the results of the first phase of this activity can be seen. Presentation has been divided into five sections: a Timeline of events, Themes, Resources, Challenges, and Units (an opportunity to present accounts of the history of each renal unit). We illustrate examples of each.

No external funding has been required so far.

Discussion: The website is live and growing. Comments and suggestions are very welcome (link at foot).

Work in progress is providing initial content to illustrate the approach, and identifying resources as well as gaps. When the content is more comprehensive we will review design and long-term hosting. With the goal of sustainability, we will avoid making it costly or high-input to maintain and update.

There are physical aspects to our history too. We have begun to catalogue the locations of key records, books, and objects, and understand options for enabling access to these.

We are keen to broaden the group working on this project, in particular to include those from other professional groups as well as nephrologists.

Does this interest you? Contact us via the details at https://ukkidneyhistory.org/about/contact

Tuesday 6th June 12:15 – 13:15

Track V – End of Life Palliative Care

Poster: 430
Submission: 269

Supportive care services for paediatric renal patients approaching end of life in the UK – A scoping exercise

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Introduction: Though kidney transplantation is the gold standard treatment for end stage kidney disease (ESKD), it may not be achievable or appropriate for all patients. Some patients may not survive to transplantation. Provision of supportive care to minimise symptoms and optimise quality at the end of life often requires specialist input. The extent of this provision, and use of specialty teams, for paediatric patients with ESKD approaching end of life is unknown. Our aim was to perform a scoping exercise of the services for this patient population.

Methods: A questionnaire was drafted and reviewed by members of the working group. Questions included membership of nephrology services, membership of supportive care services (if present), care facilities available, and documentation relevant to supportive care. Additional questions included the number of deaths per centre in the previous 12 months, location of death, supportive care involvement, and details on practical dialysis provision for infants. The questionnaire was distributed to all members of the paediatric nephrology clinical studies group via e-mail, and included as a news item on the professional organisation e-newsletter for 12 months. Three e-mail reminders were sent to non-responding centres.

Results: 11/13 centres responded, covering 87% of the UK population. 10/11 centres had a dedicated paediatric supportive care team, predominantly led by consultant medical staff and clinical nurse specialists. All centres had ICU facilities, not all had high dependency, and 10/11 had links to local hospices. Availability of standardised documentation was highly variable across centres, though all had access to advanced care plans. Symptom management plans and drug dosing were available in 8/11 centres.

18 deaths were reported in the preceding 12 months (0-4 per centre). 9/18 (50%) died at home, 4 in a hospice, 2 on an in-patient ward, and 3 in intensive care. Every child that died had involvement of a supportive care team; for the one centre that did not have their own, liaison with local paediatricians with an interest in supportive care and community teams was utilised. All centres could offer manual

peritoneal dialysis to infants, and all considered haemodialysis though minimum weights varied by centre.

Conclusions: Though children with ESKD entering end of life are small in number, there is good provision of dedicated supportive care services across the UK. Deaths outside hospital are supported. The main area of practice variation is the availability of standardised documentation.

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Track V – End of Life Palliative Care

Poster: 431
Submission: 430

A systematic review of symptoms experienced by children and young people with end-stage kidney disease, particularly during the end-of-life period

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[9]University of Glasgow, Glasgow

Introduction: The most frequent treatment of end-stage kidney disease (ESKD) in both adult and paediatric patients is transplantation, with dialysis frequently used as a bridging therapy. Some children are not suitable for transplantation, and conservative management is deemed the optimal care path. A primary goal of supportive care is symptomatic management. Knowledge of the symptomatology of ESKD, particularly during the end-of-life phase, in all age groups, is limited.

The aim of this systematic review was to establish the specific symptoms reported in children and young people (CYP), and the frequency with which they occur. A secondary outcome, if feasible, was to establish evidence-based management strategies for these symptoms.

Methods: Ovid Medline®, Embase and Central (Cochrane) databases were used to identify papers, published between 1st January 2000 to search date, which detailed the presence of symptoms in CYP up to the age of 21 years, with kidney failure, defined as those with an estimated glomerular filtration rate (eGFR) of <15ml/min/1.73m3 and/or receiving dialysis. Adult/animal studies, those not translatable to English and studies where participants had either chronic kidney disease (CKD) stages I-4 or who had received a renal transplant were excluded. Case reports, case series with <5 patients, review articles, letters, books and editorials were excluded.

The systematic review was registered with PROSPERO (CRD42022346120).

Abstract/title screening was performed by six reviewers using Rayyan (www.rayyan.ai).

Predefined data will be extracted from included articles and descriptive analysis of key themes performed. A narrative approach to analysis will be undertaken.

Results: The initial search strategy, conducted on 29th August 2022, identified 20,003 studies after deduplication. 1,176 (5.8%) articles were screened by two or more reviewers. 658 (3.3%) articles were initially considered eligible for full text review and underwent a second screening by two or more reviewers. 304 (1.5%) were included for full text review.

19,702 (98.5%) papers were excluded (12,974 wrong population, 2,407 wrong publication type, 2,148 wrong outcome, 651 background article, 541 wrong focus, 400 wrong study design, 71 wrong drug, 49 wrong publication year and 9 non-English language). A proportion of articles were excluded for multiple reasons, and for a small proportion an exclusion reason was not given.

Full text review, data extraction and analysis are ongoing. Currently, 229 articles (75%) have had full text review; 39 papers have been identified as suitable for inclusion and 40 require further discussion.

Key themes regarding symptom burden are emerging; fatigue, depression and anxiety, poor sleep, pruritis, xeroderma and limb pain. However, literature regarding symptom burden in CYP with ESKD was almost exclusively for patients on dialysis, with no focus on end-of-life. This will limit generation of evidence-based guidance on management of symptoms for this patient group.

Discussion: Understanding the symptoms likely to be encountered during conservative care for ESKD is important for those experiencing the end-of-life phase. Our preliminary results suggest that there is very limited literature on the breadth of symptoms experienced in this patient group. The results of this review will be used to guide national clinical guideline creation.

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Track V – End of Life Palliative Care

Poster: 432
Submission: 440

Supportive Care for haemodialysis patients

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Introduction: Supportive care is a term used to encompass those patients on dialysis whose health is failing despite dialysis, or those who have chosen conservative management as their treatment pathway and are becoming more symptomatic and unwell.

Supportive has some overlap with palliative care, but while palliative care focusses more on end of life care and alleviation of pain and other symptoms, supportive care helps the patient and family to maximise the benefits of treatment and to live as well as possible with the effects of the disease. The patient and family will be supported until death and bereavement as they would be with palliative care.

Methods: The renal social work team covers 5 dialysis units for the Trust; within each unit are a small number of patients (mainly elderly and frail) who meet the supportive care criteria. These include: increased hospital admissions; irresolvable dialysis access problems; patient expressed difficulties with treatment; frailty/deterioration due to progression or development of a life-threatening condition; not tolerating dialysis. These patients can be placed on the supportive care register in the renal team. The process for this includes discussion at the dialysis units' regular meeting to raise patients of concern. The register is the list of patients identified as requiring extra monitoring and assessment of their needs. This also includes community nursing referrals and end of life care planning as the patient deteriorates.

The renal social workers review the patients on the supportive care register every 4-6 weeks and monitor their situation holistically to include their practical, emotional, financial, spiritual and health needs. This extends to their family members who are often their carers. If needed, they can be referred to the renal psychological service for additional support.

The patients are discussed at each supportive care meeting, which includes members from the renal MDT and the relevant consultant, so that all aspects of the patient's situation can be supported.

Outcome: Supportive care requires good communication between the various health professionals involved in the patient's care, and also between the healthcare team and the patient/family. The provision of supportive care is essential to ensure patients approaching the end of their lives are able to plan and prepare for their death, having been supported during the period of time leading up to this. With effective planning and sensitive communication, introductions to community palliative care services can be made in good time and patients can achieve their preferred place of death where facilities allow at the time they are needed.

Conclusion: Supportive care is an essential part of renal care, allowing patients to consider their priorities towards the end of life and to make decisions about their ongoing treatment, or withdrawing from it. Holistic support as health declines is vital to enable patients to have the best end of life possible. Consideration of supportive care should be integrated across all renal modalities.

Tuesday 6th June 12:15 – 13:15

Track V – End of Life Palliative Care

Poster: 433
Submission: 490

The Development of an Integrated Community, Conservative Kidney Care and Palliative-renal Care Service

Dr Jawad Ahmed[1], Dr Lucia Birch[2], Mrs Donna Roberts[2], Dr Simon Harlin[2], Dr Matthew Dodd[2], Dr Huda Mahmoud[1]

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Introduction: Conservative kidney care is the chosen therapeutic strategy for approximately 6% of renal patients. It is estimated that a third of renal units in the United Kingdom have a dedicated conservative kidney care service. Equally, other units manage this cohort of patients in general nephrology/ low-clearance clinics or alternatively, discharge to community services. Walsall Together, is a collaborative initiative between community and speciality services, driven to provide multi-agency, patient-focused care. By combining specialist input and community resources, we aim to optimally manage individuals on the conservative kidney care and palliative-renal pathways at home.

Methods: Community, nephrology and palliative care teams devised a service for those individuals identified for conservative kidney care or individuals with renal disease requiring palliative care management. Two separate, yet linked pathways; a community, conservative care pathway and a community, renal-palliative pathway.

Individuals suitable for community conservative care pathway were identified from routine nephrology inpatient and outpatient workstreams. Prior to a telephone consultation with a nephrologist, phlebotomy for routine bloods were performed at the GP surgery or at the patients' home by the community phlebotomy service. Any alterations to medications would be performed directly by the community pharmacist. Symptoms were assessed using the integrated palliative outcome score (IPOS)-renal survey. The IPOS renal-survey asks individuals to rate symptom burden from; not at all, to slightly, moderately, severely and overwhelmingly. Home visits were offered to unwell or symptomatic patients.

Individuals requiring palliative care with established renal disease were identified from both palliative and nephology services. A bi-weekly palliative-renal multidisciplinary team (MDT) meeting was established and added onto an existing community palliative MDT meeting.

Results: Currently, there are 40 individuals on both the community conservative care and palliative-renal care pathway. Aside from intravenous iron infusion therapy, all consultations were telephone appointments or home visits. 94% of service-users felt that the community approach did not waste time waiting for appointments/treatments. 87% of service-users felt that the community approach provided them with sufficient information to understand their healthcare condition and relevant management strategies. Although patients reported pain, nausea and reduced appetite as the three most common symptoms causing discomfort in the three days preceding the survey. On detailed assessment;

significant symptom burden was attributed to reduced mobility (82% scoring slightly to overwhelmingly), pain (65% scoring slightly to overwhelmingly) and bowel concerns (65% scoring slightly to overwhelmingly). Itching affected a third of the cohort, scoring moderately to overwhelmingly. Importantly, as a result of the service, patients reported that either all or most renal-related problems were addressed. To date all patients who died while under the palliative-renal care service, died in their chosen place of death, at home.

Discussion: The Walsall Together collaborative has demonstrated a successful approach to managing complications of advanced kidney disease. Initially, by reducing the number of face-to-face hospital outpatient appointments, hospital admissions and time wasted attending healthcare appointments. Secondly, the cooperative, multi-speciality approach, has led to an improvement in patient satisfaction and the attainment of patient healthcare-related goals.