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Heparin Induced Thrombocytopenia leading to cardiorespiratory arrest during haemodialysis - lessons from an uncommon occurrence and a review of the literature

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Introduction:
Heparin Induced thrombocytopenia (HIT) is a life-threatening disorder occurring in 1-5% of patients exposed to heparin. It is classified into two types. Type 2 HIT is antibody mediated and occurs 5-10 days post heparin initiation. It causes a significant reduction in platelets causing thromboembolic and haemorrhagic sequalae. Cessation of heparin is required. Type 1 HIT causes mild reduction in platelets and cessation of heparin is not needed. Heparin is the most commonly used anticoagulant in Haemodialysis (HD) patients to prevent extracorporeal circuit (EC) clotting and as catheter locks. Although various complications are well recognised, cardio respiratory arrest during HD is an extremely rare complication of type 2 HIT, with a few cases in medical literature. Here in, we discuss such a case with a review of reported cases, outline a mechanism and highlight important lessons.

Case: A 88-year-old gentleman was switched from peritoneal dialysis to HD due to recurrent peritonitis. He had a background of hypertension, ischaemic heart disease and an implanted pacemaker for complete heart block. He commenced HD on an internal jugular tunnelled catheter. He started receiving regular Dalteparin 2500 Units on his 3rd session, after uneventful first two sessions. His fourth session was complicated by an arterial pressure of more than 200. On his 5th session, he went into cardio respiratory arrest 5 minutes after starting HD and receiving Dalteparin. After 5 minutes of resuscitation he regained cardiac output and had normal observations. His blood investigations revealed a platelet count of 37×10^9/L which was 166×10^9/L, 10 days ago. His 6th session was complicated by EC clotting despite saline flushes. As the platelet count had improved to 74×10^9/L, Dalteparin 5000 Units was given. Within a few minutes he had a cardio respiratory arrest, followed by spontaneous recovery on stopping HD. Platelet count checked the next day was 34×10^9/L. A HIT screen and mast cell tryptase were sent; the former came back strongly positive. He was taken of heparin followed by a rise in his platelet count.

Discussion:
HIT being a pro thrombotic condition, can cause vascular access dysfunction and EC clotting which was evident in our case. Transient occlusion of blood vessels in the pulmonary and coronary vasculature is also a possibility leading to cardio respiratory compromise and even arrest. Table 1 details all past reported cases, the type of heparin implicated and adverse clinical event. Generally, past cases, describe HIT occurring 8 – 21 days after heparin exposure. Our patient presented a week after heparin exposure. Timely recognition by maintaining a high degree of suspicion and checking the platelet count in new HD patients with access dysfunction or EC clotting in pivotal. The most common response in these scenarios is to increase heparin dose, which only worsens the prothrombotic state as evident in our case.The treatment is to stop heparin and switch to non-heparin-based anti coagulation. The key differential is anaphylaxis, which is differentiated with a normal mast cell tryptase level and lack of suggestive clinical features

Incidence and Risk Factors of Sudden Cardiac Death in End Stage Renal Disease Patients undergoing Haemodialysis: A Retrospective Study

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Abstract:
Background: End Stage Renal Disease (ESRD) patients undergoing long-term haemodialysis are at increased risk of suffering from Sudden Cardiac Death (SCD). ESRD patients on haemodialysis are distinctively vulnerable to SCD owing to periodic fluid and electrolyte imbalances, uremic environment and foregoing cardiovascular injury. The present study was sought to evaluate the magnitude of incidence and risk factors of SCD in ESRD patients on haemodialysis in Pakistani population.
Material and Methods: A retrospective research study was undertaken at tertiary care hospital in Karachi, Pakistan from May 2016 to April 2019. The study recruited 202 eligible ESRD patients undergoing long-term haemodialysis. Baseline characteristics of the study participants with and without Sudden Cardiac Arrest (SCA) were recorded using self-reported questionnaires. Brief history was documented for comorbid such as Diabetes Mellitus (DM), Hypertension (HTN) and family history of cardiac disease. SCA and SCD events were identified by reviewing medical records and death certificates.
Results: The study recruited 261 patients during the study duration; however, on the basis of exclusion criteria 59 patients were ruled out. Out of 202 patients enrolled in the final analysis, 37 (18.3%) patients suffered from the episode of SCA. Of those 37 patients, 18 (48.6%) of the subjects were succumbed to death. ESRD patients who endured SCA were statistically older in comparison with their non-SCA counterparts (58.2 ± 11.4 vs. 52.3 ± 9.3 years, P<0.001). When compared for comorbidities, HTN (67.6% versus 64.8%, P = 0.001), DM (62.2% versus 59.4%, P = 0.004), CAD (45.9% versus 41.8%, P = 0.001) and Congestive Heart Failure (CHF) (35.1% versus 34.5%, P = 0.002) were significantly prevalent in ESRD cohort with SCA in contrast to non-SCA. We also found LVH (62.2% versus 48.5%, P<0.001), ventricular tachycardia (51.4% versus 30.9%, P<0.001) and ventricular fibrillation/flutter (56.8% versus 25.5%, P<0.001) to be statistically higher in ESRD patients on haemodialysis with SCA event. Through multivariate logistic regression analysis, we evidenced hypokalemia (OR = 1.247, CI 1.214 – 1.278, P<0.001); CAD (OR 1.886, CI 1.469 – 2.342, P<0.001); LVH (OR 1.861, CI 1.392 – 1.953, P<0.001); ventricular tachycardia (OR = 1.253, CI 1.012 – 1.386, P<0.001); and ventricular fibrillation/flutter (OR = 0.547, CI 0.518 – 0.773, P<0.001) significantly and independently associated with SCD in ESRD patients on haemodialysis.
Conclusion: In conclusion, the prevalence of SCD among ESRD patients on haemodialysis with SCA episode is very high. CAD and ventricular tachyarrhythmias were statistically significant among ESRD patients on haemodialysis with SCA in comparison with non-SCA and were independently associated with the prevalence of in-patient SCD among ESRD patients with SCA on haemodialysis.
Keywords: End Stage Renal Disease; Haemodialysis; Sudden Cardiac Arrest; Sudden Cardiac Death

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Assessment of Quality of Life in Saudi Hemodialysis patients and Associated Factors

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Objective
Assessing quality of life among our hemodialysis patients and the associated factors
Method
The quality of life was assessed using an Arabic version of KdQol 36. The KDQOL-36 subscales Physical Component Summary (PCS) and Mental Component Summary (MCS) Burden of Kidney Disease and Effects of Kidney Disease] were calculated. Scores of the different subscales were calculated according to the KDQOL-36 scoring p system. The effect of f Sex, diabetic status, DM, marital and status employment status, exercise, dialysis shift, vascular access type, Kt/V and dialysis vintage on these subscales were evaluated Reliability was determined by calculating Cronbach's alpha.
Results
Two hundred and fifty five patients were enrolled. The mean age was 58.2 (18.2) years; 61% were male, 56.7% diabetic and 11.4%were employed
The Cronbach's alpha for internal consistency in our study was 0.9. The Mean domain scores on the physical component summary (PCS), mental component summary (MCS), burden of kidney disease and effects of kidney disease subscales were 49.4, 38.7, 52.6, and 37.2 respectively.
Afternoon shift patients score highest among all shifts in Mental component score (MCS) and Physical component score (PCS) (p=0.0001). The MCS score (38.7± 28.7) was significantly lower than PCS (49.4 ± 16.5) (p=0.0001). The "effect of kidney disease" subscale was higher in males (p=0.02), among the employed patients (p=0.02), in the afternoon dialysis shift (0.0001)
For Physical component score (PCS) higher scores were seen in males (p=0.0001), in non-diabetics (compared to diabetics) (p=0,006), in the employed patients (p=0.02) and was higher in those exercised more but this did not reach significance level (p=0.07). Marital status, vascular access type or whether the patient was using HD or G=HDF did not make a difference to the QoL
We found positive correlation between mental health (MH) and social functioning (SF) [correlation coefficient 0.70 , p=0.0001] and between mental health (MH) and general health (GH) [correlation coefficient 0.75 , p=0.0001](fig 1)

Conclusion
The highest score was seen in the "burden of kidney disease" subscale and the lowest in the "effects of kidney disease" subscale). Higher scores were seen in males, in non-diabetics, in the employed patients.

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Non-Adherence to Hemodialysis among Patients- Causes and Consequences

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Non-Adherence to Hemodialysis among Patients- Causes and Consequences

Objective
Dialysis non-adherence among Saudi hemodialysis (HD) patients has not been studied previously. We study its prevalence, causes and consequences of non-adherence.
Methods & Materials
All chronic HD patients in our center were studied. Their demographics as well as Hb, Kt/v, K, and phosphate, dialysis type, dialysis vintage, duration and shift were recorded. Non-adherence, defined as missed dialysis session or patient –derived shortening of the dialysis session by > 10 minutes over a month's period were recorded/ We analyzed the relationship of on-adherence to hospitalizations, interdialytic weight gain , intradialytic symptoms., home to hospital distance and smoking habits
Results
265 patients were included; mean age was 61.8± 18.2 years, 47.3% were male, dialysis vintage was 3.8± 3.3 years, and 65.9% were on HD and 34.1 % on hemodiafiltraion (HDF)
During the study period, the non-adherence rate was 25% for missed dialysis session and 72% for shortened dialysis for at least on one occasion.
No adherence was more likely to occur in males than females (75% and 66% respectively (p= 0.05), in smokers (57.1 % versus 21.7% (p=0.0003) and in night shifts rather than day shifts (33.6% versus 20.6 % (p=0.042)
Non adherent patients had lower Kt/V than adherent patients (1.22± 0.2 and 1.31± 0.2 respectively (p=0.01), higher mean intradialytic weight gain weight gain (2.7 ±1.0 and 2.4± 1.0 Kgs respectively (p=0.02) and are more likely to be hospitalized (50% versus 32% (p= 0.01)
On the other hand, no difference between non adherent and adherent were observed in serum P, K or hemoglobin levels or intradialytic symptoms, education, employment, in the distance between the dialysis unit and home, type of dialysis, Charlson comorbidity index or the dialysis vintage.
Table 1 comparing the adherent group to the non adherent group
Conclusion
Non adherence in our group was comparable to other reports and is more likely to occur in male patients, smokers and in night shifts. It is associated with lower dialysis adequacy, higher mean intradialytic weight gain weight and higher hospitalization rate.

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Nutritional Implications of Low Calorie Diets in Obese Patients with Chronic Kidney Disease: An Observational Study.

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Introduction It is recognised that the population with established renal failure has shown a demographic shift from predominant under-nutrition to overnutrition(1). Scottish estimates suggest that the prevalence of obesity in the chronic kidney disease (CKD) population (27%(2)) is consistent with that of the general population(3). Renal transplantation offers both a survival and cost benefit over dialysis(4) for many patients with end stage renal failure (ESRF), however, obese patients may present technical difficulties to renal transplantation and are at an increased risk of peri-operative complications. For these reasons, weight loss strategies in obese patients with CKD have attracted attention in recent years. The recent Diabetes Remission Clinical Trial(5) showed promise for the use of low calorie diets (LCDs) as a sustainable weight loss intervention in individuals with type 2 diabetes. Existing literature is limited as to whether there is a place for LCDs as a weight management strategy in patients with advanced CKD due to potential renal-specific dietary needs. This observational study aimed to examine the content of a variety of commercially available LCDs in comparison to renal-specific dietary recommendations to elucidate their suitability as an option for weight loss in renal patients.

Methods Eight commercial brands of LCDs were identified (Cambridge Weight Plan, Exante, Lighter Life, Shake that weight, Slim & Save, Slimfast, Counterweight and Optifast). Oral nutritional support (ONS) products from Abbott Nutrition® were also included as a comparison (Ensure Compact, Ensure crème, Ensure plus Yogurt style, Ensure Savoury and Ensure plus milkshake). Inclusion criteria for products into the study was the suitability for their use as total diet replacements using ≥3 homogeneous products to reach a total of 800-900kcal per day. LCDs were grouped by brand and according to product-type (meal-based, shake-based or ONS-based); and analysed for protein, sodium, potassium, phosphate and fluid content (as described by the manufacturer). This data was compared with renal-specific dietary recommendations for each of the nutrients.

Results Nutrient content varied greatly between all types and brands of LCDs. Comparisons between LCDs and renal dietary recommendations are represented in figures 1-5.

Conclusion This study demonstrates the large variations in nutrient content between different types of LCDs. No total dietary replacement product-type or brand studied here have been found to meet all dietary renal recommendations for protein, sodium, potassium and phosphate. Making an individual selection with regards to a suitable LCD for weight loss in patients with CKD emphasizes not only the challenges in managing fluid and dietary restrictions but also in ensuring nutritional adequacy in a demographic of individuals where requirements can fluctuate regularly with clinical and disease state. Whilst no specific conclusion can be drawn from this study with regards to attaining a single LCD for use in the renal population, these findings may aid the selection of the LCD product-type according to individual patient dietary and fluid needs. Indeed, more interventional studies and pragmatic trials assessing efficacy of LCDs on weight change are required to elucidate their potential use as safe, sustainable weight loss interventions in obese patients with advanced CKD.

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Diagnostic and research outcomes from a medical kidney stone clinic

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Introduction
In a large teaching hospital kidney service, 1027 patients were seen by the urology stone clinic from October 2018 to September 2019 (589 new, 438 follow up). Kidney stones are a chronic illness with a high recurrence rate (35-50% in 5 years and 75% in 20 years) hence diagnosis and treatment to reduce kidney stone formation is worthwhile [1].
We analysed the outcomes of referrals to our medical stone clinic. The aim was to evaluate diagnostic rate, stone formation rate and recruitment into clinical trials.

Methods
We retrospectively analysed all adult patients who attended our dedicated medical kidney stone clinic at a large teaching hospital from October 2018 to September 2019 (total number of patients: 136).

Results
- Referrals came from 12 locations (hospitals/primary care). Main source of referral was urology (63%); other referrals were from nephrologists (12%) and paediatrics (8%). Our own hospital's urology department had a referral rate for metabolic evaluation of 4% (36/1027).
- Of all patients, 34% had a family history of kidney stones, 23% were overweight or obese, 14% were smokers, 14% were diabetic (type 2), 12% had recurrent UTIs and 4% had malabsorption secondary to inflammatory bowel disease or bowel surgery.
- Of all patients, 29% (40/136) already had a diagnosis previously confirmed on genetics or biochemistry. Of these, 40% (16/40) had cystinuria.
- A new defined diagnosis, confirmed on genetics or biochemistry, was made in 13% (18/136) of patients.
- In the follow up group, 39% (41/105) of patients had at least one further episode of stone disease during this time period. This subgroup of stone formers had an average rate of 0.42 stones per patient per year (calculated from first recorded clinic visit to their last visit during the audited period).
- DEXA bone densitometry was obtained in 41% (43/105) of patients. In this group, results were normal in 42% (18/43), osteopenia in 44% (19/43) and osteoporosis in 14% (6/43).
- 23% of all clinic patients were recruited into or already in RaDaR (National Registry of Rare Kidney Diseases), 19% of patients were recruited into or already in the 100,000 Genome Project, and a smaller number were recruited into interventional trials.

Discussion
We made a new actionable diagnosis in 13% of this population of recurrent or rare stone formers, yet only 4% of the hospital's urology patients were referred for metabolic evaluation. This confirms the usefulness of this clinic and justifies the establishment of referral pathways, perhaps based on recent NICE guidance.
Bone disease is a major, but often undiagnosed, feature of patients with renal stone disease. This is in keeping with previous findings and is often overlooked in renal clinics.
Our clinic is a resource for patients and for recruitment into clinical trials. Nearly a quarter of patients participated in research in some way.

Reference

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Kidney transplant outcomes for children and young adults in the UK

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Background:
Multiple studies report young adulthood is associated with kidney transplant loss. However, there are few published UK graft survival data for children and young adults. To our knowledge, no studies assess initial transplant function or examine declining function.
We aimed to report graft survival for UK children and young adults and to explore the importance of donor and recipient variables on graft loss and rate of decline.
Methods:
Retrospective cohort study using UK Renal Registry and NHS Blood and Transplant data, including patients aged <30 years who underwent kidney transplantation between 1998-2016. Multivariable analyses used Cox proportional hazards to investigate variables associated with death-censored graft failure in a conditional risk-set model for multiple failure data. Age-group was time-varying. We used Efron's method for ties, stratification by graft number and clustering at participant level.
We calculated estimated glomerular filtration rate (eGFR) using the Schwartz formula if aged <18 years and the 4-variable Modification of Diet in Renal Disease formula otherwise. For participants with ≥4 values outside the first 6 months, individual regressions of eGFR against time were performed. We undertook multivariable linear regression to establish associations with eGFR slope gradients.
Results:
We studied 5121 individuals. Of these, 371 received a further transplant during the study period. There were 1371 graft failures and 145 deaths with a functioning graft over a 39541-year risk period. The cohort was 61% male and 80% white. Most (36%) had structural kidney problems, followed by glomerulonephritides (29%). Live donation occurred in 48%, donation after brainstem death in 46% and after circulatory death in 6%. Mean initial eGFR was 62 mls/min/1.73m².
Median graft survival was 7 years. One-year survival was 94.4% (95% confidence interval (CI) 93.7, 95.0), 5-year survival 84.0% (95% CI 82.9, 85.0), 10-year survival 71.1% (95% CI 69.6, 72.5), 15-year survival 60.2% (95% CI 58.1, 62.3) and 20-year survival 51.2% (47.6, 54.7). Survival at 15 years was 54.4% (95% CI 49.9, 58.7) in those transplanted aged 15-19 years compared to 71.7% (95% CI 63.4, 78.5) in those transplanted aged 0-4 years.
Figure 1 displays hazard ratios for graft loss. Protective associations were male gender (p=0.04), living donation (p=0.02) and higher initial eGFR (p<0.0001). Risk associations included adverse human leucocyte mismatches (p=0.001), black ethnicity (p=0.001), young adulthood and glomerulonephritides. Risk associations for faster eGFR decline included female gender (p<0.0001), age group 15-19 years (p=0.04), higher initial eGFR (p<0.0001), additional graft (p=0.003) and transplants during 2011-2014 (p=0.03).
Conclusion:
This study reports long-term graft survival for UK children and young adults and evaluates associations with declining transplant function. It contributes 20 years of follow-up and considers initial graft function in addition to established co-variates. Graft survival was ≈60% at 15 years. The study highlights the changing survival by age group over time. Those aged <5 years at transplant had the highest long-term graft survival relative to other age-groups. Initial transplant function is strongly associated with graft performance. Young adulthood is a high-risk period for UK patients and interventions are needed to improve outcomes during transition and young adulthood.

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Evaluation of the clinical impact of routine screening for asymptomatic bacteriuria amongst kidney transplant recipients in the immediate post-operative period

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Background:
In the United Kingdom there are no national guidelines regarding the routine screening for bacteriuria in renal transplant recipients. Furthermore, there is a lack of evidence to support routine antibiotic treatment for asymptomatic bacteriuria in this patient population. Our local transplant unit guidelines advise that, in the immediate post-operative period, until discharge from hospital, kidney transplant recipients should have thrice weekly urine culture screening for bacteriuria. In view of this, an observational study to evaluate the clinical impact of this screening process was conducted, focusing on: the likelihood of urine culture-positivity; the proportion of patients with bacteriuria with clinical symptoms and signs of infection; and the proportion of patients in whom routine screening for bacteriuria altered clinical management.

Method:
Over a three-month period, between 1st October 2018 and 31st December 2018, urine specimens and clinical data were obtained from all post-operative kidney transplant recipients admitted to a tertiary referral unit for renal transplantation. At the time of urine sampling, the presence of symptoms and signs suggestive of urinary tract infection (UTI) were prospectively noted. At the end of the study period, patients' records were reviewed to collect relevant data on their clinical management.

Results:
Twenty-seven patients were transplanted during the study period and 139 urine samples were cultured. Of these samples, 120 (86.7%) were culture-negative and 128 (92%) were collected from patients without clinical symptoms or signs suggestive of UTI. Ten of the 27 patients accounted for the 19 culture-positive urine samples. Two of these patients were symptomatic and treated according to their urine culture results. Conversely, only 2 out of 8 asymptomatic patients were treated. No infection-related adverse events or emergency re-admissions occurred in the remaining 6 patients with asymptomatic bacteriuria who did not receive antibiotic therapy. Of the 27 patients studied, routine urine culture altered clinical management in 2 (7.4%), with both asymptomatic patients receiving a course of oral antibiotics.

Discussion:
The majority of routine screening for bacteriuria in post-operative renal transplant recipients does not yield positive culture results. Over half the episodes of bacteriuria were asymptomatic. Individual clinical practice varies when managing asymptomatic bacteriuria, with the majority of patients not treated with antibiotics, which reflects a lack of evidence in support of treating asymptomatic bacteriuria. Of the four patients who received antibiotics for bacteriuria, two had clinical signs of UTI and urine culture was organised by the attending physician due to clinical concern. The prescription of antibiotics for two patients with asymptomatic bacteriuria was in the context of a complicated post-operative period.
In conclusion, routine screening for bacteriuria rarely alters clinical management of kidney transplant recipients in the immediate post-operative period. Local guidelines have been changed to reflect this finding, with routine urine culture no longer recommended. Instead, screening for asymptomatic bacteriuria

should only be undertaken in those patients who are deemed to be at considerably higher risk for urinary tract infection. Further evaluation of clinical outcomes of asymptomatic bacteriuria in the outpatient renal transplant population is currently underway.

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How does a transplant pharmacist support successful kidney transplantation in a patient with HIV and Hepatitis B co-infection and no speech, sight or hearing?

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Introduction
Kidney transplantation is considered the gold standard form of renal replacement therapy in end stage kidney disease (ESKD). Compared to dialysis, it provides better quality of life, morbidity and mortality benefits and it is more cost-effective. Outcome data of kidney transplantation in HIV positive patients suggest both, allograft and patient survival, and infection risk are comparable to non-HIV infected kidney transplant recipients (KTRs). As a result, kidney transplantation is the standard of care for appropriate candidates in this patient group.

Case report
This is a case of a 63 year old male with no speech, sight or hearing, with HIV-Hepatitis B co-infection and ESKD, receiving haemodialysis since 2014. He lived alone, self-caring and managing his medication independently. He communicates via touch sign language with two designated communicators, who provided support for a few hours per week.
After comprehensive evaluation, the patient was deemed to be a suitable KTR. Given significant drug-drug interactions (DDIs) between post-transplant immunosuppression (IS) and his antiretrovirals (ARVs): tenofovir, ritonavir, entecavir, etravirine, raltegravir and darunavir, he required an individualised plan to ensure his IS therapy after transplantation was safe and effective.
The transplant pharmacist carried out an IS trial (protocol design, IS prescribing, monitoring and patient follow up) in an outpatient setting over 4 weeks and in close collaboration with his communicators. This trial provided an optimal tacrolimus dose to reach therapeutic levels as well as being a feasibility exercise to determine medication adherence and ability to communicate and follow dose adjustments, reporting and management of adverse effects and practical arrangements for tacrolimus levels and other relevant monitoring. After successful completion of the IS trial, a patient-specific IS plan was designed by the transplant pharmacist and endorsed by the transplant multi-professional team (MPT), which completed the transplant work-up assessment.
The patient was subsequently activated on the deceased donor transplant list and received a kidney transplant in October 2018. Induction IS included basiliximab and methylprednisolone. Maintenance IS was mycophenolate, tacrolimus (Adoport® 1 mg stat followed by Modigraf® 0.2 mg every 72 hours) and prednisolone. He made a good recovery post-operatively, received intense education to self-administer his medicines and was discharged home on day 14.
He experienced delayed graft function and creatinine continued to improve, settling to a baseline 145 mmol/L, eGFR 45 mL/min. After 14 months, the patient is well with stable graft function (Figure 1), therapeutic tacrolimus levels, undetectable viral loads, maintained CD4 count, no episodes of rejection or opportunistic infections. The patient developed post-transplant diabetes mellitus managed with oral hypoglycaemic agents.
The transplant pharmacist was heavily involved during the immediate post-transplant period (in-patient) and pharmacist follow up continues in outpatient clinics.

Conclusion

Kidney transplantation in complex patients with significant communication challenges is possible through collaborative working between multiple members of the MPT across specialities and health sectors, incredibly dedicated communicators, and the patient's desire and determination to live independently and self-manage.

The transplant pharmacist's role is crucial, demonstrating direct impact on health outcomes by facilitating access to transplantation and contributing to on-going patient management post-transplant.

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Exercise for people living with frailty and receiving haemodialysis: a mixed-methods randomised controlled feasibility study.

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Introduction.
Frailty is highly prevalent haemodialysis (HD) patients, leading to poor outcomes. Intradialytic cycling (IDC) is the predominant form of rehabilitation offered, but may not be suited to those who are frail. This study aimed to determine whether a randomised controlled trial (RCT) of IDC is feasible for frail HD patients and explore how the intervention may be tailored to their needs.

Methods.
Design: Mixed-methods feasibility RCT. Participants: Adult HD patients with a Clinical Frailty Scale Score of 4-7 (vulnerable to severely frail). Interventions: Six-months, thrice-weekly, progressive, moderately intense IDC or usual care. Outcomes: Primary feasibility outcomes were: eligibility of >50%; recruitment of >50%; loss to follow-up of <20%; outcome acceptability of >80% and exercise adherence of >70%. Acceptability of trial procedures and the intervention were explored via semi-structured interviews with n=25 frail HD patients who both participated in (n=13,52%), and declined (n=12,48%), the trial. Secondary outcomes included incidence of falls and measures of exercise capacity, physical functioning, physical activity and patient-reported outcomes (PROMS).

Results.
124 (31%) people were eligible, 64 (52%) consented and 51 (80%) completed a baseline assessment. N=39 (76.5%) male, 65 years (IQR 56-70). 23 (45%) were vulnerable, 12 (23.5%) mildly, 13 (25.5%) moderately and 3 (6%) severely frail). 24 (47%) received IDC and 27 (53%) usual care. Overall n=6 (12%) were lost to follow-up. The exercise group completed 74% of sessions. Up to 70% of secondary outcome data was missing.

Exploratory analysis found the crude falls incident rate ratio (IRR) was 1.95 (95%CI 0.63 to 7.18), suggestive of an almost two-fold increased incidence of falls within the usual care group. Exercise capacity was maintained in the exercise group, but deteriorated in the usual care group, resulting in an overall difference in ISWT distance of 36m (95%CI -12 to 84) and EWST time of 181 seconds (95%CI -92 to 453). The time taken to complete the STS5 increased in the usual care group, but was maintained in the exercise group, resulting in an overall difference of 5 seconds (95%CI -4 to 15). Other functional tests and PROMS were unchanged. Steps increased in the exercise group vs usual care group (859 steps/day, 95%CI -825 to 2543 on HD days and 888 steps/day, 95%CI -84 to 1861 on non-HD days). N=13 (25%) experienced a serious adverse event unrelated to the study.

Interview participants outlined several ways to encourage trial participation and retention. Maintaining ability to undertake activities of daily living and social participation were outcomes of primary importance. The primary barrier to exercise was the perception that it was unsuitable or unsafe. Participants desired a more varied exercise programme which included preparation, choice, and offered companionship and individualised progression.

Discussion.
With changes to trial design and processes a definitive RCT is feasible. Wide-scale adaptation to the intervention incorporating education, behaviour change, and a multi-component exercise programme (strength, balance, task-training, backward chaining and increased habitual activity) supported by a decision-tool to adapt exercise during periods of ill-health and fluctuating symptoms may be more efficacious than IDC in this population.

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The impact and sustainability of a holiday dialysis facility.

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Introduction

Everyone should be able to live well with kidney disease. The benefits of holidays and respite breaks are well recognised however the logistics are an ongoing challenge for our patients. In addition there is uncertainty about the impact of Brexit on reciprocal healthcare arrangements.

As this dialysis unit approaches its 50th anniversary in 2020 we have reflected on the impact and sustainability of a dialysis facility specifically for holiday dialysis.

Purpose

This unit's first dialysis caravan was in use in the 1980s. It was based on the South Coast and had 1 dialysis machine. This was at a time when home HD was less popular and only represented a small patient population. This caravan allowed patients, unit or home, to go on holiday supported by staff to use this facility. This facility became unsustainable and was no longer in use in the early 1990's.

More than a decade ago a new caravan was designed and commissioned supported by fund raising.

Design

The caravan was purpose built to fit two dialysis stations and was able to be easily transported to any site. The caravan has all the necessary dialysis equipment, Freeview TV, a toaster and tea and coffee making facilities.

Finding a site for the caravan proved tricky at first due to concerns from site owners about what the caravan would be used for and how it may affect business.

We found a site in North Wales in 2008.The caravan was available at any time during the season for our now large population of home haemodialysis patients to "drop in" and twice a year it is staffed to enable in-centre patients to have a holiday.

When in use we alert the closest Renal Units in case of emergency.

It proved extremely popular and in 2010 a second van was designed and positioned on a site in North Devon.

Findings

The caravan was first used by one of our home HD patients in 2008. Since 2008 over 200 patients have utilised the dialysis facility for holidays.

The caravans use by home patients has fallen with the development of new machine technology which has meant travel is an easier option. Unit patients continue to use it and
we now try and staff this for 3 weeks of the year. In addition it has become popular again with home patients and their carers increasingly using it as respite.

Patients have fed back that the caravan has provided more freedom and flexibility for going on holiday and that dialysing in the caravan has increased their confidence.

The in centre patients “feel safe” as they have staff they know looking after them.
They say advantages include not having to worry about where to find the nearest hospital, car parking and booking months in advance somewhere near to where they may be staying on holiday.

Conclusion

This is an example of how for over a decade a team has supported patients to live well with kidney disease.

Uncertainty about the impact of Brexit on travel for our patients could mean this sustainable solution is one that could be extended across the UK.

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Exercise during dialysis as part of routine care

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Introduction
The benefits of exercise during dialysis to support patients to live well with kidney disease are increasingly recognised, however it is not yet integrated into routine care.
In 2018 this unit participated in the successful PEDAL study looking at the effects of exercising on dialysis. On completion it became evident that several patients were extremely keen to continue with an exercise programme on dialysis to maintain the positive benefits on their mobility and strength. However it was a year before the programme was re-established.
Purpose
Following discussion with the consultant team 6 dialysis technicians were trained by the in house educator to support those patients who felt strongly that they wished to continue to exercise on dialysis.
Training included;

- Programming of the MONARK cycle ergometer
- Safety
- Contraindications to exercise training
- Pre-exercise assessment and instructions
- Monitoring during exercise
- Post exercise checks

Design
At the start patients were asked to identify their goals which helped the team to better understand what individuals wanted to achieve.
Each patient self-assessed their frailty using the Rockwood Clinical Frailty Score before and after an 8 week exercise programme and commented on their strength and mobility.
Patients exercised 3 times/week during haemodialysis. After at least 30 minutes of haemodialysis had elapsed.
Patients were supervised during their exercise session with routine monitoring including blood glucose monitoring for our diabetic patients.
Findings
8 patients continued with exercise on dialysis; 4 male and 4 female. 5 patients were diabetic. Age ranged from 50 – 93 years and the average age was 72 years. Their average time on haemodialysis was 5 and a half years ranging from 2 – 13 years.
Distance covered ranged from 2 – 15km each dialysis session taking 5 – 30 minutes.
Patients reported improved muscle strength and walking distance. In addition frailty scores improved with the majority improving by 1 level and 1 patient reporting an improvement from 5 (mildly frail) to 3 (managing well)
“I can now walk around the hospital without having to stop and sit down. When out shopping I can shop for longer without getting too tired. It seems to have had a beneficial effect on my lungs and breathing” Feedback from a patient.

Conclusion
This on-going programme clearly demonstrates the benefits of supporting an increasing number of patients to exercise on dialysis as part of routine care. It highlighted to the team the possibility of supporting more

patients from our units to benefit from this easily implemented and very much wanted exercise programme.
The translation of exercise during dialysis from research to routine care is very relevant to all the renal community.

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A project to bring complementary therapies to those on dialysis

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Introduction
Evidence alongside clinical experience demonstrates that those receiving haemodialysis suffer from a poor quality of life and a high symptom burden not dissimilar to those with cancer. Complementary therapies are routinely accessible to cancer patients and are known to help increase a sense of well-being, improve symptoms and quality of life. Despite this kidney patients are not often the beneficiaries of such treatments. A pilot project was undertaken together with the cancer centre complementary therapies team supported by the kidney patients association to bring reflexology to some of those on dialysis.
Method
30 patients from an in hospital haemodialysis unit were identified by the renal supportive care team and offered 30 minute reflexology treatments weekly, over the course of 4 weeks. Patients with high acuity, troublesome symptoms, the elderly, frail, new starters and those having difficulty coming to terms with dialysis were engaged. Complementary therapists from the cancer centre administered the treatments. Symptoms were assessed by the renal supportive care specialist nurses' pre therapy to establish a base line symptom status and re assessed post treatment course using the POS-S Renal score.
Results
Of the 30 participants 14 were male and 16 female, the mean age was 61 years. 6 patients were unable to complete the post symptom score due to having transferred out, been admitted or died. Of the 24 that did 18 (75%) reported an overall improvement in their symptom score. 2 (8%) reported no change in the number or severity of their symptoms and 4 (17%) reported an increase in symptoms. The most prevalent symptoms were pain and anxiety/depression with 79 % experiencing pain and 75% suffering with anxiety/depression. Post symptom assessment scores showed that 9 (47%) reported an improvement in their pain and 44% reported an improvement of their symptoms of anxiety/depression. Feedback included patient's comments;
"Hand and legs not as achy"
"Enjoyed massage, cramps improved, helped relax".
"Very relaxing I am sleeping a bit better and for longer".
"Helped with pain in my leg, arm and shoulder helped me to relax more than ever wish it could continue".
"So amazing, so looked forward to it so relaxing and felt energised".
"Enjoyed, relaxing".
"It helped me to continue coming three times a week to dialysis"

Discussion
The project was well received by all those who participated. As well as a positive effect on symptom burden, feedback demonstrated that patients had really enjoyed the therapy. It helped with their sense of well-being, they reported they had benefitted from the contact that they had with the therapists and renal supportive care team. The project was funded for the therapist's time but we did not take account of the time involved for the renal supportive care specialist nurses in recruiting patients, symptom assessments or the further follow up needed to address the symptoms and other significant issues that were identified as part of the project which were considerable.

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Reality of ANCA associated vasculitis (AAV) remission and relapse, prolonged use of glucorticosteroids and burden of disease – a real world study in the UK

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Background: AAV is a relapsing remitting long term condition and patients are at risk of organ damage from both active AAV and therapy in particular glucocorticoids (GC). The remission maintenance phase of AAV is critical for good long term outcomes and therapeutic aims are to control AAV activity, prevent relapse and reduce cumulative organ damage. This retrospective study aimed to examine the definition of maintenance, therapy used and clinical outcomes in AAV patients managed in routine clinical practice.
Methods: 300 AAV patients managed by 100 UK physicians (40% Rheumatologists) who completed induction therapy for organ or life threatening AAV and then initiated maintenance therapy between 2014-16 were studied. Data were collected retrospectively from the time maintenance was determined to begin by the physician and then at 6, 12, 18 and 36 months following that time.
Results: 56% had granulomatosis with polyangiitis; mean age 55.4 years with 54% male. 61% had incident AAV and 39% were studied from time of a relapse. 79% received cyclophosphamide and 23% received rituximab GC, 68% received GCs (78% of these patients received IV then oral GC). 30% of patients received plasma exchange Physicians defined time of maintenance from remission induction treatment start with mean of 4.5 months on basis of fixed time point 47%, starting new drug for maintenance 27%, reaching full remission 16% and no specific criteria 9%. At this time 45% were in full remission vs 49% in partial and 6% refractory. Various maintenance regimes were used, 11% received rituximab (84% 6 monthly and 16% 12 monthly) at varying planned doses 61% 1g, 19% 500 mg and 16% 375 mg/m2, 4% not recorded. Remission rates varied with many patients having ongoing vasculitis activity. Treatment adverse events (AE) and infections were frequent with prolonged GC use over 36 months being common. There was a modest rise in eGFR over the initial maintenance phase but some patients had worsening eGFR or rising blood pressure. At the most recent clinical review patients had been followed for a mean of 49.2 months – 6% had died, 30% had relapsed at least once, and 10% required chronic renal replacement therapy. 62% had no vasculitis activity and were ANCA negative but 14% were still experiencing active disease. 35% were still receiving GCs - 19% of them receiving > 5mg/ day.
Conclusions – Maintenance therapy is variably defined but at approximately 4-5 months from start of remission induction therapy. Achieving full remissions and preventing relapse are still clinical problems and many patients receive ongoing long term GC therapy. Infectious complications and treatment adverse events are a problem with current therapy and there is a significant burden from renal disease.

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Glucocorticoid exposure and its link to serious adverse events in patients with ANCA-associated vasculitis in the UK

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Background: ANCA-associated vasculitis (AAV) is a severe systemic small vessel vasculitis and remission induction is with high dose glucocorticoids (GC) and immunosuppressants. Patients can be exposed to high GC dose and/or prolonged low dose. EULAR/EDTA guidelines consider a target of 7.5-10mg at 3 months but acknowledge this is often only achieved at 5 months. This study used UK real world practice data to examine the scale of GC exposure and associated clinical risks in AAV patients.
Methods: The study utilized the Clinical Practice Research Datalink (CPRD) - Hospital Episode Statistics (HES) linked database. AAV patients were identified using specific READ and ICD codes and followed between 01/01/1997 and 01/01/2018. GP prescriptions were used to describe periods of continuous GC use, stop and restart and when high dose (> 30mg/day) and low dose (<30mg/day) was prescribed. Diagnostic codes indicative of infections and adverse events linked to GCs were used to estimate the rates in the AAV population using a generalized linear model with a Poisson distribution.
Results: 450 AAV patients with at least one GC prescription were identified and analysed. Details of the GC prescriptions over time are given in the table. The median dose decreased to 9.3 mg (IQR 5.0 – 17.0) at 6 months and 5.1 mg (0.00 – 10.0) at 12 months and 50% patients were taking > 10mg at 5 months and 25% were still > 10mg at 12 months. As AAV activity data are not available, 10mg dose was used as a proxy for AAV remission - 50% are at < 10mg at 2 months and 95% within 12 months. However, within 6 months of achieving 10mg/day, 50% relapse to needing dose >10mg, 75% within 2 years and 90% within 6 years. In adjusted Poisson model (age, gender and year of diagnosis before or after 2013) the rate of infection in AAV patients currently taking high dose was 2.59 times (CI95 1.95, 3.45) that of those on low dose and lower in those not currently taking GCs (IRR 0.27 (0.22-0.34)). Increased risk of new onset cardiovascular disease (IRR 2.55 (0.92, 7.04)) and new onset renal disease (IRR 3.4 (1.29-8.96)) were also higher in patients receiving high dose.
Conclusions – AAV patients have significant exposure to high dose GCs and in real world practice, GC dose remains higher than recommended in current clinical guidelines. High dose GCs are associated with high risk of infection as well as new cardiovascular disease and renal disease. This creates a significant patient burden as well as implications for healthcare resource use.

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Cannabidiol & calcineurin inhibitors- A not so benign interaction

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Cannabidiol (CBD) oil is increasingly available as an herbal or over-the-counter supplement with widespread use. Like many non-regulated supplements many patients and healthcare professionals may perceive it to be a benign adjunct to pain control.

A patient with established renal failure due to focal segmental glomerulosclerosis underwent a renal transplant in the 1990s .He attended his routine transplant clinic appointment complaining of chronic joint pain arising from his gouty tophi along with a tremor and difficulty sleeping. Further discussion revealed that in addition to his regular medications, which included tacrolimus, mycophenolate mofetil and prednisolone, he had recently started taking CBD oil. He was unaware of the exact dose and had not sought medical advice before commencing CBD oil but felt that it had vastly improved his quality of life with amelioration of his tremor, pain and poor sleep.

Routine blood tests performed at the time of clinic demonstrated an acute kidney injury with his creatinine rising to 242 µmol/L from a baseline of 190, there was a concomitant rise in his tacrolimus levels (13.8 µg/L). Tacrolimus levels and renal function returned to a prior baseline with cessation of CBD oil.

Cannabidiol (CBD) oil is available widely in the UK including in health food shops; it is different from medical cannabis. Studies have shown that CBD inhibits cytochrome P450 3A4 (CYP3A4), the same system that metabolizes tacrolimus.1 Therefore, theoretically, use of cannabidiol alongside a CYP3A4 substrate like tacrolimus, will increase blood levels of tacrolimus and may increase the risk of adverse effects. The interaction between CBD oil and calcineurin inhibitors is not predictable as the concentration of CBD oil varies widely.

The use of herbal supplements is not recommended in transplant recipients due to the lack of data on their safety, efficacy and inter-batch variability. Supplements may be either directly nephrotoxic or interfere with the metabolism of immunosuppressants. There is minimal formal pharmacokinetic data on interactions between calcineurin inhibitors and CBD oil but patients using tacrolimus, ciclosporin or sirolimus should be advised against using CBD oil.

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The role of a Dialysis Assistant Practitioner and their impact on a shared care and home haemodialysis service within a regional renal unit utilising a Kidney Care UK Grant

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In 2018 we submitted an application to Kidney Care UK and were successful in gaining a grant giving us the opportunity to fund a three year secondment to aid expansion of our home dialysis programme.
In July 2019 we appointed an experienced Dialysis Assistant Practitioner (DAP), to work alongside the home haemodialysis Nurse Specialist (NS). The DAP assists in the management and training of patients and carers who are wishing to embark on our home haemodialysis programme. The DAP also supports our renal unit in increasing the patient population choosing self-care. It is important we recognise the impact of the DAP role and where it sits in the provision of health care.
We have always offered choice to our patients, but previously we had only one NS leading the home haemodialysis programme. It was a challenge to ensure all elements of the patient pathway were delivered in a timely manner. The addition of the DAP ensures the NS can focus on home assessment, reassessment and education, all of which have a positive impact on patient experience and reduce hospital attendance. The DAP can focus on raising the profile of home haemodialysis and shared care, recruitment of patients, basic assessment against criteria and the commencement of training. The DAP has utilised all forms of communication , including coffee mornings, patient information sheets, notice boards, focus of the month boards and social media particularly Twitter
Gaining a further member of staff to support the home haemodialysis and shared care initiative offers flexibility and more options on how we deliver renal services. The benefits of home haemodialysis are well documented. Patients require fewer visits to hospital; there are improved patient experience and outcomes (NICE 2011). Home haemodialysis offers flexibility to our patients, allowing them to fit therapies around their lifestyle or work. Patients have the option to increase frequency of sessions and, where appropriate, increase duration; the impact of this is better cardiovascular health, improved haemoglobin, better BP control, decreased medication burden and improved nutritional status (BMC Nephrology 2013).
The introduction of the DAP has facilitated home training, thus further reducing patient travel time, parking issues and time spent waiting around. For budget holders, there is clear potential to have fewer cost variables and create capacity in our main renal unit which can help accommodate a growing haemodialysis population.
Kidney Research UK (2018) found self-care improves quality of life and outlook of haemodialysis patients by supporting them to become independent in managing their own treatment. Patient confidence is improved; they have better psychological and physical outcomes. Patients report more control and understanding of their blood results, condition and medications, therefore improving decision-making. This grant has enabled our unit to focus on our home haemodialysis and shared-care cohort. It has helped raise general awareness about home treatments and their benefits.

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Challenges for the future of Renal Nurse Education in a regional renal centre

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Within the renal nursing team in our organisation we face increasing challenges with staffing, with experienced staff retiring and issues with nurse recruitment and retention. Like other specialist units, we recognise the requirement of a highly skilled, well-trained, highly motivated and fully engaged workforce. The current financial climate can make change management difficult and sometimes seem impossible.

We developed a five year forward-thinking plan; this strategy was developed with both local and national context. This vision will inform how we develop, train, motivate and retain our nursing team whilst delivering safe, high quality, patient-centred care.

We distributed an education questionnaire to all renal nursing staff. Through our discussions, the need for a more structured format of renal nurse training and education became apparent. We recognised a need to support renal nurse development and decided to conduct an educational questionnaire. Questionnaires included 9 multiple choice questions and were distributed to Registered Nurses, Assistant Practitioners and Health Care Assistants across the renal department, with a 50% return.

There were common themes emerging with clinical areas (renal ward and dialysis unit) facing different challenges. The renal unit staff highlighted time as a huge factor, as well as location of the training, as leaving the unit was often difficult. They favoured online rather than simulation (SIM) training. In contrast, the ward team felt a full study day would be better attended rather than several shorter sessions. Staff also fed back that making sessions mandatory would ensure staff attended. It was clear that both areas agreed on what drives development: patient safety, clinical skills and NMC requirement. The feedback highlighted that one model of training doesn't fit all.

The results were presented to the department and a subgroup of senior nurses went on to formulate a training programme. This included SIM training, mandatory renal nurse on-site study days and a 24 month competency-based training programme that would include vascular access, anaemia, transplantation, haemodialysis and peritoneal dialysis competencies.

In addition, we developed a dedicated hub area where clinical skills such as cannulation, aseptic technique and emergency scenarios could be practiced. We felt the key to success was increased staff engagement, so a link nurse from each clinical area was identified to ensure effective communication, attendance and support. It has been crucial to engage ward managers so time could be allocated, in addition to the impact on staff development reviews and NMC revalidation.

We are developing a structured training programme for junior nurses to improve knowledge, retention and recruitment. We hope this will lead to improved training for experienced nurse leaders, who balance leadership roles and clinical commitments. This programme includes specialist training, utilising skills and experience already in the team. The primary ethos is collaborative working, replacing the current practice of doing great work in isolation. We believe this will lead to better renal nurse training and investment in the renal department.

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Top tips for fleet transition with merged satellite unit

utilising a "single fleet" method.

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Trust “A” and Trust “B” merged in 2019. This brought the dialysis provision based at “Satellite” into the management structure at the main site at “Main”. The renal unit at “Satellite” comprises 9 dialysis stations (one isolation), operating 3 shifts 6 days a week.
The existing fleet consisted of 15 Dialysis machines with ages from 3 to 10 years, maintained by 3rd party as part of a service agreement.

Rationale
It was decided that a single machine fleet across both sites would have the following benefits:
1) Efficiencies and better use of the skill mix within technical services could be achieved by having one pool of machines,maintained on one site but shared across both.
2) Having one model allowed a single set of operational protocols with streamlined training and opportunities for cross site staffing.
3) Management of the fleet as a single entity will help streamline monitoring and technical resources.

Single fleet method
“Main” Renal Services would be used as the service “Base”, with purpose made facility and adequate space, equipment and spares. This would avoid the inefficiency of duplication.
By utilising the Renal Storemen and Van to transport equipment between sites, the technicians can be more productive and their skills can be better utilised with the repair and maintenance of the fleet at base and not on traveling. Working machines can be delivered from “Main” and the malfunctioning machines brought back for repair. The repaired machines would be put back into service at “Main unit”,saving transport time and costs. Consequently the “fleet“ would rotate between the sites, with the benefit of evening out running hours and wear.
At “Satellite”, in addition to one machine per bay only a small “float” of machines would be necessary , optimising fleet size and reducing capital outlay. The reduction of “Idle” machines will reduce the disinfection rota with further reductions in space, equipment and resources.

Outcomes
In the first 6 months since transition the following has been achieved:
1) 10 Artis installed
2) 50% of treatments performed on the new machine
3) Nurse training for machine competency achieved by October with ongoing support/training for specialised procedures i.e. on line Kt/V and fistula blood flow monitoring The Technicians have been proactive in supporting training and providing technical knowledge in machine operation.
4) 8 issues with possible machine malfunction have required urgent on site attendance.

The Technical team and renal unit staff at “Satellite” continue to work together and support each other through the transition.

Staff Quotes

There are further developments required; which will be undertaken in due course,

- the development of direct delivery of consumables to the “Satellite”, rather than decanting out of the “Main” store
- control of water treatment, which will enable assurance of water quality
- dialysis machine fleet transition completed by end of January 2020

Tips for success

Reinforce the positives which will help overcome human factors. Keep to your word. Ensure delivery. Back up any assumptions with hard facts. Involve the whole team.
Understand and work through concerns.

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Establishing mortality associated with AKI in a DGH and then trying to do something about it- introduction and audit of the AKI7 care bundle

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Introduction
Acute kidney injury (AKI) is a prevalent and treatable contributor to inpatient mortality. Simple management steps for AKI are frequently omitted or delayed in patient care due to its insidious onset and lack of symptoms. The NCEPOD report in 2009 found that only 50% of patients with AKI received good care. One response to this has been increased use across trusts of the electronic medical record for recognition and monitoring of AKI. Such systems also enable collection of reproducible datasets for audit as well as a platform for prompting the use of best practice guidelines.
We sought to establish mortality trends for patients with AKI and to audit the introduction of an electronic alert system and order set proforma for AKI: the AKI7 care bundle.

Methods
We collated data from all inpatients in West Suffolk Hospital (WSH) flagged as developing AKI by the recording system 'eCare' over a 2-year period and present a mortality analysis for this cohort. Data was collected retrospectively from eCare and statistical analysis conducted in 'R'.

Results
Of 3527 individuals who developed AKI over a 2 year period in WSH; 79% did not progress beyond AKI stage 1, 13% stage 2 and 8% stage 3, the mean age was 74 years and mean length of stay 13 days. Across all stages of AKI, 75% were investigated with urinalysis, 94% received fluid balance monitoring, 5% were investigated with renal tract US and 58% were referred to a nephrologist for specialist input. Mortality analysis for this same cohort revealed an association between survival at 60 days and use of urinalysis p=<0.001, fluid balance monitoring p=<0.001 and investigation with renal tract US p=<0.001. The 1 year mortality associated with AKI increased significantly with severity; 29% for AKI stage 1, 51% for AKI stage 2 and 65% for AKI stage 3 (Figure.1). The all cause 1 year mortality for all stages of AKI combined was 39.1%. Following launch of the AKI7 care bundle we found that use of the document template promoted requests for renal tract US (20% versus 5%), urinalysis (83% versus 75%) and requests for input by renal physicians (75% versus 65%).

Conclusions
The AKI7 care bundle improves clinician awareness of AKI and promotes the use of important steps in AKI management. Since mortality increases with AKI stage, management targeted to ameliorate progression of AKI is vital and can be supported by well designed electronic care bundles. The association of improved survival with fluid balance monitoring and investigations for AKI further supports measures to promote the use of these steps. We intend to encourage use of the AKI7 care bundle during induction for junior doctors coupled with distribution of cards as an aide-memoire.

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Acute interstitial nephritis due to SGLT2 inhibitor empagliflozin; a case report

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SGLT2 inhibitors will likely become more widely used following the results of recent large randomised controlled trials which demonstrated improved cardiovascular outcomes and slower progression of chronic kidney disease (CKD), and therefore physicians should be cognisant of potential side-effects.

We report a patient with type 2 diabetes who presented with acute kidney injury (AKI) due to biopsy proven acute interstitial nephritis (AIN). A convincing timeline pinpointed empagliflozin as the causative agent. To the authors' knowledge this is the first published case of AIN due to an SGLT2 inhibitor

A 63 year old woman presented with a five-week history of gradually increasing lethargy, malaise and poor appetite. She was found to have stage 3 AKI by Acute Kidney Injury Network (AKIN) criteria, with a serum creatinine of 381umol/L (normal range 50-120umol/L), having been 60umol/L three months prior. Empagliflozin had been commenced six weeks before her presentation. On examination she was euvolaemic and hypertensive. Urinalysis showed erythrocytes + and glucose ++++, in keeping with SGLT2 inhibitor use. Urinary protein to creatinine ratio was 168mg/mmol (previously normal). Blood testing including 'renal immunology screen' was negative or normal. Despite supportive measures, her creatinine remained static and she therefore underwent a renal biopsy, which confirmed the diagnosis of florid AIN, superimposed on background diabetic changes (images available). Her creatinine rose to 466umol/L despite drug discontinuation, and she was started on intravenous methylprednisolone 500mg daily for three days, followed by oral prednisolone 60mg daily. Given the time course, a diagnosis of AKI due to empagliflozin-induced AIN was made, and the drug was permanently discontinued. She recovered without the need for dialysis with discontinuation of empagliflozin and corticosteroid treatment, though required insulin for steroid-induced hyperglycaemia.

Any drug has the potential to cause drug-induced acute interstitial nephritis (DI-AIN), and therefore it is vital to remain vigilant for AKI when initiating medications, especially given DI-AIN accounts for up to 20% of unexplained AKI. The novel clinical observation that SGLT2 inhibitors can cause AIN is likely to be seen more frequently as these drugs are increasingly prescribed.

The potential benefits of SGLT2 inhibitors still greatly outweigh the risks of side-effects. However, this case should prompt clinicians to obtain baseline renal function when starting empagliflozin, and though an initial small rise in serum creatinine due to haemodynamic effects should be expected and tolerated, one should contemplate the diagnosis of DI-AIN if a significant or progressive AKI occurs after SGLT2 inhibitor initiation.

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Understanding the clinical course and complications in adults with ADPKD

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INTRODUCTION:
Autosomal dominant polycystic kidney disease (ADPKD) is a multi-system disease characterised by a gradual progressive decline in kidney function; many affected patients will reach ESRF and require transplantation and/or dialysis. The clinical phenotype is heterogenous, with wide variation in renal and extra renal complications, including after ESRF. We sought to describe the frequency of renal and extra renal complications in our ESRF ADPKD cohort to help identify potential opportunities for research and service improvement.

METHODS:
All adult patients with a diagnosis of ADPKD with ESRF were identified from our tertiary centre renal database, Renalware, between 1996 and 2018. Renalware is a comprehensive clinical database with high data validity. Data extracted include cohort demographics and the frequency of complications including recurrent UTI, intracerebral aneurysm, renal cell carcinoma, nephrectomy, hypertension, diabetes & CVD (coronary artery disease, myocardial infarction, valvular disease, cardiomyopathies, aortic dissection and peripheral vascular disease). Descriptive statistics were used to report the frequency of co-morbidities and complications related to ADPKD.

RESULTS:
178 patients were identified as reaching ESRF requiring long-term RRT. During follow-up, 36.5% of patients died; the mean age of ESRF was 54 (34-89) years. The median age of death was 68 years. The most frequent coded cause of death was withdrawal from life-supporting treatment (16.9%).
Cardiovascular comorbidity was common - hypertension (97.2%) and cardiovascular disease (34.3%). Diabetes mellitus was recorded in 16.9%, intracerebral aneurysms were detected in 16.3%.
Records showed 69.1% of ESRF patients were prescribed ACEi or ARBs as part of their cardiovascular risk management.
Recurrent UTI (10.7%) and pyelonephritis (6.2%) were common; renal cell carcinoma was diagnosed in 2.2%.
38/178 patients (21.3%) had undergone nephrectomy. Of these, 20/38 patients had a pre-transplant nephrectomy, 6/38 nephrectomy at the time of kidney transplantation and 9/38 patients had a post-transplant nephrectomy. The timing of nephrectomy in relation to transplantation was not known for 3 patients.
The most common indication for native nephrectomy pre-transplant was mass effect related to enlarged kidneys (35.0%), followed by urine infections including recurrent pyelonephritis (40.0%). The most common reason for peri-transplant nephrectomy was as part of simultaneous liver transplant (50%). The most commonly observed reason for post-nephrectomy was renal cell carcinoma (22.2%), followed by infection (11.1%) and transplant failure (11.1%). In 4 cases the data was not available.

DISCUSSION:
Cardiovascular co-morbidity is common in patients with ESRF and ADPKD as expected. Nephrectomy in our cohort was fairly prevalent - primarily in relation to preparation for transplantation.

We have developed a specialist clinic for patients with ADPKD. In addition, in conjunction with colleagues at the local transplanting centre, we have developed a specialist MDT involving urology, transplant surgeons, nephrology, radiology and pain colleagues to optimise holistic care for complex ADPKD patients.

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Early renal function trajectories, cytomegalovirus serostatus and long-term graft outcomes in kidney transplant recipients: A Bayesian analysis study

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Background and Aims:
Despite significant improvements in short-term kidney transplant survival, long-term graft survival has not improved to the same degree with transplant failure being a top four cause of end-stage renal disease. We previously showed in a prevalent kidney transplant population that most patients do not experience linear renal function trajectories[1]. Many, instead, have periods of stability whilst others experience rapid progression. We also showed that episodes of rapid progression are associated with graft loss. Understanding trajectories of kidney allograft function is, therefore, key to defining the mechanisms underpinning allograft dysfunction. In this study, we evaluated the allograft function trajectories and associated factors, in an unselected, incident population of kidney allograft recipients in the early period post-transplantation. We also investigate whether episodes of rapid progression or non-progression are associated with graft loss in an extended follow-up period

Method:
Demographic and clinical data were obtained from electronic health records. We used Bayesian smoothing techniques[1] to create 10,000 Monte Carlo sample curves for 310 kidney transplant recipients for estimated glomerular filtration rates from 3-27 months after transplantation. This technique produces a smooth curve for each patient that reflects the gradual, longer term changes in eGFR values, rather than the rapid, short-term changes because of clinical and biologic variation as well as other interference including measurement error. The estimated trajectory is a smooth curve, allowing its slope to be calculated month by month. The probability of having an episode of rapid progression (decline greater than 5 ml/min/1.73m²/year in any 1-month period) and non-progression (decline no greater than -1ml/min/1.73m²/year) were calculated. Overall follow-up period was 8 years. Factors associated with having an episode of rapid progression, non-progression, and associations with long-term graft loss were explored.

Results:
A median of 54 eGFR measurements per patient were available from 3-27 months for analysis. 65 patients (21%) had a probability of rapid progression greater than 0.8. During the follow-up period, 34 patients (11%) lost their graft. In multivariable Cox Proportional Hazard analysis, a probability greater than 0.8 of rapid progression was associated with long-term death-censored graft loss (Hazard ratio, 2.17; 95% CI, 1.04-4.55). In separate multivariable logistic regression models, cytomegalovirus serostatus donor positive to recipient positive (Odds ratio [OR], 3.82; 95% CI 1.63-8.97), CMV donor positive (OR 2.06; 95% CI 1.15-3.68), and CMV recipient positive (OR 2.03; 95% CI 1.14-3.60) were associated with having a greater than 0.8 probability of an episode of rapid progression. Having a probability greater than 0.8 of non-progression was not associated graft loss.

Conclusion:

We further validate the use of Bayesian smoothing for renal transplant function trajectory modelling. Early episodes of rapid progression are associated with long-term death-censored graft loss and are associated with cytomegalovirus seropositivity. Possible mechanisms include adverse cytomegalovirus-related immunomodulatory effects resulting in increased infections, glomerular injury and allograft vasculopathy. Investigation into these factors may yield potentially modifiable risk factors and improve graft survival.

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The effect of regularly dosed paracetamol versus no paracetamol on renal function in Plasmodium knowlesi malaria (PACKNOW): a randomised controlled trial.

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Background:

Acute kidney injury (AKI) is a frequent complication of Plasmodium knowlesi malaria; the commonest cause of malaria in Malaysia and an increasing public health concern in regions of Southeast Asia aiming to eliminate falciparum and vivax malaria. Intravascular haemolysis and subsequent oxidative damage and lipid peroxidation from cell-free haemoglobin (CFHb) is thought to be a major mechanism of AKI in malaria. Paracetamol inhibits CFHb-induced lipid peroxidation and has been demonstrated to improve renal function in a pilot study in severe falciparum malaria. The renoprotective effect of paracetamol in knowlesi malaria has not been evaluated.

Methods:

PACKNOW was a two-arm open-label randomised controlled trial of regularly-dosed paracetamol (1g 6-hourly for 72 hours) versus no paracetamol in Malaysian patients aged ≥5 years with microscopy-diagnosed knowlesi malaria treated with standard antimalarial therapy. The primary endpoint was change in creatinine at 72 hours. Secondary endpoints included longitudinal changes in creatinine in patients with severe malaria and AKI.

Results:

During 2016-2018, 396 patients were randomised to receive paracetamol (n=199) or no paracetamol (n=197). The primary endpoint did not differ between arms, with creatinine falling by a mean 15% (95%CI:12%-17%) in both arms. In patients with severe malaria (n=19), creatinine decreased by a mean 38% (95%CI:20-57%) at 7 days in the paracetamol arm compared to 9% (95%CI:-13 to 30%) in the control arm (p=0.04), and in those with AKI (n=71), by a mean 36% (95%CI:31-42%) in the paracetamol arm compared to 29% (95%CI:24-35%) in the control arm (p=0.067). In both subgroups, this effect was more pronounced in those with hemolysis, with creatinine falling by a mean 45% (95% CI 34-58 %) over 7 days in the paracetamol arm compared to 15% (95% CI –5 to 34%) in the control arm (p=0.022) in those severe malaria and haemolysis (n=11) and by a mean 43% (CI 38-49 %) over 7 days in the paracetamol arm compared to 26% (95% CI 21-32 %) in the control arm (p<0.001) in those with AKI and haemolysis. In the subgroup of patients with severe malaria and hemolysis, proteinuria was detected at 28 days in 60% (3/5) in the control arm and no patients (0/7) in the paracetamol arm (p=0.045) No patient met criteria for Hy's law of hepatotoxicity.

Conclusions:

These findings support the hypothesis that paracetamol inhibits CFHb-mediated oxidative damage. Regularly dosed paracetamol improves renal function in patients with severe knowlesi malaria, and in those with AKI, with this effect more pronounced in those with intravascular hemolysis. Use of adjunctive

paracetamol as a renoprotective agent should be considered in these groups and warrants further investigation in other disease states with circulating free haemoproteins.

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Improving the care of young adults and adolescents with Kidney disease: Results of a patient survey

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Background
Transition is described as “the purposeful, planned process that addresses the medical, psychosocial and educational needs of young people and young adults with chronic physical and medical conditions as they move from child-centred to adult-orientated healthcare systems”1.
It is recognised that this period can be fraught with difficulties and require additional support. In addition, young adults and adolescents have complex care needs that differ from the older population.
Policy initiatives around transition and young adult’s services have become increasingly common in order to implement, improve and standardise care. The Department of Health guideline “Transition: getting it right for young people” 2 and Royal College of Paediatrics and Child Health “Facing the Future”3 reports highlight the standard for ongoing health needs of children and young people.
Methods
We carried out a survey of Young People known to Renal Service at our unit that serves a population of 750000 patients. All patients aged 18-25 who had contact with renal services between September2018-September2019 were invited to participate. The survey was sent by post with a stamped return envelope and via a text system which provided a weblink. Patients attending clinic were also approached.
Our aims were to explore young adult patients’ experience with the renal service in line with current recommended standards4 and understand the barriers for engagement with adult services and potential targets for service improvement.
Results
108 patients were identified as having ongoing follow up with Renal services in the 12month period. 18 patients returned the survey. The average age was 22 years and 8/18 were in full-time employment. 44% (13/18) of participants left school at age 16 or younger.
16/18 of the patients attended general nephrology clinic, 1 attended haemodialysis clinic and 1 was a patient of the low clearance clinic (patients with persistent eGFR <20 or pre-dialysis). On average, the cohort attended 3 appointments in 12 months (range 0-10). 6 patients had transitioned from children services to adult services.
The clinic environment scored 4/5 on average. Communication between adult team, the patient and their family was rated 4/5. All participants were aware of the department’s confidentiality policy.
Providing age appropriate information, access to text service reminders for appointments and having a written health care plan together with access to mental health support workers, were the highest rated interventions to improve patient experience.
2 patients suggested a dedicated 18-25 years clinic as an intervention that would improve their experience.
Conclusion
There is a need for further improvement in the care that young adults receive, especially those with a recent diagnosis or patients that have transitioned. Patient involvement in service development is pivotal in assuring it is fit for purpose.
A dedicated clinic for 18-25 years old patients together with a written care plan and age specific leaflets about their diseases may be the best interventions to meet the needs of this group. Work is under way to develop a transition process that incorporates these features into patient care and ensures active engagement of Paediatric and Adult Renal teams.

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Management of blood and urine parameters in distal renal tubular acidosis (dRTA) with a novel prolonged-release treatment

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Introduction
Distal renal tubular acidosis (dRTA) is a rare and potentially severe condition characterised by hyperchloremic metabolic acidosis and hypokalemia, requiring appropriate metabolic control. Currently there are no drugs registered for dRTA treatment, however different standard of care (SoC) treatments exist, which exhibit important limitations, such as short duration of action, poor gastric tolerability and low acceptability. This study evaluates the clinical benefit of a new prolonged-release granule combination of potassium citrate and potassium bicarbonate (ADV7103) compared to SoC in patients with dRTA.
Methods
In a multicentre, open-label, non-inferiority, sequential study, 5-day steady state treatment periods were compared in adult and paediatric patients (N=37 enrolled): first with SoC (multiple daily intakes required) and subsequently with ADV7103 (morning and evening). Plasma bicarbonate and potassium levels were measured over 3 consecutive days and calcium/creatinine (UCa:UCr), citrate/creatinine (UCi:UCr) and calcium/citrate (UCa:UCi) urinary excretion ratios were measured over 2 consecutive days. All measurements were performed before first morning doses. For each parameter, proportions of responders (patients with normal values) and non-responders were compared, and the difference between treatments evaluated using McNemar's test in the intent to treat set.
Results
The responder rates obtained for each parameter with both treatments are shown in Table 1. Considering plasma bicarbonate levels, in patients with comparable data from both treatment periods (N=30), 17 (56.7%) of patients where non-responders (abnormally low levels) with SoC and 3 (10%) with ADV7103. When switching to ADV7103, 82.4% (14/17) of non-responders with SoC became responders, while none of the responders with SoC became non-responders. This difference between treatments was statistically significant ($p<0.001$). No statistically significant difference was observed for plasma potassium levels and the response rate was high for both treatments (82.8%, 24/29 in both cases), although there was a trend towards increasing values with ADV7103 (4.08 vs. 3.83 mmol/L with SoC).
No significant difference between treatments was shown for UCa:UCr (N=30). However, only three patients presented hypercalciuria: 1 under SoC treatment, 1 with ADV7103 and 1 during both periods. For UCi:UCr (N=17), hypocitraturia was noted in 16 (94.1%) of patients with SoC and in 10 (58.8%) of patients treated with ADV7103. When switching to ADV7103, 43.8% (7/16) of non-responders with SoC became responders and only one responder with SoC became non-responder, but the difference was not significant due to the limited number of patients in this analysis ($p=0.070$). For UCa:UCi (N=20), 16/20 (80%) of the patients presented abnormally high values with SoC and 40% with ADV7103. When switching to ADV7103, 56.3% (9/16) of non-responders became responders, while only one responder became non-responder and this difference between treatments was statistically significant ($p=0.021$).
Discussion
The clinical benefit of ADV7103 over current SoC treatments is indicated by the increased response rates for normalisation of plasma bicarbonate levels after switching to this new prolonged-release formulation. The increased rate of normalisation of UCa:UCi excretion ratio also suggests a reduced risk of stone formation with ADV7103 treatment.

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Long-term management of metabolic parameters in distal renal tubular acidosis (dRTA) with a novel prolonged-release treatment

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Introduction
An innovative prolonged-release granule combination of potassium citrate and potassium bicarbonate, ADV7103, with a simplified age-adapted dosing regimen, has been shown to improve management of plasma bicarbonate levels in patients with distal renal tubular acidosis (dRTA) when compared to standard of care (SoC) treatments. ADV7103 has also been shown to maintain normal plasma potassium levels in most patients. This study aimed to investigate long-term treatment efficacy and patient satisfaction.
Materials/Methods
A cohort of adult and paediatric patients with dRTA (N=30, 6 adults, 8 adolescents, 13 children and 3 infants/toddlers), having completed a previous short-term phase II/III study with ADV7103, were included in a multicentre (N=12), open-label, 24-month extension study. Participants received ADV7103 twice daily at appropriate doses, as defined in the previous study and further adapted if required. Plasma bicarbonate and potassium levels were measured in blood samples drawn before first morning dose, at baseline (last visit of short-term study) and after 3, 6, 12, 18 and 24 months of treatment. Only non-haemolysed blood samples were considered for plasma potassium determinations. Urinary excretion parameters were measured at the same time points. Quality of life improvement was evaluated by patients and/or their parents using a 100-mm visual analogue scale. Descriptive statistical analyses of the data were performed.
Results
Most patients demonstrated normalised plasma bicarbonate and potassium levels for the duration of the 24-month ADV7103 treatment. After 12 months of treatment, 4 patients presented plasma bicarbonate levels below normal range and only 2 patients showed plasma potassium levels below normal range. At 24 months, the overall mean ± SD plasma bicarbonate level was 22.8 ± 2.9 mmol/L, plasma potassium level was 3.8 ± 0.3 mmol/L, and urine calcium/creatinine excretion ratio was 0.3 ± 0.2 mmol/mmol, with average alkali doses of 2.3±1.3, 2.6±1.7, 3.4±1.3 and 4.8±2.0 mEq/kg/day in adults, adolescents, children and infants/toddlers, respectively. Improvements of urinary excretion parameters observed in the previous study were maintained and positive effects on some parameters (in particular citrate and calcium) were noted. The evolution of mean plasma bicarbonate and potassium values, as well as of calcium excretion is shown in Figure 1. Patients and/or their parents reported an average improvement of quality of life of 80.7% and 88.9% at 6 and 24 months of this study, respectively, compared to previous SoC treatments.
Discussion
The results of this 24-month extension study show ADV7103 allows a sustained control of metabolic acidosis and hypokalaemia in patients with dRTA, and thus confirm observations from the short-term phase II/III study. Both patients and/or their parents were extremely satisfied in terms of improvement of quality of life showed with ADV7103. Taken together these data ADV7103 could represent an effective first-line treatment for dRTA.

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Should we use a dialysate potassium concentrate of 3mmol/l more often?

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Should we use a dialysate potassium concentrate of 3mmol/l more often?

Background
DOPPS data suggests optimal survival for patients using a 3mmol/l KCL (3K) dialysate. We have previously used a 2mmol/l KCL (2K) concentration for our standard dialysis prescription. We were keen to find out how much difference in blood results arose after switching to a 3K dialysate.

Method
This service evaluation study was carried out in a 40 patient satellite dialysis unit. It involved nine people with average pre-dialysis potassium level less than 5mmol over three months and average post dialysis potassium less than 3.5mmol. All of these people had an unrestricted diet in terms of potassium. The change occurred in March 2018. For this analysis, monthly serum pre and post-dialysis potassium levels were analysed for the six month period prior to change and the six months after. The volume of blood processed on those dialysis sessions was also analysed. Our SOP indicated that patients should revert to 2K dialysate if monthly bloods showed pre dialysis potassium levels over 6.0mmol/l on two occasions.

Results
Average pre dialysis potassium was 0.45 +/- 0.31mmol/l, $P<0.05$ higher and average post dialysis potassium was 0.51 +/- 0.22mmol/l, $P<0.001$ higher using 3K dialysate. The average interdialytic change in serum potassium during dialysis was 0.09 +/- 0.16mmol/l, P=NS less using 3K concentrate. The ratio of interdialytic potassium change per litre of blood processed was 0.022mmol/l/l with 2K and 0.020 with 3K.

In the 6 months after conversion, two people changed back to 2K for hyperkalaemia (K> 6.0 mmol/l). One developed this when spironolactone was added to her medication; the other had abbreviated dialysis due to recurrent access problems. 45% of patients have remained on 3K dialysate for 18 months now. The other three people switched back to 2K because of intercurrent septic illness affecting dialysis, reduced blood flow and as a prophylactic measure when spironolactone was added to treatment.
When we compared the incidence of hyperkalaemia in those using 3K and 2K dialysate, we found it was present in 11% of pre dialysis blood tests in both groups.

Conclusion
There was no increased rate of symptomatic hyperkalaemia-related adverse events in patients using 3K in this group. The changes in average pre dialysis potassium levels were small. The amount of potassium removed per session was similar in keeping with the principle of conservation of matter. When hyperkalaemia occurred, there was an external factor contributing. Given that there is some evidence that 3K concentrate has optimal survival outcomes, we believe that we should look to use it more widely as part of an individualised dialysis prescription.

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Impact of a medium cut-off dialyzer on skin autofluorescence in haemodialysis patients

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Introduction: Advanced glycation end-products (AGEs) are middle-sized uraemic toxins that accumulate in haemodialysis (HD) patients due to increased production, impaired excretion and insufficient removal. Previous studies have reported that the use of a medium cut-off (MCO) dialyzer promotes a greater removal of larger middle molecules (such as AGEs) than conventional high-flux HD and haemodiafiltration. However, to our knowledge, there is no published evidence regarding the effect of an MCO dialyzer on skin autofluorescence (SAF), a measure of long-term tissue AGE accumulation and independent risk factor for mortality in the HD population. We aimed to investigate the impact of using an MCO dialyzer on change in SAF over time in HD patients.

Methods: HD patients were enrolled in a prospective observational study. SAF was measured using a validated Autofluorescence Reader at baseline, 12 and 24 months. During the initial 12 months patients dialysed using high-flux polysulphone, polyarylethersulfone or polyvinylpyrrolidone dialyzers. At a variable time after 12 months patients were switched to an MCO dialyzer (Theranova; Baxter®). Forty patients who had been using the MCO dialyzer for at least 3 months were included in this analysis.

Results: Mean age, baseline SAF levels and time on MCO dialyzer were 63±13 years, 3.5±0.9 arbitrary units (AU) and 124±49 days, respectively. SAF increased significantly from baseline to 12 months (3.5±0.9 vs. 3.9±1.1 AU; $p<0.0001$) but tended to decrease between 12 and 24 months, after conversion to an MCO dialyzer (3.9±1.1 vs. 3.7±0.7 AU; $p=0.06$). Additionally, mean ΔSAF from baseline to 12 months was positive (0.41±0.68 AU) whereas ΔSAF from 12 to 24 months was negative (-0.18±0.76 AU; $p=0.002$ for comparison). Furthermore, SAF at 24 months correlated negatively and significantly with time on MCO dialyzer ($r= -0.384$; $p=0.01$) though second year ΔSAF (delta from 12 to 24 months) did not ($r= 0.061$; $p=0.7$).

Conclusion: We found in this observational study that SAF levels decreased/stabilised in HD patients after switching to an MCO dialyzer compared to the time when patients were using conventional high-flux HD and haemodiafiltration, during which SAF levels increased. Future prospective and interventional studies with larger sample sizes and longer follow-up are needed to confirm these findings and to evaluate the impact of using an MCO dialyzer on long-term outcomes, including survival.

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Impact of malnutrition on health-related quality of life in dialysis patients: a prospective study.

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Introduction: Health-related quality of life (HRQoL) is severely impaired in dialysis patients compared to the general population. Previous studies have shown that malnutrition, a frequent complication and independent risk factor for mortality in the dialysis population, is associated with poor HRQoL. However, there is no published evidence regarding the impact of malnutrition on change in HRQoL over time. We sought to determine the most important predictors of poor HRQoL as well as the determinants of change in HRQoL over time in dialysis patients, with a particular focus on malnutrition.

Methods: We enrolled 119 haemodialysis and 31 peritoneal dialysis patients in a 1-year single-centre prospective observational study. HRQoL was assessed using the physical and mental component scores (PCS and MCS, respectively) from the 36-Item Short Form Health Survey and the health state and visual analogue scores from the European Quality of Life 5-Dimensions (EQ5D) questionnaire. The 7-point scale Subjective Global Assessment (SGA) was performed to evaluate nutritional status. Energy, protein and fat intake, biochemical variables, anthropometric measurements and handgrip strength (HGS) were also measured. All study assessments were performed at baseline, 6 and 12 months.

Results: Mean age was 64±14 years. Malnutrition (as determined by 7-point SGA) was present in 37% of the population. Patients with malnutrition and diabetes had significantly lower MCS, PCS and EQ5D scores compared to well-nourished and non-diabetic patients, respectively. At baseline, chronological age, serum albumin, energy and protein intake, and HGS correlated positively with PCS and EQ5D health state score. Multivariable analysis at baseline identified malnutrition as the strongest independent predictor of decreased HRQoL, after adjusting for confounders (Table 1). Patients who stayed or became malnourished during one year showed a significant decrease in MCS, PCS and EQ5D health state score at 12 months compared to baseline. This same group of patients had significantly lower MCS, PCS and EQ5D scores at baseline and 12 months compared to those who stayed or became well-nourished during one year. Prevalent/development of malnutrition was independently and significantly associated with the 1-year decrease in MCS and EQ5D health state score. In addition, a decrease in serum total protein and dietary protein intake (markers of malnutrition) were identified as independent determinants of 1-year decrease in MCS, PCS and EQ5D health state score.

Conclusion: We observed in this prospective observational study that presence of malnutrition was the most important and strongest independent predictor of decreased HRQoL in this dialysis population. Furthermore, prevalence/development of malnutrition and a decrease in markers of nutritional status were independently associated with a decrease in some HRQoL scores over 1 year. These findings strengthen the importance of undertaking screening to identify malnutrition, and providing specialised, individualised nutritional advice to all dialysis patients in order to prevent and/or improve nutritional status. Future studies with larger sample sizes, longer follow-up, and which include evaluation of barriers to effective nutritional interventions are needed to evaluate the impact of nutritional interventions on HRQoL and other long-term outcomes.

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Clinical frailty scoring in patients with end stage renal disease: A predictor of declining health?

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Background
The incidence of frailty increases as GFR decreases. In the end stage renal disease (ESRD) population frailty is associated with early mortality, increased hospitalisations, and significant symptom burden. We examined the use of formal frailty scoring and its role in identifying deteriorating patients with advanced renal disease.

Methods
The Rockwood Clinical Frailty Scale (CFS) has high inter-rater reliability and correlates well with objective measures of frailty. We introduced routine recording of the CFS from January 2018 in the renal electronic record for patients on hospital haemodialysis therapy and those undergoing renal replacement therapy (RRT) planning. Based on CFS scoring patients were divided into 'frail' (CFS≥6) or 'robust' based (CFS<6) and patient demographics are described. The association of being 'frail' or a decline in score with mortality at seven months were described using adjusted logistic regression analyses.

Results
A total of 1663 scores were recorded in 800 patients. 57.3% of patients were male. The median age at entry date was 66 (IQR 55,75) years. The median CFS score was 4 (IQR 3,5). At follow-up 74 (9.3%) had died. The median score prior to death was 5.5. 182 (22.8%) were 'frail'. During the study period 469 patients had more than one score documented. Death at follow-up was more common in those who were 'frail', 20.9 vs 5.8%, p<0.001. Patients who were deceased at follow-up were more likely to have had a deterioration in frailty score, 51.9% vs 24.4%, p=0.002. Being 'frail' or having a deteriorating frailty score was associated with death at seven-month follow-up independent of age, sex or diabetic nephropathy status.

Conclusion
The presence of 'frailty' as measured by CFS, or deterioration in CFS is associated with death at follow-up, independent of age, sex or diabetic nephropathy. Routine monitoring of frailty using the CFS provides a simple method to identify patients who are deteriorating and at risk of death. High or deteriorating CFS score should trigger clinical review and anticipatory care planning where appropriate.

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Empagliflozin (EMPA) and incidence of rapid decline in eGFR in patients with type 2 diabetes mellitus (T2DM) and established cardiovascular disease (CVD): an exploratory analysis from the EMPA-REG OUTCOME trial

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Introduction: The eGFR progressively declines in most patients with T2DM. In some patients a more rapid decline in eGFR is observed, putting them at risk for the consequences of uraemia and ultimately end-stage renal disease. In the EMPA-REG OUTCOME trial, EMPA was associated with slower progression of kidney disease. The objective of this post hoc analysis was to investigate the effect of EMPA on the incidence of a more rapid renal decline in patients.

Methods: The study included 7020 patients with T2DM and established CVD. Participants were randomised (1:1:1) to EMPA 10 mg, 25 mg or placebo (PBO) in addition to standard of care. Change in eGFR decline over the study period (from baseline to follow-up) was calculated by utilising linear regression models. A rapid decline in eGFR was defined by an annual decline in eGFR >5 ml/min/1.73m2. Logistic regression analysis was used to investigate differences between EMPA vs PBO groups.

Results: At baseline, mean (SD) eGFR was 74.0 (21.4) ml/min/1.73m2. Over the study period, 354 participants (5.1%) experienced a rapid decline in eGFR, including 8.9% in the PBO group and 3.2% in participants receiving EMPA. After adjusting for other risk factors, this equated to two-thirds reduction in risk (Figure, odds ratio 0.33 [95% CI 0.26, 0.41]; p<0.0001) among participants receiving EMPA. A similar reduction among EMPA-treated participants in the incidence of patients experiencing a rapid decline in eGFR was also observed using a lower threshold (Figure).

Discussion: Patients treated with EMPA were significantly less likely to experience a rapid decline in eGFR over approximately 3 years of treatment. This finding suggests that EMPA may have the potential to reduce the incidence of renal impairment in T2DM in the long term.

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Examining patient distress and need for support across UK renal units with varying models of psychosocial service delivery: a cross-sectional survey study

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Background
Internationally, whilst calls for collaborative renal care models are increasing, large variations in the availability and type of renal psychosocial care have been reported across and within countries[1]. In the UK, a general renal psychosocial care model is lacking, reflecting a dearth of empirical studies on the delivery of these services that can inform evidence-based staffing standards and regulations[2].
Methods
This cross-sectional survey study is the first to examine in-centre haemodialysis patients' distress (as measured with the Distress Thermometer) and perceived need for support across seven main renal units with varying models of psychosocial service provision, in England, Wales and Scotland.
Results
48.9% (95% Confidence Interval (CI): 44.5 – 53.4) of 509 respondents were categorised as experiencing distress. A significant association between distress and models of renal psychosocial service provision was found ($\chi^2(6)=15.05$, $p = .019$). Multivariate logistic regression showed that patients in units with higher total psychosocial staffing ratios [odds ratio (OR) 0.65 (95% CI 0.47-0.89); p=0.008] and higher social work ratios [OR 0.49 (95% CI 0.33-0.74; p=0.001) are less likely to experience distress, even after controlling for demographic variables. In addition, a higher patient-reported unmet need for support was found in units where psychosocial staffing numbers are low or non-existent ($\chi^2(6)= 37.80$, $p<0.0001$).
Conclusions
The novel findings emphasise a need for increased incorporation of dedicated renal psychosocial staff into the renal care pathway. Importantly, these members of staff should be able to offer support for psychological as well as practical and social care related issues.

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Building Bridges from Children's to Adult Kidney Care Services- Making a difference showing we care

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Background
Historically there has been a lack of support for younger people in our service provision, mainly due to the relatively small number of people in this age group and a tendency to remain under the care of the same Trust where they had received paediatric care . Results from a recent GIRFT visit and feedback from our patients highlighted this deficit. Combining this with the results from the "Speak Study" 2018 emphasised to us the importance of creating links and getting to know our young people. Previous attempts with our existing young population have not been sustainable- so we are developing a new approach.
Objectives
Our objectives were to improve links with children's services from referring trust to aid a seamless transition into our adult services. To support young people earlier with making their decision as to where, to geographically transition to and ensure they have a key point of contact in our unit.
Method
We formed a working party with multi-disciplinary healthcare professionals and patient representation led by one of our Renal Counsellors. The group attended conferences for networking opportunities and courses to help improve communication with this age group. They liaised with lead nurses and multi-disciplinary staff from our own children's services within the Trust to see how transition has been implemented in similar services i.e. diabetes. We commenced joint clinics with the referring centres prior to transfer; our first clinic was held in Nov 2019. The aim of the clinic is to build relationships and identify key people who will be involved with their care. We also include a tour of the unit so those transitioning can see the set up and get a feel for themselves.
Results
We are currently evaluating this change in practice. To date three young people have fully transitioned using our new approach and another four are in the process. We are gathering feedback, from the patients themselves, parents and staff. We have started to compile patient information, initially for those who have been transplanted outlining the service and information for other modalities will follow. Working with those transitioning & our existing young people to get this right. The closer liaison with the referring Trusts has improved the process and patients have benefited by being cared for closer to home e.g. financially, ability to attend further education, improved family life.
Conclusion: Whilst we are still in the early stages of this project, we are seeing an improvement in the care of younger people in our unit.
Implications for Practice
We can build on this to further develop a service for our existing younger patients across all modalities, enabling them to have a voice and influence how we deliver our service for young adults.

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Follow up for the Acute Renal Transplant - Room for improvement?

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The immediate post-transplant period is a critical time for renal transplant recipients, as they are most at risk of developing complications, notably organ rejection and opportunistic infection. Early identification and management of these complications through careful manipulation of immunosuppression can reduce the risks of these complications. Accordingly, the first 12 months following transplantation is a period of intense out-patient follow up for transplant recipients. British Transplant Society recommendations suggest recipients be seen up to 40 times during this period. This is both costly to the NHS and burdensome to the recipient.
There are 23 UK adult renal transplant centres and all have seen growth in transplant numbers in the last decade, a rise matched by an increased demand on clinic services. We sought to a) identify any variation in post-transplant follow up practice amongst transplant centres and b) survey our current local transplant clinic population to understand the patient experience of post-transplant care.

Method:
National post-transplant follow-up practice. We telephoned the transplant coordinators at the 23 transplant centres in the UK and requested a summary of the typical follow-up practice for the immediate post-transplant period until care was transferred out of the acute transplant team. Data was collated and anonymised.
Local patient experience. A questionnaire was designed with patient input to understand patient experience of attending the acute transplant follow-up clinic. The questionnaire was distributed to all patients attending the clinic over a single week, with instructions on how to complete them.

Results:
National post-transplant follow-up practice: Details about acute transplant follow-up was collected from 17 of 23 transplant centres. 13 centres followed up recipients for 6 months, whilst 4 centres discharged their patients at 3 months. There was notable variation in follow-up practice. In the first 3 months post-transplant the average number of clinic attendances was 18 (10-24). In the 13 centres monitoring recipients for 6 months, the average number of attendances was 24 (16-38).

Patient experience: Surveys were distributed to all 36 recipients attending the local acute transplant clinic, 28 responses were received (78% response rate). On average, recipients spent 6hrs 46mins attending clinic. Broken down this reflects 1hr 4mins (15mins - 2hr 45mins) travelling from home to clinic; 29mins (45mins - 2hr 15mins) waiting for phlebotomy and 2hr 35mins (1hr 50mins - 3hr 35mins) waiting to see the transplant team. Recipients spent 15mins (8mins-30mins, 3.7% of Clinic) with the transplant team and valued in almost equal amounts their time spent with the transplant team and finding out their blood results.

Conclusion:
There is significant variation of practice in post-transplant care between transplant centres within the UK and the frequency of clinic appointments remains high. Transplant recipients within the acute transplant clinic report attendance to be time consuming, with only a small proportion of that time spent engaging with the transplant team. Whilst recipients valued the time spent with the transplant team, they equally valued the reassurance provided by finding out their blood results. Remote monitoring could improve patient experience and the efficiency of follow up.

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Iron management in a haemodialysis population post-PIVOTAL

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Background
IV iron plays a critical role in the management of anaemia in haemodialysis patients. The PIVOTAL trial recently generated new insights in this context, and suggested potential harm associated with under-treatment with IV iron.

Aim
To perform a prospective cross-sectional survey of iron management in a single-centre haemodialysis population in light of the results from the PIVOTAL trial.

Methods
During June 2019, we prospectively measured haemoglobin, serum ferritin and transferrin saturation in a prevalent haemodialysis population at a tertiary renal centre. The current dose of IV iron sucrose was also recorded. Extrapolating from the PIVOTAL trial results (best outcomes in the high-dose group with a mean ferritin of around 650 ng/ml and a TSAT of around 26%), we arbitrarily and conservatively defined under-treatment with iron as a ferritin level ≤500 ng/ml and a TSAT ≤25%.

Results
A total of 587 patients were identified, 581 of whom had a ferritin result available. Of these, 358 (62%) had a ferritin level ≤500 ng/ml and 295/527 (56%) had a TSAT ≤25%. For the 527 patients in whom both ferritin and TSAT measurements were available, 204/527 (39%) were defined as under-treated.
Of the 587 patients, 111/582 (19%) were not receiving IV iron. 71/582 (12%) were on 100 mg monthly, 48/582 (8%) were on 200 mg monthly, 339/582 (58%) were prescribed 400 mg iron sucrose/month and 14/582 (2%) were on ≥ 400 mg. The iron dose was not available in 5 patients.
Of the 204 undertreated population, 22 (11%) were not on IV iron. 17/204 (8%) were on 100 mg/month, 16/204 (8%) on 200 mg/month, 137/204 (61%) on 400 mg/month, and 11/204 (2%) on > 400 mg monthly.
Of the patients defined as undertreated, the haemoglobin ranged from 63 to 151 g/l with a mean of 109.8 g/l and a median of 111 g/l.
30 patients had a haemoglobin less than 100 g/l and 92 patients had a haemoglobin less than 110 g/l.
24/204 patients were not on an ESA (one patient was on Daprodustat) with a mean dose of 12,200 U/week.

Conclusion
Our current iron protocol is under-dosing a significant proportion of patients. This protocol requires review in light of the PIVOTAL study since it is likely significant cost savings could be achieved as a result of using lower doses of ESA therapy, along with the cardiovascular benefits seen in the higher dose arm of the trial.

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Quality Improvement case study - Using the Kidney PREM results to improve transport provision

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Using the Kidney PREM to improve the experience of transport provision for haemodialysis patients: A quality improvement case study

When the Kidney PREM results came out for 2018, we shared the results locally at these patient meetings. We also discussed it at our dialysis Quality Improvement, Renal Care Group and Performance meetings where transport is always a key agenda item.

With the support of one of our haemodialysis consultants, who is also Corporate Medical Director for Quality, Governance and Risk, we presented renal transport updates at the Trust Patient Experience and Patient Safety Committees throughout the year. We had helpful steers from the Trust Governors. We work together at addressing transport provision and this joint working has played a huge part in the success of this project.

What we did

Firstly, we set up monthly meetings with the transport providers in July 2018, ensuring patient experience and performance data was top of the agenda and created an ongoing action tracker to capture activity and progress. The transport companies provided the data to review monthly.

We then rolled out clear escalation policies for each transport company and ensured that both transport providers met with relevant patient groups on a rolling basis to hear feedback and discuss plans for quality improvement.

Joining the South London Renal Operational Delivery Network for transport provided the opportunity to swap patients with a local Trust and improved patient journeys by enabling patients to dialyse closer to home.

There was a fresh focus on Cleric training (transport booking system) and engagement and we set up a system that allowed us to capture weekly data on transport issues from each unit.

We created transport champions at each of our units and some of these staff members have excelled in their roles and have received recognition from the trust for their contribution to transport provision.

We undertook a large mapping exercise and focused on improved patient placement by identifying patients with transport challenges and giving them the opportunity to dialyse in a unit closer to where they lived.

We tracked adverse incident and complaint rates, including time to respond. We created flow diagrams of how both would be managed between Trust and provider.

We obtained line by line lists of escort-requiring patients and aborted journeys, to maximise efficiency and reduce unnecessary wasted journeys.

Finally, we worked together with Trust Facilities and Contract teams to review and revise transport contracts, successfully renegotiating and renewing a contract with one of the providers that ensured tighter control of key performance indicators. We met the Director of Facilities quarterly so that our meetings were aligned with contract monitoring meetings.

The outcome

We managed to significantly reduce adverse incidents related to transport, as shown in the table above, and we work much more closely with Transport providers. We have reached a point where we can review individual patient journeys and work proactively at improving those that are problematic. Overall, we have improved the transport experience considerably from where it was when we set out on our journey in 2018.

Whilst we appreciate that this work is an ongoing project; the work to date has been a real team effort and we feel proud of what we have achieved for our patients.

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The journey, not the destination: Renal cholesterol embolization secondary to coiling of a ruptured intracranial aneurysm

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INTRODUCTION: Renal cholesterol embolization, or atheroembolic renal disease, occurs when cholesterol crystals occlude the renal vasculature and cause renal impairment. Well-recognized iatrogenic causes of this are cardiac catheterization, vascular procedures and fibrinolytic therapy. We report the first case to our knowledge where renal cholesterol embolization occurred following an intracranial procedure.
CASE: A 57 year old man presented to hospital with a headache on a background of hypertension, peripheral vascular disease and coronary artery disease. Imaging revealed an anterior communicating artery aneurysm with secondary intracerebral and subarachnoid haemorrhage. He underwent emergency coiling of the aneurysm. Access was obtained via right groin arterial puncture using a 6F sheath. From Day 9 post-procedure his renal function rapidly deteriorated from a normal baseline (Creatinine <80 µmol/L, eGFR>60 mL/min) to a peak Creatinine 316 µmol/L and eGFR 18 mL/min. This was associated with a persistent eosinophilia and raised ESR. His autoimmune, myeloma and virology screen were unremarkable. Renal biopsy showed the presence of cholesterol emboli on a background of chronic hypertensive changes. Subsequent imaging of his aorta showed widespread atherosclerosis with mural thickening of the thoracic and abdominal aorta in addition to a 4cm abdominal aorta aneurysm with common iliac extension bilaterally. Blood pressure control was achieved and he only had minimal improvement in his renal function at time of his discharge.
DISCUSSION: Renal cholesterol embolization occurs in the presence of aortic atherosclerosis and though it can occur spontaneously, it is now more commonly iatrogenic. In a majority of cases it presents in a subacute manner, typically more than a week after the causative event. Though any procedure requiring access via an atherosclerotic aorta could dislodge cholesterol crystals, there have been no reports of renal cholesterol embolization as a result of intracranial coiling. Thus, renal failure following endovascular intracranial procedures via femoral access should raise the suspicion of renal cholesterol embolization, especially in the presence of risk factors, eosinophilia or extra-renal sites of embolization.

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Multiparametric Renal MRI in Chronic Kidney Disease: changes in clinical and MRI measures over two years

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Background and Aims: Chronic kidney disease (CKD) progression is currently monitored using estimated GFR (eGFR) and albuminuria but these are relatively crude measures with multiple limitations. Multiparametric renal magnetic resonance imaging (MRI) combines several MR measures into a single scan session, offering the potential to assess severity, progression and response to therapy in CKD in a novel, non-invasive way. Previous studies have focussed on cross-sectional comparisons of MRI and clinical measures. In this study we sought to investigate the ability of MRI variables to predict and monitor progression of CKD over two years.

Methods: Persons with CKD stage 3-4 (eGFR 15-59ml/min/1.732) who had undergone renal biopsy were recruited. Participants underwent multiparametric renal MRI scans on a 3T Philips Ingenia scanner at baseline, one and two years. In addition demographic data, medical history, eGFR and urine protein:creatinine ratio (uPCR) was collected. Multiparametric renal MRI comprised longitudinal relaxation time (T1 using SE-EPI and bFFE readouts), Diffusion Weighted Imaging, renal blood flow (Phase Contrast MRI), renal cortex perfusion (Arterial Spin Labelling), and Blood Oxygen Level Dependent (BOLD) relaxation rate (R2*). CKD progression was defined as participants having a slope in eGFR of -5ml/min/yr or greater over 2 years. Interstitial fibrosis was quantified on renal biopsy samples.

Results: 22 participants underwent MRI scanning at baseline (7 participants were classified as 'progressors' and 15 as 'stable'), while 13 completed all three scans (4 of whom were 'progressors'). At baseline, cortex T1 was significantly higher for 'progressors' compared to 'stable' participants (p=0.02), and renal cortex perfusion was significantly lower (p=0.03). There was no significant difference in total kidney volume (TKV), ADC, renal cortex or medulla R2*, or renal biopsy measures of interstitial fibrosis between 'progressor' and 'stable' CKD participants.

At Year 1 and Year 2 compared to baseline, a decrease in total kidney volume (TKV) was found, with a significantly greater decrease in TKV in the 'progressor' group (p=0.04). Over time, T1 increased in the 'progressor' group versus baseline, particularly in the cortex which showed a significant difference at year 1 (p=0.034) and year 2 (p=0.053). There was a trend for a reduction in ADC in 'progressors' versus stable participants over time. There was no significant change over time or between groups in renal cortex perfusion, renal cortex or medulla T2*, or renal biopsy measures of interstitial fibrosis.

Conclusion: Our results show that at baseline lower renal cortex perfusion and higher renal cortex T1 were associated with progression of CKD over 2 years suggesting that these MRI parameters may be a predictors of progression. On the other hand, cortex T1, TKV and ADC changed more in 'progressors' than in 'stable' participants over time (TKV and ADC decreased, T1 increased), suggesting that they may be useful MRI measures to monitor progression. Further studies are required to confirm these findings in a larger cohort of patients before renal MRI can be recommended for clinical use.

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De-indexed estimated glomerular filtration rates: Improving renal function estimation in obese patient

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Background
Obesity is increasingly prevalent as nearly a third of the world's population is now categorized as overweight or obese. Chronic kidney disease (CKD) patients with obesity very often have underestimated renal function according to standard UK laboratory method using the chronic kidney disease-epidemiology collaboration equation (CKD-EPI) in which estimated glomerular filtration rates (eGFR) is corrected for body surface area (BSA) in mL/min/1.73m2. Accurate assessment of kidney function is imperative to guide the dosage adjustment of renally excreted medications, CKD categorization, renal replacement therapy planning. Given that body surface area of obese patients is highly variable, we propose that their eGFR should be de-indexed in clinical practice.

Methods
We retrospectively collected data of 33 patients known to our renal services with BMI of greater than 30 kg/m2 and CKD (stage 3 and below). We accessed electronic systems such as DiProton, Quadramed, and clinic letters to collect demographic (age, gender, race), anthropometrical (height and weight) and biochemical data (creatinine value at steady state). We then calculated BMI using standard formula and BSA using Mosteller formula (m2 = [Height, cm x Weight, kg/ 3600]1/2). We compared the standard method (CKD-EPI equation) and de-indexed eGFR which is corrected for individual BSA. Derivation of the de-indexed values was made with the use of GFR calculator on https://www.kidney.org/professionals/kdoqi/gfr_calculator.

Results
Patient characteristics are shown in Table 1. Our 33 patients are divided according to CKD classification into 5 (15%) in CKD 3, 11 (33%) in CKD 4 and 17 (52%) in CKD 5 respectively. Following de-indexing, we observed improvement of eGFR less than 2 ml/min/1.73m2 in 8 patients (24%), 2 to 4 ml/min/1.73m2 in 12 patients (36%) and more than 5ml/min/1.73m2 in 13 patients (39%). Improvement of eGFR is very minimal (less than 2 ml/min/1.73m2) in CKD 5 group especially when their BSA is less than 2 m2. 7 patients (21%) have clinically significant changes in their eGFR leading to improvement in CKD staging, 5 out of which have BSA of greater than 2 m2 as well as BMI of greater than 35 kg/m2 (Figure 1). The difference between standard and de-indexed eGFR are more prominent in parallel to increasing BSA.

Conclusion
In light of the positive findings in this small study, we suggest that eGFR de-indexing should be considered in patients with obesity to improve the performance of this CKD-EPI formula thus the accuracy in renal function assessment. This is to allow better dosing in medication, staging in CKD and assess the risk of progression. Further studies are being undertaken.

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A long-term retrospective outcome analysis of ANCA-negative pauci-immune glomerulonephritis

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Background and Aims:
Pauci-immune glomerulonephritis (GN), usually associated with circulating antineutrophil cytoplasm antibodies (ANCA), is one of the most common causes of rapidly progressive glomerulonephritis that results in high incidence of end-stage kidney disease (ESKD). Most of the existing large trials looking at treatment efficacies exclude ANCA-negative patients, and relatively few studies have reported their long-term outcomes. Therefore, we conducted a single-centre retrospective study to examine the long-term survival and renal outcome in this cohort.

Method:
All cases of newly diagnosed biopsy-proven pauci-immune GN from 2006 - 2019 were identified through a local histopathology database. Patients with negative anti-myeloperoxidase (MPO) and anti-proteinase-3 (PR3) serology were identified (ANCA-negative group) and comparisons made with patients with positive serology (MPO/PR3 positive group). Patients with relapsing ANCA-GN, eosinophilic granulomatosis with polyangitis, other co-existing glomerulonephritis or missing data on induction therapy or outcome were excluded.
Baseline demographics, initial serum creatinine (sCr), estimated glomerular filtration rate (eGFR), systemic involvement and histopathology features including percentage normal glomeruli, and interstitial fibrosis/tubular atrophy score of >25% were collected.
Kaplan Meier survival analysis was used to compare overall survival and ESKD progression rate between the two groups.

Results:
178 patients were identified with a median follow-up of 44 months. 83 were female (47%) and median age was 62 years. 15 (8%) were ANCA-negative. 163 (92%) were MPO- and/or PR3-ANCA positive.
There were no differences in baseline characteristics such as age, gender and proportion of patients with normal glomeruli <25% on histology. However, we observed a significantly higher proportion of patients with renal-limited vasculitis in the ANCA-negative group (67% vs 24% p=0.01) and more severe renal dysfunction at presentation (median sCr 309umol/L vs 204umol/L, p= 0.01). We also demonstrated a higher proportion of patients with an IFTA score of >25% on biopsy (53% with >25% IFTA in ANCA-negative cohort vs 27%, p =0.03).
The ANCA-negative group were more likely to receive combination immunosuppressive therapy that included plasma exchange (47% vs 23%, p value 0.04).
When considering overall survival there was significantly higher mortality (40% vs 16%, p value 0.009) and rate of progression to ESKD (53% vs 18%, p value 0.001) in the ANCA-negative group.
When we compared patients with renal-limited vasculitis only however, there was no significant difference in either overall survival or rate of progression to ESKD (p=0.85 and 0.84 respectively). We found that ANCA-negative patients with systemic disease did still have significantly higher rates of both progression to ESKD and overall mortality (p=0.002 and p=0.02 respectively).

Conclusion:

In our cohort, patients with ANCA-negative pauci-immune GN have poorer renal function and higher IFTA scores on biopsy at presentation perhaps reflecting delayed diagnosis due to a lack of diagnostic serology and the higher proportion of renal-limited disease in this subgroup. Despite intensive immunosuppressive therapy, this study observed overall higher treatment failure rates in ANCA-negative patients, largely in those with systemic disease. This possibly relates to a different underlying disease process. Larger, prospective studies are required to enhance understanding of the disease pathogenesis to allow optimal tailored treatment for these patients.

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Impact of directly observed treatment of one-alfacalcidol on mineral bone disorder profile in dialysis patients- A single unit pilot study

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Abstract
Impact of directly observed treatment of one-alfacalcidol on mineral bone disorder profile in dialysis patients- A single unit pilot study

Background and Aims:
Secondary hyperparathyroidism (SHPT) is a common mineral bone disorder observed in patients with end-stage renal disease. Management of SHPT can be challenging mainly due to poor medication compliance. Directly observed treatment (DOT) has shown to improve management outcomes in other conditions like tuberculosis. We conducted a pilot study to investigate the impact of DOT with one alfacalcidol for SHPT in our cohort of dialysis patients.

Method:
This prospective observational study was conducted on 21 end stage renal disease patients on dialysis from a single centre who were commenced on one alfacalcidol on dialysis days under direct observation .All patients had not shown any improvement in PTH despite increase in one alfacalcidol either admitted to or were suspected to have medication non-adherence. Serum bone mineral profile including parathormone (PTH), corrected calcium, phosphate and alkaline phosphatase were recorded before and after initiation of DOT. Treatment outcome was measured by comparing the mean change in the biochemical profile prior DOT initiation and at the lowest PTH value achieved on DOT. Data was analysed by paired t test using SPSS software.

Results:
The mean age of our sample at the time of commencing DOT therapy was 52 years. Our sample had a predominance of males (67%) and Asian ethnicity (62%). 71% had a history of hypertension and 43% were diabetic. DOT one alfacalcidol therapy produced a significant reduction in the mean PTH value (pre-DOT-92.2 vs post DOT-36.1 pmol/L, $p<0.001$). There was a significant rise in the corresponding mean corrected calcium levels (pre-DOT- 2.22 vs post-DOT-2.45 mmol/L, $p=0.001$) (table-1). Over a mean follow up of 8 months, a significant reduction in the one alfacalcidol dose requirement was observed in 52.38% of our cohort.

Conclusion:
DOT one alfacalcidol therapy produced a significant improvement in the mineral bone profile in our cohort of dialysis patients. DOT approach can help to improve the outcomes in dialysis patients with poor compliance.

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Tolvaptan in ADPCKD - a 3 year experience of service delivery in a district general hospital

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Introduction:
We describe our centre experience of service delivery for Tolvaptan use in ADPCKD in a district general hospital. In this setting, there were initial concerns if this could be feasible in a resource limited environment. We describe a simple service delivery plan that has made this feasible.

Methods:
Description of how we set up a Tolvaptan service across 2 hospitals 20 miles apart, spanning 3 counties (and their clinical commissioning groups) with no extra funding.
Presentation of the number of patients through our service, their eGFR, eGFR variance, and their annualised eGFR decline at 5 years before starting Tolvaptan, 12 months before, then 6 monthly reports prior and post starting Tolvaptan to describe its effectiveness.

Results:
Using renal registry coding data on our Clinical Vision database we were able to identify those with ADPCKD who could then be screened for potential Tolvaptan use. In addition, we set up a teaching programme for our renal consultant and junior colleagues on potential qualifying Tolvaptan criteria. This facilitated transfer of care to 2 consultants to assess, counsel, prescribe and review these patients in clinics as there was no resource available for an MDT approach. A real-time database was created for Tolvaptan patients to help monitor their bloods and prescription dates. With close ties with our pharmacy department, we are made aware when patients' Tolvaptan prescription are ending, so new prescriptions are completed.

We have delivered Tolvaptan to 23 patients to date. 3 people have stopped Tolvaptan: 1) stopped as intolerant to working life within the first 2 weeks of use. 2) LFT derangement within the first 3 months of use. 3) was ineffective with eGFR decline after 1.5years use.

Figure attachment shows an example of the data to be presented of the eGFR decline of our patient cohort. Spread and change of eGFR will also be presented for individual patients.

Conclusion:
The recent GiRFT review has highlighted we are in the top 20% of Tolvaptan use nationally. We have also enrolled in the observational trial for Tolvaptan side-effects 2 years ago (the PASS study) and presently 30% above recruitment target for this study. Using the education programme, close links with pharmacy and a real time database has allowed us to monitor blood results, and prescription dates to help Tolvaptan service delivery without extra resource.

More recently, we are using MRI total kidney volume assessment to help patients who do not qualify for Tolvaptan by eGFR decline, in order to start Tolvaptan earlier.

This abstract highlights the ease Tolvaptan can be started locally in a district general hospital setting without specialist teams initially. It is acknowledged that with increasing patient numbers, an MDT approach will likely prove more cost-effective in running a Tolvaptan service.

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Hematological Profile in End Stage Renal Disease Patients in Pakistan: A Cross-sectional Research Study

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Background: End Stage Renal Disease (ESRD) imposes a significant healthcare burden globally. A number of hematological parameters have been shown to be deranged in ESRD patients and are associated with anemia, coagulopathy and leukocyte dysfunction.
Objective: The objective of the research study was to characterize the hematological profile identified in ESRD patients.
Material and Methods: In this cross-sectional study, 156 ESRD patients were enrolled. Demographic details including age and gender and brief medical history was obtained. Medical records of the patients were also reviewed. In addition, upon obtaining written informed consent, venous blood sampling was performed by professional phlebotomist and results were acquired. The hematological profile was documented through predesigned proforma.
Results: The mean age of patients was 47.59 ± 5.87 years. There were 114 (73.1%) male and 42 (26.9%) female patients in this study. Overall, 96 (61.5%) ESRD patients had diabetes mellitus (DM), 89 (57.1%) had hypertension (HTN) and 65 (41.7%) had active smoking history. The average duration (months) of ESRD in patients was 15.5 ± 2.4, mean hematocrit (%) was 23.8 ± 3.2, hemoglobin (g/dL) was 8.7 ± 3.1, erythrocyte sedimentation rate (ESR) (mm/hr) was 94.2 ± 43.2, platelet count (cells/L) was 147x109 ± 65x109, white blood cell (WBC) count (cells/L) was 7654.8 ± 3947.4, neutrophil (%) was 67.3 ± 14.6, lymphocyte (%) was 30.5 ± 14.2 and eosinophil (%) was 6.2 ± 2.2. The hematological profile also revealed that 144 (92.3%) patients had anemia, 128 (82.1%) had elevated ESR, 25 (16%) had thrombocytopenia, 30 (19.2%) had leukocytosis and 19 (12.2%) had eosinophilia. When we stratified hematological profile of ESRD patients with regard to age, gender, DM, HTN, smoking status and duration of ESRD, we found significant correlation of age (elevated ESR and thrombocytopenia), gender (anemia, elevated ESR, thrombocytopenia and eosinophilia), DM (elevated ESR), smoking status (thrombocytopenia and leukocytosis) and duration of ESRD (thrombocytopenia and leukocytosis) ($P < 0.05$). No relationship was witnessed between hematological abnormalities and HTN.
Conclusion: In conclusion, our study demonstrated that anemia is a predominant clinical manifestation in ESRD patients along with elevated ESR, thrombocytopenia, leukocytosis and eosinophilia. A statistically significant correlation was observed between hematological abnormalities in ESRD patients and age, gender, DM, smoking status and duration of ESRD.

Keywords: Anemia; Eosinophilia; End Stage Renal Disease (ESRD); Hematologic Profile; Leukocytopenia; Thrombocytopenia

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Cytomegalovirus Infection and Risk of New-Onset Diabetes after Transplantation: A Retrospective Study

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Background: NODAT is a frequent complication among kidney transplant recipients and is considerably associated with risk of allograft rejection and allograft loss. The present research study was aimed to identify whether CMV infection acts as risk factor for NODAT development in kidney transplant recipients.
Methods: This retrospective study recruited 59 kidney transplant recipients (43 males and 16 females). The diagnosis of NODAT was established if two fasting plasma glucose readings were ≥126 mg/dL after the 3rd month of post-transplantation. We carefully monitored recipients for CMV viremia (CMV DNA copies/mL) in the plasma through quantitative Polymerase Chain Reaction (qPCR). The 1 year post-transplantation allograft outcomes due to CMV viremia were also measured; eGFR (CKD-EPI method), allograft and transplant patient survival.
Results: In this study, 14 (23.7%) patients were diagnosed with NODAT. The CMV load and CMV viremia was elevated in NODAT cohort in comparison with their counterparts (4000 versus 3600 and 51.1 versus 47.6, respectively); however, no statistical relationship was observed (P = 0.79 and P = 0.84, respectively). We witnessed significantly high CMV DNA replication in first (1-6 months) half of the post-transplant period in both controls and NODAT patients; however, statistically significant CMV DNA replication was only observed for NODAT cohort (P<0.001). Majority of the NODAT diagnoses; 9 out of 14 (64.3%), in our cohort was made during the first six months of kidney transplantation (P<0.001). Overall, 7 (11.9%) of the kidney transplant recipients recruited in our study progressed to symptomatic CMV infection. We also witnessed that a greater CMV viremia load was worsening the kidney allograft function at 12 months post-transplantation. The allograft and patient survival (censored for death) was poor in the NODAT cohort; however, without any statistical significance.
Conclusions: The present study demonstrated that CMV infection is not a risk factor for NODAT development among kidney transplant recipinets.
Keywords: New-Onset Diabetes after Transplantation (NODAT); Cytomegalovirus (CMV) Infection; Kidney Transplantation

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New-Onset Diabetes among Kidney Transplant Recipients in a Tertiary Care Hospital in Karachi, Pakistan

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Background:
New-onset diabetes after transplantation (NODAT) is significantly associated with increased infectious disease complications, allograft rejection, allograft loss and reduced overall patient survival. Among kidney transplant recipients, the incidence of NODAT has been reported between 4% and 25% in the literature. However, the incidence, risk factors and outcomes of NODAT among kidney transplant recipients are yet to be explored in Pakistan.
Aim: The aim of the research study was to explore the incidence, risk factors and outcomes of NODAT among kidney transplant recipients.
Methods:
This retrospective study enrolled 84 patients (61 males and 23 females) between March 2017 and February 2018. Of them, NODAT was diagnosed in 26 (30.9%) kidney transplant recipients. As per WHO criteria, diagnosis of NODAT was established if during the first month of post-transplantation, two fasting plasma glucose readings were ≥126 mg/dL.
Results:
The mean age of the research patients was 42 years ± 12 years. The median time to onset of NODAT was found to be 3 months. Upon univariate analysis, kidney transplant recipients were found to be significantly older in the NODAT cohort (P = 0.002), had a positive family history of diabetes mellitus (P = 0.004) and had pre-transplant glucose impairment (P = 0.022). However, no significant differences were noted related to BMI (kg/m2) and hepatitis C infection history between both the groups (P = 0.114 and P = 0.437, respectively). On the multivariate analysis, family history of diabetes (P = 0.036) and impaired fasting glucose (P = 0.043) were statistically significant risk factors for NODAT development. At six months follow up, serum creatinine of subjects with NODAT was considerably higher than their counterparts (1.33 ± 0.21 versus 0.93 ± 0.12, P = 0.023). Interestingly, upon one year follow up, the statistically significant difference of serum creatinine between both the cohorts retained (1.26 ± 0.17 versus 1.11 ± 0.29, P = 0.042). Significant difference of graft survival was also witnessed between the two groups (P = 0.022). However, no mortality was observed.
Discussion:
Our study findings are very similar to that of recently published by Abdulrahman et al. (2018). They reported a median time to inception of NODAT of 2.5 months. Their study found 1 year cumulative incidence of NODAT 14.1% and 5 years cumulative incidence of NODAT 27.5%. In contrast to our findings, they found BMI of >30 kg/m2 and age >60 years at the time of transplant as significant risk factors to development of NODAT. In Pakistan, a recently conducted research study by Mohammad et al. (2018) also found significantly high serum creatinine at 6 months follow up among kidney transplant recipients with NODAT. However, in contrast to our findings, they did not find statistically significant difference in serum creatinine at 1 year follow up. In conclusion, the present study demonstrated that NODAT has a substantial impact on allograft function and allograft survival and hence, suggests meticulous follow up of such patients.

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Use of vascular access for haemodialysis patients: a retrospective analysis of indications and outcomes in 12 months

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Introduction:
In recent years, there is an increasing trend in using central venous catheters (CVSs) rather than arteriovenous fistula (AVFs) at the start of haemodialysis (HD) worldwide. Studies reported there was a large variation in the use of different types of vascular access, and a relative paucity in evidence to explain the reducing trend in using AVFs.
In this report, we analysed the use of new vascular access for HD patients in our local trust for the 12 months' period from September,2018 to September,2019. We aimed (i) to assess the types of new vascular access for HD; (ii). To determine the appropriateness of vascular access use by analysing the clinical indications; (iii). To assess the outcomes of patients with the use of different types of vascular access.
Methods:
Three clinicians and one vascular specialist nurse collected data independently on the vascular access use for HD patients dated from 01/09/2018 to 01/09/2019. Data were sourced from vascular access nurses' records (part of renal registry data), Vita-data, discharge summaries and paper medical notes. Details were collected on the age of the patients, the type of vascular access, the indications of its use, and the outcomes/complications of each patient.
Results:
There was a total of 156 new vascular access formed in the 12 months' period, of which 117 were incident HD (44 with known established ESRD). The types of vascular access are divided between: 66 (42%) femoral CVC, 67 (43%) right internal jugular venous (IJV) tunnelled catheter, 3 (2%) femoral Tesio tunnelled catheter, and 20 (13%) AVFs.
The indications and outcomes for each type of vascular access demonstrated that the majorities of femoral CVCs were for crash landing AKIs (29/66: 44%) and the interim access due to blocked AVF (37/66: 56%), which was the results of a relatively long waiting time for fistuloplasty to be carried out in our local trust. The average waiting time for a routine referral was 14 days and an urgent referral 2 days, with the same day fistula-plasty a rare possibility. Majorities of the crash-landing AKI patients (18/29:62%) had a full recovery of renal function and only 1 died later with hospital acquired pneumonia.
Of those with RIJ tunnelled catheter, the main indications were either awaiting AVF formation /maturation (27/67:40%) or unexpected fast deterioration of CKD patients (24/67:36%). These patients were relatively older in age (with an average of 75 years).
Discussion:
Our results demonstrated that despite of appropriate clinical indications of the use of each vascular access, there is an urgent need to expand the vascular interventional service in our local trust to shorten the waiting time for fistula-plasty, and AVF formation. This serves to avoid the unnecessary interim use of femoral CVCs, which impacts negatively both on patients' health and the trust' economy, and also increase the rate of AVF use for incident HD patients with established ESRD, which stands at a much lower rate in our unit(20/44: 45%) than it is currently recommended by the renal association (60%).

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Circulating lymphocytes, monocytes and cytokines in renal transplant recipients and healthy controls: a longitudinal analysis

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Renal transplant recipients (RTRs) are at increased risk of cardiovascular disease, infection and malignancy. Surveillance of biomarkers associated with immunity and inflammation would be a valuable tool in patient management to predict events and guide clinical decisions. The aim of this study was to compare immune and inflammatory cells and cytokines in stable RTRs and healthy controls over a longitudinal period of 6 months.

Resting blood samples were taken from stable renal transplant recipients (n = 8, age: 54 ± 12 years, BMI: 25.6 ± 4.7 kg.m2, eGFR: 60 ± 12 ml·min·1.73m2) and healthy controls (n = 8, age: 42 ± 19 years, BMI: 24.4 ± 3.5 kg.m2, eGFR: 88 ± 2 ml·min·1.73m2) at week 0, week 4, week 8 and week 24. Peripheral blood mononuclear cells were stained with lymphocyte, monocyte, phenotypic and activation markers. EDTA-plasma was analysed for cytokines (IL-6, IL-10 and TNF-α) using affinity ELISA kits.

A Mann-Whitney U test was used to assess between-group differences and Friedman's ANOVA was used to assess within-group differences; any significant findings were followed up using a post-hoc test. There were no differences for circulating lymphocytes or monocyte lineage markers within or between groups over time ($P > 0.05$). Renal transplant recipients had greater circulating IL-6 at week 0 ($P = 0.021$) and week 4 ($P = 0.011$) than healthy controls. TNF-α was greater in renal transplant recipients at week 0 ($P = 0.003$), week 4 ($P = 0.001$), week 8 ($P = 0.002$) and at 6-months ($P = 0.029$) than healthy controls. No within-group differences were observed over time ($P > 0.05$).

This is the first study to compare immune and inflammatory cells in renal transplant recipients and healthy controls over a longitudinal period in their habitual states. Our data indicates elevated cytokines in renal transplant recipients that is likely contributing to systemic inflammation.

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Nephrology involvement in deceased donor kidney organ offers: a national survey.

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Introduction: The decision to accept or decline a deceased donor kidney offer is a complex process involving consideration of both donor and potential recipient factors. The decision is sometimes made with limited information about the potential recipient, by clinicians who may not know them directly. We undertook a national survey of consultant nephrologists to investigate their desire to be involved in the organ offer decision-making process.
Methods: We undertook an electronic survey of nephrologists in all renal units across the UK and asked questions regarding willingness to participate in the organ offer decision-making process.
Results: We received 176 responses from nephrologists in 47 different renal units. Fifty-nine percent worked in a transplanting unit and 12.4% were the first responder for organ offers.
When asked about their transplanting unit, 73% felt they were involved in organ offer decisions but only 50% were made aware of organ declines for their recipients. Sixty-seven percent felt they had sufficient involvement in the offer process while 39% wanted more and 14% did not wish to be involved at all.
When considering specific offers, 32% felt they should always be involved, 53% only when there are specific issues and 15% were happy for the transplanting centre to make the decision. The desire for involvement increased with greater complexity of the donor or potential recipient.
When asked whether nephrologists should be contacted about the organ offer before a decision is made, 31% replied always, 34% - only if there is enough time, 29% didn't need to know at the time and 4% did not need to know at all.
When asked about who should be contacted, 40% wanted the consultant looking after the recipient to be contacted during daytime hours, but during the night, the most common answer was the on-call nephrologist in the recipient centre (34%), followed by the nephrologist in the transplanting centre (30%) followed by surgeon alone (20%). Only 28% of units had a single contact number for the on-call nephrologist.
We asked about an email system informing nephrologists of organ offers for their patients; 61% felt it would be useful.
Discussion: Our survey revealed that most nephrologists are happy with their involvement in deceased donor organ offers but there is variation in willingness to be involved. The requirement for involvement also varied with the complexity of donor and recipient. Most nephrologists would like to know when an organ has been declined for their patient and we have approached NHSBT on the feasibility of providing a referring unit level report of named organ offer declines.

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Performance of GFR estimation equations in living kidney donors - A single centre study

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Introduction: CKD-EPI is routinely used to determine estimated glomerular filtration rate (eGFR). For potential living kidney donors (PLD) accurate assessment of kidney function is essential, and is achieved by measured GFR (mGFR) using plasma clearance of either crEDTA or Iohexol. At our renal unit Cystatin C is also routinely measured in PLD. We aimed to assess the role of Cystatin C eGFR (CySC) and combined CKD-EPI and CysC eGFR (Epi-CysC), versus CKD-EPI alone, against mGFR in a cohort of PLD.

Methods: Data were retrospectively collected from 113 PLD between 2015-18. Epi-CysC was calculated using NKF-KDIGO application. Statistical analysis was performed using PRISM and Excel. We analysed accuracy of eGFR equations within ±30% (P30) and ±10% (P10) of mGFR. Ethics approval was obtained from the Health Research Authority.

Results: Correlation analysis (eGFR vs mGFR) with Pearson's r coefficient was; 0.59 (P <0.001) for CKD-EPI; and 0.43 (P <0.001) for CySC. Corresponding R2 values on regression analysis were 0.35 and 0.19 for CKD-EPI and CySC vs mGFR, respectively. Accuracy (P30) was; 90.2% for CKD-EPI (n=113); 80.6% for CySC (n=108); and 89% for Epi-CysC. Accuracy (P10) was; 42% for CKD-EPI; 33.3% for CySC; 37.4% for Epi-CysC. Mean (SD) bias (eGFR-mGFR); CKD-EPI 2.3 (16.3); CySC 4.1 (20.6); Epi-CysC 3.7 (17.4). Precision (Root-Mean-Square-Deviation): CKD-EPI 16.2; CySC 20.3; Epi-CysC 17.1.

Discussion: CKD-EPI correlated better with mGFR than CySC in PLD. Both equations demonstrated acceptable P30 accuracy values, with CKD-EPI being superior to CySC. Both equations showed poor accuracy assessed by P10 values. Combined Epi-CysC did not improve the accuracy of eGFR. CKD-EPI demonstrated lower bias compared to CySC and Epi-CysC.
CKD-EPI and CySC eGFR equations showed significant correlation with Iohexol mGFR, but neither demonstrates acceptable accuracy to replace mGFR in PLD. Cystatin C does not add value to the accuracy of eGFR equations in PLD.

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A noticed decline in peritoneal dialysis prevalent patients in our unit and measures to encourage growth

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Objectives

Ascertain why the prevalent peritoneal dialysis (PD) population, as a percentage of the dialysis population, is decreasing. Use this data, to develop strategies to increase the incident population and maintain the prevalent population.

Methods

Review figures from the electronic database and extrapolate information. Investigate the total number of patients receiving a PD catheter, referred from low clearance clinic (LCC) or acute start. Review the number of patients still on therapy at 90 days. Investigate all the reasons for drop off.

Results

PD Prevalent population: 2017 76 (23% of prevalent population), 2018 73 (23%), 2019 59 (18%).

Number of PD catheters inserted by year; 2017 55 (52 LCC, 3 acute) 2018 54 (47 LCC, 7 acute) 2019 29 (19 LCC 10 acute)

Drop off time frame

2017 47 (8<90 days), 2018 39 (8< 90) 2019 44 (3<90)

Drop off reasons

Adequacy	2017 (3) 2018 (6) 2019 (5)
Recovered function	2017 (0) 2018 (4) 2019 (5)
Deaths	2017 (10) 2018 (11) 2019 (14)
Transplant	2017 (13) 2018 (9) 2019 (7)
Infection	2017 (14) 2018(4) 2019 (7)
Other	2017 (7) 2018 (5) 2019 (6)

Conclusion

The numbers of patients dropping off PD remains high. Drop off reasons highlighted infection as a leading cause, so we concentrated on peritonitis prevention. Introducing a retraining programme, completing a root cause analysis for every peritonitis and reducing the use of strong glucose bags has meant we have halved infection related losses. We hoped this would increase the prevalent PD population.

However, over the same period the numbers of PD incident patients has dropped, with a marked decrease in 2019 from LCC. Acute starts account for a third of incident patients in 2019. Therefore, to try to reduce

this marked decrease in LCC patients, we are relaunching a PD first strategy, the PD team is increasingly involved in LCC, PD staff and PD patients attend pre-dialysis education afternoons. The PD team attends the LCC MDT identifying potential PD patients early. We are also doing home assessments earlier and revisiting these patients as they get nearer to needing renal replacement therapy
This two pronged approach will then bring about an increased PD prevalence in our unit.

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Reporting E.coli bacteraemia in UK Renal Registry – what does it tell us about our haemodialysis population?

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Background

As stated in the 2017 UK Renal Registry (UKRR) report Public Health England (PHE) has carried out mandatory enhanced surveillance of MRSA bacteraemia since October 2005 and of MSSA bacteraemia since January 2011 for NHS acute trusts, with the subsequent addition of E. coli bacteraemia and C. difficile reporting. It was also stated that in previous reports 'infection data were validated by securely emailing individual renal centres to confirm that infections were related to dialysis patients. Historically, this has resulted in only a small number of alterations in cases and so was not undertaken for these analyses'.

Our unit was highlighted as having the highest rate of E.coli bacteraemia of 4.45/100 HD days. Should we worry?

NHSE is proposing new targets aimed at reducing levels of E.coli, MSSA, Klebsiella and Pseudomonas be included in the 2012 NHS standard contract. According to PHE E.coli infections increased by 27% between 2012 to 2018.

Method

All E.coli positive blood cultures in patients on haemodialysis were reviewed as to their root cause in 2016 and 2017. This included review of case records, microbiology and dialysis access.

Results

In 2016 and 2017 there were 27 positive blood cultures in 21 patients (2016 14 in 13 patients; 2017 13 in 11 patients). Urosepsis was confirmed as the source in 5; bowel perforation or diverticulitis n=5; ischaemic bowel n=1; biliary sepsis n=2; infected APK/LD cyst n=2; limb gangrene n=3; leg ulcers n=1; pneumonia (confirmed at post mortem) n=1; presumed abdominal source n=1. The vascular access was: 4 AVG; 10 AVF; 6 Tunnelled dialysis catheters (TDC).

Conclusion

Whilst always necessary to be cognisant of infection rates and types of infection in our haemodialysis patients reporting E.coli rates without context is unhelpful. The purpose of the NHSE`s surveillance is to identify E.coli linked to healthcare associated infections so they can be prevented by altering practice eg: increase in urinary catheter related E.coli sepsis (look at issues around catheter care), E.coli sepsis post urological procedures (review of surgical technique, need for/choice of antibiotic prophylaxis), increase in cases of E.coli pyelonephritis (are lower UTIs being picked up and treated adequately in the community?) etc.

It is unclear by reporting these rates in the UKRR whether the implication is that these E.coli infections are avoidable haemodialysis practice, if high rates are deemed a marker of the quality of renal unit care and/or

of the vascular access type and/or its care? Our root cause analysis has confirmed the sources of the E.coli infections have no relation to practice within our unit.

Our current vascular access related infection rates are 0.16 events/1000 catheter days in TDCs (MRSA x1, MSSA x1, Klebsiella x2, Serratia x2, Enterococcus x1) and 0.02 events/1000 AVF/G days in AVF/G (MSSA x2). These rates compare very favourably to published rates in the literature. We do not use antibiotic-lock solutions (resistance risk; hides poor practice). The best reported TDC rates in units where these are used are 0.62, 0.28, and 0.24 events/1000 catheter-days (CJASN 9: 1156–1159, 2014)

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The safety profile of repeat rituximab treatment in ANCA-associated vasculitis – a 10 year single centre study

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Introduction:
Rituximab is a proven effective induction and remission-maintenance treatment in patients with antineutrophil cytoplasmic antibody (ANCA)-associated vasculitis (AAV). Studies have identified hypogammaglobulinemia, infection, and late-onset neutropenia as potential adverse events. There is limited data on long-term outcomes following extended periods of B-cell depletion therapy with rituximab in AAV cohorts. We conducted a retrospective study to examine the safety profile of repeated rituximab treatment in AAV.

Methods:
All patients with AAV treated with rituximab between 1st January 2008 and 31st December 2018 were identified through local dispensary database. Patients were stratified into low (≤4g), medium (>4g to ≤8g) and high (>8g) dose groups according to the cumulative rituximab dose received until 1st October 2019. Baseline characteristics and events including death, opportunistic and severe infections (defined as infections required hospitalization and/or intravenous antibiotic administration), neutropenia (neutrophil count≤1.5x109/L), hypogammaglobulinemia (IgG level≤5.0), infusion reactions and malignancy diagnosed post-rituximab treatment were examined and compared between the groups.

Results:
364 patients (49% male, 52 year old mean age) received rituximab for treatment of active disease or remission maintenance. 49%(n=175) had repeat rituximab treatments (267/513 treatment courses for relapsing disease and 247/513 for remission maintenance). There were 262 (72%), 70(19%) and 32(9%) patients in low-, medium- and high-dose groups respectively. The median cumulative rituximab dose for each group was 2g, 6g and 12g (p<0.001). Low-dose group patients were older (59 and 40 years, p<0.001) and more likely to have renal-limited disease compared to high-dose groups (19%vs4%; p<0.05). Conversely, there were more ear-nose-throat (ENT) /ocular limited (41%and13%;p<0.05) and antiproteinase 3 (PR3)-ANCA positive disease (56% vs 38%, p<0.05) in high-dose compared to low-dose group. The overall median duration of follow up was 72 months (QR: 28-135months).

Outcomes:
Infections: no difference in serious or opportunistic infection rate between groups (1.2vs0.1 vs0.1infections/patient/year; p=0.18). 77% of opportunistic infections across all groups were related to herpesvirus (e.g. Cytomegalovirus/Herpes Zoster/Herpes Simplex) reactivation.

Hypogammaglobulinemia: incidence was comparable between groups (9.7%vs10%vs9%,p=0.91). Overall median time to event was 5 months from first rituximab.

Neutropenia: 101 patients had recorded neutropenia after rituximab (Low-dose:32%; medium-dose:16% and High-dose: 22%,p<0.05). All were related to concurrent immunosuppressants (e.g. Azathioprine,

cyclophosphamide or mycophenolate) or infection. Events resolved after withdrawal or reduction of concurrent immunosuppressant or treatment of underlying infection.

Cancer: No difference in malignancy rate between groups (6%vs14%vs3%, p=0.22). 39 malignancies reported in 32 patients post rituximab treatment. The two commonest reported cancers were skin (36%) and breast cancer (21%)
Deaths: 58 patients died during the study period. Mortality rate in the low and medium-dose groups were comparable (82% survival at 30 month after last rituximab). Conversely, there were no deaths in the high-dose group.

Conclusion:
In this large single-centre cohort of patients with AAV, we did not observe an increased incidence of adverse events with increasing cumulative rituximab exposure. This likely reflects physician bias in patient selection for repeat treatment and suggests that in selected patients, extended periods of rituximab treatment might be safe. The superior survival seen in high-dose group was likely related to higher proportion of ENT/ocular limited vasculitis.

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Treatment Efficacy of Biosimilar Rituximab (Truxima®) Compared to the originator (Mabthera®) in Patients with ANCA associated Vasculitis

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Background and Aims:
Truxima is a biosimilar version of rituximab. It was licensed & launched in the United Kingdom in April 2017. A biosimilar medicine is made to be highly similar in quality, safety and efficacy to existing licensed "reference" biological medicine and the cost is often significantly lower. A recent systematic review showed comparable long-term efficacy and safety of biosimilar rituximab to the originator drug in treatment of rheumatoid arthritis and non-Hodgkin's lymphoma. Fewer data are available in regards to the efficacy of biosimilar rituximab in treatment of antineutrophil cytoplasmic antibody (ANCA)-associated vasculitis (AAV). A retrospective study was thus conducted in our centre to examine the efficacy of Truxima when compared to the reference rituximab (MabThera) in the treatment of patients with AAV.

Method:
All patients with new or relapsing AAV who received first ever rituximab therapy between 1/1/2016 and 31/12/2018 were identified via hospital dispensing database. Patients were stratified into Truxima or MabThera treatment group depending on the version of rituximab administered. Primary outcomes that were assessed include: time to B cell depletion (defined as absolute B cell count (ABC) ≤10) and repletion (i.e ABC >10 and >20); time to antimyeloperoxidase(MPO)/antiproteinase 3(PR3)-ANCA negativity; Secondary outcomes assessed include: overall survival, time to major relapse (defined as relapse requiring further course of rituximab for remission induction); adverse events including episodes of neutropenia, hypogammaglobulinemia and major infusion reactions. Subgroup analysis in patients who received concomitant cyclophosphamide and rituximab or other induction therapy was performed to examine if it impacts on the treatment efficacy.

Results:
59 and 60 patients received Truxima and MabThera respectively for treatment of new or relapsing AAV. The baseline characteristic (age, gender, entry estimated Glomerular Filtration Rate, proportion of patients received concomitant cyclophosphamide, ANCA serology and organ involvement) of both group were comparable. All patients achieved clinical remission following induction treatment. Using Kaplan Meier analysis and log rank test, no difference was identified in time to B cell depletion or repletion (Figure 1&2), MPO/PR3-ANCA negativity (Figure 3), overall survival or major relapses requiring further rituximab as induction therapy.
Treatment efficacy of Truxima and MabThera did not differ in subgroup analysis. However we observed that patients who received concurrent cyclophosphamide during induction therapy achieved MPO/PR3-ANCA negativity more rapidly compared to those who did not irrespective of the version of rituximab received. No difference in adverse events such as major infusion reactions was seen in either group upon first rituximab exposure. Two patients in each group developed reactions following repeated dosing of rituximab.

Conclusion:
Biosimilar rituximab Truxima appears to have comparable treatment efficacy compared to the reference drug in our cohort of patients with AAV.

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Validation of the ANCA Renal Risk Score in a London Cohort: Potential Impact of Treatment on Prediction Outcome

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Introduction:
A renal risk score was recently developed to predict the risk of progression to end stage kidney disease (ESKD) in patients with ANCA-associated glomerulonephritis (ANCA-GN). The score defines three risk groups, each with distinct renal survival at 36 months: 68% of high-risk patients reaching ESKD, compared to 26% and 0% in the medium- and low-risk groups, respectively. The majority of patients (101/115) used to define the risk score were treated with IV cyclophosphamide and steroids. At our centre, we employ a combined low-dose IV cyclophosphamide, rituximab and oral corticosteroid induction regimen, with or without plasma exchange (PEX) depending on disease severity, for ANCA-GN. A recent cohort study suggested this combination regimen may lead to better renal survival. We thus hypothesized that choice of remission-induction treatment may affect prediction accuracy of the risk tool. We retrospectively test the validity of the ANCA renal risk score in patients with ANCA-GN treated at our centre.

Methods:
All patients with newly diagnosed, biopsy-proven ANCA-GN from 2006-19 were identified from local renal histopathology database. Patients with relapsing ANCA-GN, EGPA, other coexisting GN, or missing data on induction therapy or eventual renal outcome were excluded. ANCA-negative pauci-immune GN was included. Baseline demographics, ANCA serology, initial therapy and parameters in the ANCA risk score (including % normal glomeruli, % tubular atrophy and interstitial fibrosis (TAIF), and estimated glomerular filtration rate were collected. All patients were stratified using the risk tool and Kaplan Meier survival analysis was applied to examine the ESKD prediction. Subgroup analysis was then performed for patients who received the combination regimen of cyclophosphamide and rituximab.

Results:
178 patients with a median follow up of 44 month were included in the analysis. The median age was 62 years and 82 patients (46%) were female. 94(53%) were MPO-ANCA positive, 66(37%) PR3-ANCA positive, 15 (8%) ANCA-negative, and 3 (2%) were double PR3/MPO-ANCA positive. 148 (83%) patients received the combination regimen, and 45 had concurrent PEX. Total of 37 (21%) patients reached ESKD. 29 (78%) of these, developed ESKD within 36 months of initial diagnosis. Using the risk score, 64(36%), 76(43%) and 38(21%) patients were deemed low-, medium- and high-risk, respectively. Very distinct poor renal survival at 36 months was seen in high-risk group (55% reaching ESKD, $p<0.01$), but was less apparent between low- (95%) and medium-risk (90%)($p=0.052$) (Figure1); In the subgroup of patients treated with combination regimen without concurrent PEX, the high-risk subgroup continues to demonstrate poor renal survival at 36 months (60% ESKD), but renal survival between low- and medium-risk group were comparable (0 and 2% respectively, $p=0.57$) (Figure 2).

Conclusion:
In our cohort, the ANCA Renal Risk Score reliably predicted rapid ESKD progression at 36-month in high-risk patients, but was less accurate for distinguishing patients with low- and medium-risk. The subgroup analysis suggested combined cyclophosphamide and rituximab therapy may have modified long-term renal outcome

especially in the medium-risk cohort, influencing the accuracy of the prediction tool. Large multi-centre cohorts are required to further evaluate the potential impact of treatment on predicting outcome.

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Stable calcium isotopes: a novel biomarker of bone mineralisation in children with chronic kidney disease

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Background: In CKD dysregulated calcium (Ca) homeostasis is common and causally associated with reduced bone mineral density (BMD) and vascular calcification. Currently available radiological measures and biomarkers do not allow accurate evaluation of BMD.

Naturally occurring stable (i.e. non-radioactive) Ca isotopes, ^{42}Ca and ^{44}Ca, are present in our diet, taken up in all parts of the body and excreted in urine and feces. ^{42}Ca and ^{44}Ca are sequestered in different body compartments at different rates depending on their atomic mass, following distinct rules of kinetic isotope fractionation: isotopically light Ca (^{42}Ca) is always enriched during chemical transport reactions (i.e. incorporation into bone), while the reactant (i.e. urine) becomes enriched in the heavy Ca isotope (^{44}Ca). The ratio of Ca isotope (expressed as $\delta^{44}/^{42}$Ca_Blood or $\delta^{44}/^{42}$Ca_Urine) gives a direct function of the state of bone turnover.

Our hypothesis is that natural Ca isotope fractionation ($\delta^{44}/^{42}$Ca levels in blood and urine) is a sensitive and specific measure of bone mineral balance in children with CKD.

Methods: We measured stable Ca isotopes ^{44}Ca and ^{42}Ca by plasma-ionization mass-spectrometry in blood and urine. The relationship between bone Ca gain and loss was calculated using a compartment model based on Ca kinetics, and expressed as $\delta^{44}/^{42}$Ca. Ca absorption from bones increases $\delta^{44}/^{42}$Ca_Blood and $\delta^{44}/^{42}$Ca_Urine, and resorption decreases these fractions.
104 children in CKD4-5 and on dialysis (CKD4-5D), 40 age-matched children and 100 healthy adults (18 - 75 years) had Ca isotope measurement and bone biomarker analysis. Children with CKD4-5D (ages 5-18 years) also underwent dual energy x-ray absorptiometry (DXA) and tibial peripheral quantitative CT scan (pQCT), an accurate measure of cortical BMD.

Results: In healthy children the $\delta^{44}/^{42}$Ca_Blood and $\delta^{44}/^{42}$Ca_Urine were higher than in adults ($p<0.0001$), reflecting avid Ca uptake during bone formation (Figure 1A). Since urinary Ca excretion is impaired in CKD, $\delta^{44}/^{42}$Ca_Blood was higher and $\delta^{44}/^{42}$Ca_Urine lower in children with CKD4-5D compared to controls ($p<0.001$ for both; Figure 1B).

In CKD2-5D $\delta^{44}/^{42}$Ca_Blood positively correlated with cholecalciferol ($p=0.01$) and alfacalcidol ($p=0.002$) doses, implying increased bone Ca uptake when Ca bioavailability is increased. $\delta^{44}/^{42}$Ca_Blood positively correlated with biomarkers of bone formation (alkaline phosphatase, $p=0.05$) and negatively with bone resorption markers (PTH, $p=0.013$; TRAP5b, $p<0.001$ and CTX, $p=0.006$). $\delta^{44}/^{42}$Ca_Blood positively correlated with tibial cortical BMD-Z-score ($p=0.006$, $R^2=0.39$), and DXA hip BMD-Z-score ($p=0.02$). On multivariable linear regression analysis significant and independent predictors of tibial cortical BMD-Z-score were

$\delta^{44}/^{42}$Ca_Blood (β=0.68, p=0.006) and PTH (β-0.39, p=0.04), together predicting 67% of the variability in BMD.

Conclusions: Ca isotope ratios provide a novel, non-invasive method of assessing bone mineralisation. Defining an accurate biomarker of bone mineral balance will form the basis of future studies investigating Ca dynamics in health, disease states and in response to treatments that can alter bone homeostasis, so as to guide safe and effective treatment to prevent Ca deficiency or overload.

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Hypocalcaemia management post parathyroidectomy in renal patients - A review of practice

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Background and aims
Hypocalcaemia is a common post-parathyroidectomy complication in renal patients with secondary hyperparathyroidism. This is due to reduced parathormone (PTH) mediated calcium absorption in the kidneys and increased influx of calcium to bones. Our initial study in January 2015 showed preloading patients with one alfacalcidol 2 microgram once a day for 5 days preoperatively was ineffective in reducing hypocalcaemia related complications. We re-investigated the outcomes in patients following a change in practice to use one alfacalcidol 5 microgram once a day for 5 days preoperatively.

Method
All patients with pre-existing chronic kidney disease (CKD) who underwent parathyroidectomy by a single surgeon in our centre between March 2016 and October 2017 were included (12 patients). The outcomes (length of hospital stay and hypocalcaemia requiring IV calcium replacements) were compared with a previous study on patients operated on by the same surgeon between April 2008 and September 2014 (24 patients). Statistical analysis was conducted using Microsoft excel and SPSS version-22.

Results
Twelve patients were included in this study; 5 were females. Mean age at surgery was 54 (range 45-61) years. Eight patients were on long-term haemodialysis, 3 had a functioning renal transplant and 1 had CKD stage 5. Eight patients had been receiving cinacalcet for more than one month preoperatively.
Mean length of stay (LoS) was 5.3 days (range 3-10), half (n=6) were discharged four days post-op. Ten had a total parathyroidectomy, of which half (n=5) were discharged after post-op day 4. Four patients were not preloaded with 5mcg as per protocol; reasons for non-adherence to the protocol included regular prescription of alfacalcidol and physician discretion to utilise a lower dose. Patients with lower pre-op corrected calcium levels (2.4-2.6 mg/dL) stayed for a mean of 6.74 days after surgery. This was a longer LoS compared to other calcium ranges. No hypercalcemia related complications were recorded. The need for post-operative intravenous calcium use decreased from 10/24 to 2/12. Despite more patients having total parathyroidectomy and being on dialysis, a smaller proportion required IV calcium in the post-operative phase, although this was not statistically significant due to the small sample size (p=0.26).

Conclusion
Our study highlights that the current practice of preloading one alphacalcidol 5 mcg once a day for 5 days preoperatively in renal patients undergoing parathyroidectomy appears to be a safe and effective approach. Ongoing monitoring and further studies on a larger cohort of patients is needed to strengthen these observations.

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Identifying AKI deterioration rates in an acute hospital setting; a comparative study.

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Introduction

Acute Kidney Injury (AKI) still has a high prevalence across the United Kingdom and a higher association with mortality. It was identified within an acute hospital setting that there was a lack of information regarding the deterioration of AKI among the inpatient population.

Method

Using 'in house' data collection obtained from daily reviews of every triggered AKI alert from the hospital pathology laboratory using the NHS England algorithm for standardising the early identification of AKI (NHS England, 2014). The Acute Kidney Injury Nurse Specialist from the period of 2017 to current has kept a record of AKI alerts from inpatient, outpatient and primary care trust bloods. Organising them into community or hospital acquired AKI alongside of admitting speciality.

Using this historic data collection and expanding the existing data into an Excel 'IF' function; a formula was created that was able to identify inpatient only deterioration based on an individual hospital number to count deterioration of AKI stage 1-2, 1-3 and 2-3 per patient, per initial AKI stage on a monthly bases.

Results

On average the trust has approximately 400-600 inpatient AKI alerts a month. From the time period of April 2017 to March 2018 the average of all AKI deterioration was 15% with 22% of hospital acquired (HA) AKIs deteriorating compared to 14% of community acquired (CA). For the time period of April 2018 to March 2019 the average of overall deterioration remained at 15% with a decrease in HA AKI deterioration to 20% and an increase of CA deterioration to 16% (Table 1).
The data further broken down into deterioration per stage shows that there is a higher rate of deterioration from 2-3 (for both HA and CA) AKI alerts comparatively over the two years with a peak of 28% for HA in 2018-19. Whereas stage 1-2 deterioration, patients were more likely to deteriorate if the AKI was HA compared to CA with between 18-20% of stage 1's deteriorating to stage 2. Finally, there was a similar average of deterioration for stage 1-2 for both HA and CA AKI 1's at an average of 4% (Table 2).

Conclusion

These initial results show the rate of AKI deterioration increased between 2017-18 and 2018-19. With a higher percentage of deterioration among the HA AKI in comparison to CA which is not unexpected. It identifies that there is a higher rate of deterioration among stage 2-3 regardless of HA/CA status as well as identifying that a similar percentage of patents deteriorated from stage 1-3 across both years. The reason for individual deterioration is unknown, and though it can be expected that there will always be a certain percentage of deterioration, that cannot be halted. The reason for this percentage of deterioration across this time period is not thus far identified. Current deterioration continues to be monitored and will be compared to current results April 2020.

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Vancomycin dosing for peritoneal dialysis-related peritonitis: a single centre experience

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Background
Peritoneal dialysis (PD) related peritonitis is one of the serious complications of PD and needs prompt early treatment with appropriate antibiotics. Vancomycin is a commonly used antibiotic for this condition as it can be safely instilled intraperitoneally and has longer duration of action due to reduced clearance secondary to renal impairment. Plasma vancomycin level could be affected by various factors including the level of residual renal function which could be significant in PD patients. There is no recommended national or international consensus on the frequency of vancomycin dosing in PD patients due to lack of pharmacokinetic data.

Methodology
In our centre, we changed practice from vancomycin dosing once a week for PD peritonitis to more frequent dosing till 10th day from the start of antibiotic course. Vancomycin was administered on days 1, 3, 5 and 10 of an infection episode. Plasma vancomycin level was checked prior to every dose and dose adjustment was made based on the level on the same day. Residual renal function was measured as renal urea clearance (Kru) through 24-hour urine collection. Data was collected prospectively for a period of 1 year following change in the administration protocol.

Results
A total of 9 PD peritonitis episodes in 4 patients were treated using vancomycin over a period of 12 months. The mean age of the participants was 64.6 (± 14.8) years and the mean weight was 75 (± 7.1) kg. All patients received 30mg/kg of vancomycin on day 1. The mean plasma vancomycin levels were 18.8 (± 1.9), 26.9 (± 4.4) and 22 (± 3.2) mg/L on days 3, 5 and 10 respectively. Except in 1 patient episode, the levels were above the therapeutic range on day 5 for all other episodes. Plasma vancomycin levels were within the therapeutic range on days 3 and 10 in all patient episodes. In 2 episodes, drug levels tested on day 6 or 7 showed the levels to be in therapeutic range. There was a poor correlation between vancomycin level and Kru for both day 3 ($r = 0.04$) and day 5 ($r = 0.19$).

Discussion
Whilst dosing vancomycin once a week may be sub-therapeutic in PD peritonitis, more frequent dosing run the risk of causing vancomycin toxicity. Our study findings indicate accumulation of the drug does happen in PD patients as evidenced by plasma drug level above the therapeutic range on day 5 and return to therapeutic level on day 10 following a longer dosing interval. Our data also suggests there should be a minimum of 3 days interval between consecutive vancomycin doses. The effect of residual renal function on vancomycin level may not be significant at low levels of eGFR and hence, should not necessitate more frequent dosing. We intend to change our dosing protocol based on these results to reduce the risk of vancomycin toxicity through accumulation secondary to frequent dosing.

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Cardiovascular Determinants of Physical Function in Patients with ESRD on Haemodialysis

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Objectives: Patients with end-stage renal disease (ESRD) are amongst the most sedentary of all patient groups. Physical function has been shown to predict mortality in this patient group, but the relationship between measures of physical function and prognostically-relevant aspects of CV disease has not been fully explored. This could offer insight into whether exercise interventions could target specific elements of CV disease seen in these patients.

Methods: 130 haemodialysis patients, recruited as part of the CYCLE-HD trial, underwent comprehensive cardiovascular phenotyping with cardiac MRI and cardiac biomarker assessment. Subjects completed field tests of physical performance and capacity including; the incremental shuttle walk test (ISWT), sit-to-stand 60 (STS60) and the short physical performance battery (SPPB). Univariate and multivariate regression analyses were performed to identify the cardiovascular determinants of each measure of physical functioning. Pre-specified prognostically relevant measures cardiovascular disease (high-sensitivity troponin I (hsTnI), NT-proBNP, LV mass index, LV ejection fraction, LV mass:volume ratio, global native T1, pulse wave velocity (PWV), and global longitudinal strain) and variables known to influence physical performance (age, body mass index, gender, diabetes) were included in multivariable regression models to identify the independent cardiovascular determinants of physical function.

Results: Between 113-117 participants completed each field test. Mean age was 57 years (±15), 73% were male and median dialysis vintage was 1.3 years (0.5, 3.4). On univariate correlation, age and diabetes were associated with all three physical performance tests ($p<0.01$). Additional significant associations with the ISWT and STS60 were hsTnI, PWV and native T1. NT-proBNP also correlated with the ISWT. In multivariate models, age and diabetes were determinants of all measures of physical performance. Global native T1 was the only CV determinant to independently predict performance, and only in the ISWT. Multivariate regression models are shown in Tables 1, 2 and 3.

Conclusion: In patients on haemodialysis, native T1 was an independent determinant of ISWT performance, a measure of aerobic capacity. Age and diabetes were the overwhelming determinants in all physical function tests. These findings underscore the consequences of diabetes on metabolic ageing and physical deconditioning. Improving strategies for prevention and management of diabetes may ameliorate the 'deconditioning spiral' in these patients. Whether interventions improving physical performance translate into improvements in prognostically relevant measures of CV disease requires further study.

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Decision making about home dialysis: What are the voices of renal patients approaching end stage kidney disease?

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Introduction

Patient preference to modality choice requires further exploration in the literature. This aspect of inquiry is pertinent because other than those patients who experience life limiting physical and cognitive states, it is unclear why patients approaching end stage kidney failure change their mind about dialysing at home. Access to home dialysis therapies should be an achievable option to many[1]. A critical literature review was therefore undertaken to elicit the extent of inquiry about decision making in predialysis patients approaching end stage kidney disease.

Method

Databases used in the search strategy were: Cochrane Library- all years; Cumulative index to Nursing and Allied Health literature (CINAHL) 1970 – 2019, Medical literature On-line (Medline) 1970 – 2019, Psychological Information Database (PsycINFO) 1970 – 2019.
Key search terms used: Home therapies', 'Haemodialysis', 'Peritoneal Dialysis', 'Shared decision making' 'Culture', 'Ethnicity' and 'identity'. A search of the Electronic Theses Online Service (ETHoS) for renal theses yielded 2 relevant results with relevance to the review.

Results

Three key themes emerged from the data extraction tool.

1. Patient empowerment in the shared decision process
There is robust evidence in the literature linking effective and timely patient education to empowerment, and this finding is translated to the notion of modality decision making in the predialysis setting irrespective of age, education level and health literacy. Of significant note is that empowerment and quality of life among peritoneal dialysis (PD) patients is enhanced compared to haemodialysis (HD), but the literature is very limited in order to give credibility to these findings. What is striking is that despite the apparent superiority of PD in this regard, the 'take up' rate of this modality is consistently poor.

2. Addressing decisional conflict
The complex nature of decision conflict is a renowned concept across many healthcare disciplines. Decision conflict has potentially serious repercussions for CKD patients approaching ESKD because a decision made and missed opportunity to self-manage dialysis at home will compromise superior clinical outcomes and the treatment flexibility that home dialysis affords.
Decisional conflict is complex in nature. Level of education and the ability to understand the information presented can influence decision making conflict and participation in the shared decision making process [2]

3. Cultural influences in decision making

There is a relative paucity of research literature available to elucidate the effectiveness of shared decision making among cultural groups. It is clear that empowerment in decision making must apply to each individual irrespective of patients' existence within cultural groups. Tailored predialysis information and education is equally important across all cultural groups [3]

Conclusion

There are significant, albeit limited findings which link enhanced shared decision making and patient empowerment to the peritoneal dialysis modality. [4,5]6[7,8]9 Of continued uncertainty is why, despite evidence of CKD patient willingness to engage in home dialysis preparation, particularly PD, the enthusiasm for independence and autonomy is lost at end stage kidney disease when the final decision to commit is required. Research evidence supports conclusively that home dialysis therapies improve clinical outcomes and quality of life, but it is already elicited in the evidence that patient uptake to home dialysis therapies is notoriously under recruited to 10, 11

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Patient activation, symptom burden and quality of life across chronic kidney disease stages: results from a large UK cohort

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Introduction

Patient activation, the knowledge, skills and confidence of an individual to manage their own health, can be assessed via the Patient Activation Measure (PAM), which places respondents into one of four activation levels ranging from Level 1 (lowest) to Level 4 (highest). There is increasing evidence that in people with chronic disease, higher levels of patient activation are associated with better health outcomes. In chronic kidney disease (CKD), a few small studies have described associations between patient activation and both Health-Related Quality of Life (HRQoL) and symptom burden, but there is little evidence available from the UK CKD population. The Transforming Participation in CKD (TP-CKD) programme gathered Patient Reported Outcome Measure (PROM) data from a large UK kidney patient population, comprising non-dialysis and pre-dialysis CKD, dialysis and kidney transplant patients. This study aimed to explore the factors associated with patient activation in the TP-CKD cohort.

Method

This cross sectional study comprised of 3,325 adults (≥aged 18) from 14 UK renal units who completed the Your Health Survey (YHS) as part of the TP-CKD programme. The YHS included the Patient Activation Measure, the POS-S Renal and the EQ-5D-5L for assessment of patient activation, symptom burden and quality of life, respectively. The survey data were linked to the UK Renal Registry (UKRR) data to obtain information on patient demographics and comorbidities.
Latent class analysis (LCA) was used to identify classes that best described the HRQoL and symptom burden data. Multinomial logistic regression analysis was used to investigate the association between patient activation and symptom burden and HRQoL separately, adjusting for age, gender, deprivation, comorbidities and treatment modality.

Results

After excluding those lacking UKRR-linked data, the final sample included 2,644 patients (mean age 61.5 years, 60.3% males, 53.3% haemodialysis patients). 25.4% were PAM level 1, 18.6% PAM level 2, 33.9% PAM level 3 and 17.7% PAM level 4.
LCA found that three classes provided a good fit to the data for HRQoL (high, medium and low quality of life) and for symptom burden (few, some and many) (Figure 1).
Results of the regression models showed that highly activated patients (PAM level 4), the odds of having a low quality of life is 4% compared to the least activated patients (PAM level 1), and the odds of having a higher quality of life increased with patient activation. A similar trend was observed for symptom burden, with patients who were highly activated having low odds (4%) of having many symptoms (Table 1).

Discussion

This is the first large UK study to demonstrate that low activation levels are associated with a higher symptom burden and reduced quality of life across the trajectory of CKD stages and treatment modalities. Identifying the factors associated with low and high activation levels indicates which patients may need extra help to manage their health, symptoms and quality of life. This overlooked topic merits more research and clinical attention to optimise resource targeting and deliver improved care quality and outcomes at lower costs.

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‘Bikes for Dialysis’: A service improvement project introducing intradialytic exercise to a satellite haemodialysis unit

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Introduction
It is widely accepted that exercise is beneficial in patients with end-stage renal disease as in the general population, and meta-analytical evidence supports the benefits of intradialytic exercise (IDE) for the improvement of several heath related outcomes including physical performance and mental health[1]. Patient adherence to an exercise programme is improved if delivered during haemodialysis (HD)[2]. However, it remains a challenge to incorporate exercise programmes into routine clinical practice. Our service improvement project aimed to demonstrate a safe, tailored IDE service is feasible and acceptable by staff and patients and is life enhancing for partaking patients.

Methods
Charitable funding enabled provision of 2 dialysis bicycles and a senior physiotherapist time one day per week. Consenting patients were recruited based on inclusion and exclusion criteria. An IDE regime used with previous research[2] consisting of cycling for up to 30 minutes during a dialysis session was administered. Data on Sit to Stand in 60 Seconds (STS 60) (indicator of exercise capacity), Duke Activity Status Index (DASI) (indicator of self-reported level of fitness), Hospital Anxiety and Depression Scores (HADS), Kidney Disease Quality of Life (KD-QoL) and pre-dialysis blood pressure were collected at baseline, 3 and 6 months, or upon cessation of IDE. Patient/staff feedback questionnaires were completed at 6 months, or upon cessation of IDE.

Results
8 patients were initially recruited to exercise on the 2 bicycles. If a patient withdrew from the programme, another patient was recruited in their place. In total 11 patients took part in the IDE programme during the 6-month inclusion period. 3 patients withdrew within 6 weeks due to pain, hypotension and transferring to home haemodialysis. 3 patients took part in IDE for 3 months and 5 patients for 6 months.

Over 1600 miles were cycled in 200 sessions. There were notable improvements in STS 60, DASI, and HADS, indicating increase in exercise capacity, self-reported home physical functioning, and decrease in anxiety/depression levels (Table 1). There was marginal improvement in (3%) in patient reported quality of life measures. Blood pressure was closely monitored during dialysis and emergency saline was required twice due to extreme hypotension. All patients made a full recovery with no harm.

Staff and patient feedback was positive. Patients commented on several benefits of IDE including improved energy levels, weight management and a “welcome distraction” whilst dialysing. Staff noted improved patient morale on the days of IDE on the dialysis unit. Three patients undergoing transplant work-up were exempted from completing cardio pulmonary exercise tests as their IDE data confirmed fitness for surgery, saving both time and money.

Discussion
This successful, safe and feasible trial of IDE was rated positively by patients and staff. The limited sample size showed a trend of increasing physical function, mood and quality of life. This has led to further funding, extending the project to observe longer term effects and compliance in our patient group. Increase in

frequency, equipment and physiotherapy staffing could benefit a wider HD population in our trust. Organisational change is required to enable this.

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The association between frailty and outcomes after acute kidney injury: a cohort study in UK routine care

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Introduction:

The evidence for association between frailty and outcomes following acute kidney injury (AKI) is limited. An improved understanding of how pre-admission frailty is related to long-term outcomes may guide clinical practice, for example understanding length of survival could inform decisions about initiation of renal replacement therapy.

The electronic frailty index (eFI) has been developed from information routinely recorded in United Kingdom primary care health records for use in adults from the general population aged 65-95 years. The eFI can categorise individuals as fit, mildly frail, moderately frail, or severely frail. These categories are validated and accurately predict outcomes such as mortality and hospitalisation.

We aimed to investigate the association between pre-admission eFI category and outcomes for people who had been discharged from hospital following AKI.

Methods:

Using the Clinical Practice Research Datalink linked to Hospital Episode Statistics, we identified adults admitted to hospital with their first recorded episode of AKI between January 2010 to December 2016, and who survived to discharge. This analysis was limited to those prescribed ACE-inhibitor/angiotensin receptor blocker in the 60 days preceding admission: further analysis in the whole population is ongoing. We determined each participant's baseline eFI and eFI category using the sum of 36 defined frailty deficits from each patient record. We estimated hazard ratios (HR) for death (primary analysis) and subsequent readmission with AKI or heart failure, using multivariable Cox regression, comparing moderate/severe frailty to fit/mild frailty. We undertook stratified analyses within pre-specified subgroups.

Results:

We included 18,747 people whose baseline characteristics by frailty group are shown in Table 1. The association between frailty category and death, or readmission with AKI or heart failure, is shown in Figure 1. After adjustment for age, sex, ischaemic heart disease, hypertension, diabetes, heart failure, baseline eGFR and year of discharge, moderate/severe frailty before admission was associated with increased risk of mortality compared to fit/mild frailty (HR 1.16; 95% CI 1.09-1.23); this was not altered by additional adjustment for initiation of renal replacement therapy as a potential mediator. In fully adjusted models, eFI was also associated with risk of readmission with AKI (HR 1.40; 95% CI 1.28–1.54) and readmission with heart failure (HR 1.43; 95% CI 1.28–1.60).

In stratified analyses, the association between baseline eFI category and death was notably not demonstrated in women (compared to men), among those aged over 90 years (compared to younger age

groups), among those with pre-admission heart failure (compared to none), or for those with baseline eGFR <45 mls/min/1.73m2 (compared to better kidney function).

Conclusion:

Moderate/severe frailty, assessed by objective pre-admission characteristics, was associated with greater risk of death and other adverse events after AKI, beyond known comorbidities. The eFI can provide valuable information that may aid discussion with patients about prognosis and future care wishes. However, the lack of association in specific groups suggest that it is of limited use to guide decision-making in its current form.

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The EX-FRAIL CKD Trial: a pilot randomised controlled trial of a home-based EXercise programme for pre-frail and FRAIL, older adults with Chronic Kidney Disease

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Introduction: Frailty is highly prevalent in adults with chronic kidney disease (CKD) and is associated with adverse health outcomes. However, exercise training may improve physical function leading to associated improvements in outcomes. The EX-FRAIL CKD trial (ISRCTN87708989) aimed to inform the design of a randomised controlled trial (RCT) that investigates the efficacy of a progressive home-based exercise programme in pre-frail and frail older adults with CKD.

Methods: Patients aged 65 years with CKD G3b-5 and a Clinical Frailty Scale score ≥4 were eligible for participation. Participants categorised as pre-frail or frail, following Frailty Phenotype (FP) assessment, were randomised to receive a tailored 12-week home-based exercise programme or usual care. Primary outcome measures included recruitment, intervention adherence, outcome measure completion and participant attrition rate. Secondary outcome measures included frailty status (FP), physical function (walking speed, handgrip strength and Short Physical Performance Battery [SPPB]), fall concern (Falls Efficacy Scale-International tool [FESI]), symptom-burden (Palliative Care Outcome Scale-Symptoms RENAL [POS-S RENAL]) and health-related quality of life (Short Form-12v2 [SF-12]). Outcome measures are reported descriptively with 95% confidence intervals (CI) as recommended for pilot trials. Progression criteria to RCT stage were defined as: (1) eligibility >10%; (2) recruitment >30%; (3) exercise adherence >70%; (4) outcome measure completion >80%; and (5) loss to follow-up <25%.

Results: Six hundred and sixty-five participants had an eligibility assessment with 201 (30% [95% CI 27-34]) patients eligible for enrolment. Thirty-five (17% [95% CI 12-23]) participants were recruited. Six participants were categorised as robust and therefore were withdrawn prior to randomisation. Fifteen participants were randomised to exercise (mean age 77.0±8.3 years; mean eGFR 18.9±7.0 ml/min/1.73m²) and 14 to usual care (mean age 78.8±7.0 years; mean eGFR 20.4±7.2 ml/min/1.73m²). Exercise adherence (average of ≥2 exercise sessions/week) was achieved by 73% (95% CI 45-92). Eight (28% [95% CI 13-47]) participants were lost to follow-up. Retained participants (n=21, 100% [95% CI 84-100]) completed all outcome measures. The odds ratio for improvement in frailty status with exercise was 5.50 (95% CI 0.46-65.16) and for deterioration in frailty status was 0.63 (95% CI 0.05-8.20). The adjusted mean group differences in walking speed, grip strength and SPPB score between exercise and usual care groups were: 0.01 metres/second (95% CI -0.07-0.10), 3.6 kg (95% CI -0.6-7.9) and 0.5 (95% CI -0.9-1.8), respectively. The adjusted mean group differences in POS-S RENAL, FESI, SF-12 Physical Component Summary and SF-12 Mental Component Summary scores

were: -1.4 (95% CI -6.6-3.7), 3.4 (95% CI -3.5-10.3), -3.9 (95% CI -9.3-1.5) and 0.2 (95% CI -6.2-6.6), respectively.

Discussion: Eligibility, adherence and outcome measure progression criteria thresholds were exceeded; however, recruitment and loss to follow-up progression criteria thresholds were not achieved. Analysis of a nested qualitative study will explore perceived barriers to participation and retention. The EX-FRAIL CKD trial demonstrates that it is possible to progress to a definitive RCT with adaptations that address the barriers described. It has also provided preliminary evidence that frailty status and physical function may be improved with a home-based exercise programme in patients living with frailty and CKD.

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Performance of traditional and novel formula-based estimates of glomerular filtration rate in living kidney transplant donors

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Accurate determination of glomerular filtration rate (GFR) is an essential component of work-up for living donor kidney transplantation to ensure that both the function of the transplanted kidney and remaining donor kidney are adequate. The gold standard means of assessing GFR is to measure clearance of a radio-isotope such as 51Cr-EDTA or 99mTc-DPTA.[1] Age and gender adjusted thresholds of minimum measured GFR for donation are advised by the British Transplantation Society (BTS)[1]. Whilst isotopic GFR is accurate and reproducible, it is also a costly and relatively invasive investigation. The aim of this study was to compare different formula-based estimates of GFR with measured GFR (mGFR) in living renal transplant donors to assess their utility in this population.

100 living kidney transplant donors were identified who underwent donor nephrectomy at Glasgow Renal and Transplant Unit between 2016 and 2018. Pre-donation isotopic measurements of GFR and serum creatinine were retrospectively recorded as well as measurements of age, height and weight required to calculate estimated GFR (eGFR) adjusted to a standard body surface area of 1.73m². We calculated eGFR based on the widely-used MDRD and CKD-EPI formulae, as well as a third estimating formula 'CamGFR' (recently developed for use in calculating chemotherapy dosing) and compared these with mGFR.[2]

MDRD, CKD-EPI and CamGFR eGFRs all showed significant correlation with mGFR by Spearman correlation (0.59, 0.47, 0.48 respectively; all $p<0.0001$). All three formulae tended to overestimate mGFR. Bias, measured by mean difference between mGFR and eGFR was lowest for the CamGFR formula (-2.86ml/min/1.73m² vs -7.26ml/min/1.73m² for MDRD-eGFR and -7.33ml/min/1.73m² for CKD-EPI-eGFR). CamGFR-eGFR was significantly less biased than MDRD-eGFR and CKD-EPI eGFR. Standard deviation of the differences was lowest for CamGFR-eGFR (11.04ml/min/1.73m²), followed by CKD-EPI-eGFR (11.29ml/min/1.73m²) and MDRD-eGFR (15.11ml/min/1.73m²) suggesting CamGFR-eGFR was the most precise. Root mean square error was lowest for CamGFR-eGFR at 11.35ml/min/1.73m² compared to 13.41ml/min/1.73m² for CKD-EPI-eGFR and 15.11ml/min/1.73m² for MDRD-eGFR, suggesting CamGFR-eGFR was the most accurate. 99% of patients' CamGFR-eGFR was within 30% of mGFR, compared to 96% for CKD-EPI-eGFR and 91% for MDRD-eGFR. 94 of 100 patients' mGFR was above the BTS-recommended threshold for donation. Of the six patients who were below the mGFR threshold, five patients were above the threshold by if GFR was estimated using the CamGFR formula. Three of the six patients were above the threshold by CKD-EPI-eGFR and MDRD-eGFR.

In living kidney transplant donors, the CamGFR formula provided the least biased, most accurate and most precise estimate of eGFR. There was still considerable discrepancy between eGFR and mGFR, with a tendency for formula-based estimates of GFR to over-estimate, which could result in patients with mGFR lower than the recommended threshold proceeding to donation. This suggests current practice of measuring GFR by isotopic clearance should continue, though use of the CamGFR formula may provide a better estimate of GFR than traditional formulae in this group of patients.

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An educational e-learning intervention on blood borne viruses (BBV) for a haemodialysis unit to reduce patient harm: A quality improvement project.

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Introduction:-

There are reported outbreaks of BBV infections in haemodialysis units worldwide caused by lapses in high standards of infection control. These rare events have adverse consequences on patients and haemodialysis units. Current standards are set to minimise the risk of BBV transmission and simplify complexities of managing infected patients as well as aiming to prevent other patients and staff from becoming infected. Following a Hepatitis C transmission in a large haemodialysis unit in the Midlands, It was identified that there was a lack of training for Registered Nurses (RN), multidisciplinary team and a lack of knowledge regarding BBV management. It was identified that there was a need to develop a bespoke training programme.

Method:-

In 2018 a BBV education pilot programme was trialled for haemodialysis staff. It consisted of a presentation on theories of BBVs and practical considerations for dialysis patients followed by an assessment of knowledge. The training was delivered to Health Care Assistants (HCA) and RN by the Clinical Nurse Specialist for haemodialysis. A total of 20 training sessions were delivered and 92% (n=73) of staff were trained during the pilot programme.
In 2019, this was adapted and formatted into a Moodle e-learning module where 95% (n=64) of staff underwent training. It consisted of part 1: the theory of BBVs and part 2: The practical considerations for dialysis patients and was followed by an assessment of knowledge. We measured risks in the haemodialysis unit by auditing on line Datix retrospectively for 2016 - 2019. The number of BBV transmissions, incidents, adverse events and near misses were analysed.

Results:-

The pilot study showed an average score of achievement 80% (n=14) in RN's following assessment and an average score of achievement 65% (n=11) in HCA's. There was also an increase in the uptake of training from 92% to 95% once it had been adapted into an e-learning module.
The percentage of reported BBV incidences of non-adherence to standards policy/procedure at our haemodialysis unit had decreased from 3% (n=4) in 2016 to 0% (n=0) in 2019.

Discussion:-

Management of BBVs in a haemodialysis unit is a complex area however when all aspects of BBV were structured, simplified, standardised and brought together on one platform, the uptake of training increased and as a result, the knowledge and confidence of staff increased when it came to interpreting BBV results and deciding which pathways to follow.

E-learning is not everyone's choice of learning style however for this trial it was successful as the uptake of training increased without the need for extra resources and it enabled the Clinical Nurse Specialist more time to work in the clinical unit with patients and staff. Any future package should consider other learning methods such as group discussions, problem solving, scenarios and work station simulations. The programme will be rolled out to all Nursing and Medical staff at 3 other sites with pre and post knowledge test to follow.

There had been no further reported BBV incidences of non-adherence to standards policy/procedures after the training package was delivered in 2019 suggesting the e-learning package has minimised risks.

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Identifying areas for improving junior doctor education through the analysis of electronic referrals to the renal department in an acute hospital

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Background

Electronic referrals are a routine form of interdepartmental communication regarding a patient's care. Used effectively, electronic referrals have been shown to have both quantitative improvements, in reducing the delay from reviewing patients, and qualitative improvements.(1)(2) However, the inappropriate use of referral pathways has been well-documented, resulting in the overloading of a service or the delay of referral to a more appropriate service.(3) These inappropriate referrals may represent a gap in knowledge and thus an area for improving education . On this background, we sought to characterise and evaluate the referrals made to our renal department.

Methods

Electronic referrals made from all hospital departments to renal department in May and June 2019 were analysed, spanning the last clinical placement of the training year for junior doctors, by which time it is expected that trainee doctors would be able to make appropriate referrals, a core competency as laid out by the foundation programme curriculum.(4) Data was collected on patient demographics, stage of acute kidney injury (AKI) if present at the time of referral, data on the referring department, and the quality of the referrals made. Parameters for assessing referral quality include the presence of a specific question in the referral, and whether or not they met the criteria for renal referrals as defined by the hospital guidelines.

Results

A total of 142 electronic referrals to the renal department were made in the two months studied. The average age of patient was 69.0 years (range 23 to 97 years). 12.7% patients were in AKI Stage 1, 12.0% in Stage 2 and 26.1% in Stage 3.
31.7% of the patients had no AKI and 17.6% had AKI on a background of chronic kidney disease.
94.4% of referrals were accepted. The most common reason for rejection was improving renal function.
53.5% of referrals had asked specific question. 71.1% of referrals met the criteria for referrals to the renal department. The most common primary reason for referral were deteriorating AKI or failure to improve despite initial management (n=36), and AKI Stage 3 (n=35).
The most referrals were from emergency department and Medical Assessment Unit (n=42), cardiology (n=18), the short stay ward (n=15) and the surgical wards (n=13). Common reasons for referrals were advice on the management of AKI/hyperkalaemia, on the general management of patients with a renal history (transplant or dialysis patients), the management of AKI in decompensated heart failure, consideration of dialysis in heart failure patients, advice on the management of declining renal function or AKI with urinary retention.
24.6% out of all patients referred were transferred to the renal ward for further management, and 37.1% of these were dialysed.

Conclusion

We demonstrate that the majority of referrals (71.1%) have met the criteria for referrals to the renal department. However, our project has highlighted potential areas for improving education. In particular, the management of AKI, cardiorenal syndrome and declining renal function peri-operatively have been identified as common reasons for referral, representing a need for further education of junior doctors on these topics.

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Spread of Acute Kidney Injury Improvement Programme across a Large Multi-Site Teaching hospital

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Background

Acute kidney injury (AKI) is a widely recognised serious health care issue. Up to 25% of hospital patients can develop it, with worse outcomes. The trust set up the AKI Team in 2014 to improve AKI detection, care and outcomes after local audit in 2014 showed poor AKI care management.
Successful implementation of a Multifaceted Quality Improvement (QI) Programme for AKI across the main hospital campus since 2015 saw significant improvement in AKI care and outcomes; recognition within 24hrs improved from 52% to 100% since 2016; 34% reduction in AKI incidence, 26% in length of stay (LoS), 42% in AKI days (time to recovery) and 10% less AKI associated mortality.

The Trust being one of the largest acute trusts in the UK (10 hospitals across 6 sites, over 2000 beds), the QI spread represented a formidable challenge.

We describe the methodology and outcomes of AKI QI spread across the trust.

Method

Central Campus Hospitals: Improvement on this site involved setting a bespoke electronic alert coupled with education, key stake holder engagement, gradual culture change and AKI Priority Care Checklist (PCC) and use of change agent (AKI Clinical Nurse Specialist-CNS) visiting local teams and empowering them to manage AKI using Demming's Model for Improvement

A stepwise staggered similar approach was implemented first in the Women's and Eye Hospitals followed by Children's Hospital after a local adaptation and testing of algorithm, PCC and appointment of local change agent, a Paediatric AKICNS.

West Campus Hospital: A DGH, 1-2 incident cases of AKI/day required a bespoke approach. The central AKI team populates AKI alerts report and remotely alert the local multidisciplinary teams and empowering them to implement the PCC.

South Campus Hospitals: A large tertiary hospital merged in 2018 with an existing AKI CNS team. Detection algorithms, education material, PCC, reporting, and approach have been progressively harmonized using the Central Campus model.

Data is expressed using SPC charts and analysed by t-test.

Results

Care process and outcome measures have seen a consistent improvement across all sites. In Central Campus, recognition of AKI within 24hrs has improved from 52% to 100% since 2016; 34% reduction in AKI incidence ($p<0.00001$), 26% in LoS and a 42% in AKI days (time to recovery).

The Children's Hospital had 24% reduction ($p<0.0001$) in AKI incidence and a 34% reduction in hospital acquired AKI. Recognition of AKI has improved from 42% to 100%; 15% in AKI and 22% reduction in AKI days.

In the South Campus recognition of AKI has improved from 67% to 100% and 19% reduction ($p<0.0015$) in AKI incidence. LoS and AKI days data yet to be reported whilst IT systems are been harmonised.
In West Campus recognition is 100% but the small numbers prevent any meaningful analysis of other outcomes.

Conclusion

This study demonstrates how a cluster of simple interventions and approach to AKI detection and care were successfully rolled out across a multisite large complex acute care organization taking into account the local realities of each site/Hospitals whilst maintaining the core interventions.

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What impact would a post discharge follow up clinic have on patients after an AKI episode during a hospital admission?

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Introduction

Acute Kidney Injury (AKI) is an increasingly common problem among hospitalized patients. Patients who survive an AKI-associated hospitalization are at higher risk of chronic kidney disease, end-stage kidney disease, cardiovascular disease, and death. Most patients who survive an AKI episode do not receive any follow-up Nephrology care. The KDIGO guidelines recommend that patients be evaluated 3 months after an episode of AKI for kidney recovery, new-onset CKD, and progressive CKD.

Project Aims & Objectives

The aim of this project was to review the evidence of outcomes following discharge in patients who had AKI in hospital and to scope service provision across the UK.

Methodology

A literature search was undertaken databases used were Pub med, Medline CINAHL and google scholar (timeline- 10yrs-2008-2018). A survey of questions was designed for clinicians to understand follow up and care provision following discharge. The survey was distributed through the British Renal Society membership list and also at two events Nationally using the conference app.

Results

At total of 15 key studies/papers were identified and critically analysed. Most studies were retrospective follow up studies with one RCT and 4 published reports. The evidence did support 10-fold higher risk of developing either incident or progressive CKD. 150 surveys completed with 99 hospitals covered across the country. 32%(n=32) have an AKI team/service in addition to or separate from in house nephrology team/service. 44 %(n=14) of the hospitals AKI service is led by AKI nurse and 53%(n=17) is with AKI Nurse and Nephrologist. Only 7 hospitals have an AKI follow up clinic although 65% of the people strongly agreed the need to have an AKI follow up Clinic.

Conclusion

Outcomes following AKI are poor the evidence to support improvements in outcomes with follow up care is lacking. This project demonstrated the need for further research.

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Higher physical activity levels before and after an episode of stage 3 AKI are associated with improved renal recovery

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Introduction
Acute kidney injury (AKI) is a known risk factor for the development of chronic kidney disease (CKD). Animal studies have demonstrated the potentially reno-protective effects of physical activity, both against the development of AKI and in promoting renal recovery. However, this has not been investigated in humans. The aim of the study was to investigate the association between physical activity levels and recovery in kidney function, measured by eGFR and creatinine, following an episode of stage 3 AKI.

Method
Twelve hospitalised participants with non-obstructive stage 3 AKI (as per KDIGO criteria) were asked to complete two questionnaires; the General Practitioner Physical Activity Questionnaire (GPPAQ), and the Duke Activity Status Index which provided measures of physical activity and functional capacity levels respectively. Baseline questionnaires were completed in hospital (as participants were asked to recall their physical activity and functional capacity levels before hospitalisation). Following discharge, the participants wore a pedometer for 7 consecutive days to ascertain their daily step count. Renal function was monitored by collecting eGFR and creatinine measurements. Measurements within the 12 months prior to admission were taken as baseline renal function and further readings 25 ± 46 days after discharge were used as an initial measure of renal recovery (referred to as recovered creatinine).

Results
Data from the 12 participants who provided step count information were analysed. At diagnosis of stage 3 AKI, participants had a mean creatinine of 547 ± 280 with their mean baseline and recovered creatinine as follows; 95 ± 35 and 172 ± 83. There were positive associations between renal recovery and baseline physical activity levels measured using the GPPAQ (r=0.55, p=0.06) and functional capacity (0.17, p=0.6), although not to statistical significance. A higher daily step count after discharge was associated with both a higher baseline eGFR (r=0.73, p<0.01) and significant improvements to their renal recovery (r=0.69, p=0.01). The participants were divided into two groups based on their recovered creatinine levels. Those who recovered renal function back to within 25% of baseline (n=5) had a higher mean step count compared to those whose renal recovery was less pronounced (n=7); (3712 ±3960 vs 3334 ± 2254, respectively).

Conclusion
Those with higher baseline and post discharge physical activity levels had greater improvements in their renal recovery following an episode of AKI. This suggests that higher levels of physical activity may be protective and promote recovery of renal function following an episode of AKI. Physical activity and exercise interventions should be tested in the AKI situation to see whether they are efficacious in promoting renal recovery.

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‘I was surprised that the machine could build muscles in your legs … it looks like something out of Alien’: Patient experiences of resistance exercise training in CKD

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Purpose:
Muscle wasting is highly prevalent in chronic conditions and can result in decreased physical functioning, strength, and impaired ability to perform daily tasks, impacting upon quality of life. Exercise, particularly resistance training, promotes a multitude of benefits, including prevention and management of muscle wasting. Engagement in resistance training by older and chronically ill populations is recognised to be poor. However, the reasons underlying this are not well understood from the individuals’ perspective. Exploring patient perceptions and experiences of a supervised progressive resistance exercise training program may help to identify factors that influence individual motivators and barriers to begin and continue with resistance training. Identification of these factors will inform the development and implementation of effective resistance exercise training programs and interventions for people with CKD.

Methodology:
This a sub-study of a parallel randomised controlled feasibility study, in which patients with CKD stages 3b and 4 were randomly assigned to an exercise or non-exercise control group. The exercise group undertook an eight-week progressive resistance exercise training program consisting of three sets of 10-12 leg extensions at 70% of estimated 1-repetition maximum thrice weekly.
Semi-structured interviews were conducted with a sample of individuals in the exercise group. Topics explored included perceptions and experiences of resistance training, the study resistance exercise program, and exercise habits following cessation of the study. Data were audio-recorded and transcribed verbatim. Thematic analysis was used to identify and report themes in the data.

Findings:
Nine participants (five females and four males) were interviewed between two and eleven months after their final exercise session. Interviews were conducted face-to-face and lasted approximately 40 minutes. Five main themes were identified:

- Perceptions of resistance training

Participants had a lack of understanding of the importance of resistance training despite experiencing loss of muscle and declines in physical strength.

- Experiences of the resistance exercise program

The structured progressive exercise program provided routine, discipline, and a sense of achievement for participants.

- Challenges experienced

Gym environment and weight machines were considered to be quite intimidating and the intensity of the exercises appeared to be a shock to participants.

- Impact on daily activities and quality life

The benefits of resistance training such as improved physical function and ability to perform daily activities were experienced by all participants.

- Maintenance of resistance training

Only a small minority continued (modified) resistance training. After stopping the resistance exercise program, participants reported experiencing declines in physical function and difficulties with basic everyday tasks.

Both facilitators and barriers to begin or continue resistance training were identified by participants. Perceived barriers included lack of confidence, accessibility, and available resources such as time and money. Supervision, guidance, and structured programs were considered to be facilitators.

Conclusion:

The findings highlight the need for patient education and counselling about the importance and implementation of resistance training in their daily lives. The focus should be on increasing patients' knowledge and confidence to empower them to independently conduct and progress resistance training appropriately.

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Identifying and assessing the phenotypic features of HNF1B deletions and duplications in UK Biobank

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Introduction

Heterozygous mutations in the gene that encodes the transcription factor hepatocyte nuclear factor 1β (HNF1B) represent the most common known monogenic cause of developmental kidney disease. Renal cysts are the most frequently detected feature of HNF1B-associated kidney disease. Other clinical features include early-onset diabetes mellitus and abnormal liver function. It is thought that duplications of HNF1B do not result in strong phenotypic features.

The true pathogenicity and penetrance of many rare putative disease-causing copy number variants (CNVs) is uncertain and may be over-estimated by clinical ascertainment.

We aimed to assess the pathogenicity and penetrance of HNF1B deletions and duplications in UK Biobank (UKBB) and to describe their phenotypic features.

Method

We used data from 388,714 UKBB participants to assess CNVs of HNF1B in a population-based setting using SNP chip intensity data. We tested the association of these CNVs with diabetes and other clinically-relevant traits. We assessed the UKBB phenotype and biomarker information and correlated these with the deletions and duplications.

Results

We identified 11 individuals with large deletions relating to HNF1B and 106 with duplications. There were no significant difference in the average ages of deletion (53), duplication (56) and UKBB population (57). Of the 11, 3 were reported to have glomerular disease, 1 had haematuria, 1 had received a renal transplant, and 6 had diabetes (54.5% vs. 5.3% amongst the rest of the UKBB; P=2x10-6). The penetrance of diabetes was 30% and average eGFR was 71 (45% with eGFR<60) compared to average GFR 91($p<0.0001$) in UKBB population. Their liver function is comparatively different. Gamma GT 110 v 37.4 ($p<0.0001$) and ALP 186.5 v 83.5 ($p<0.0001$) in UKBB population.

We found no association between the duplication and diabetes (4.4% vs. 5.3%; P=0.8) or liver function GGT 40.8 v 37.4, p=0.4, ALP 84.4 v 83.5, p=0.7 but we did find a significant difference in renal function, their average eGFR was 80 v 91 in UKBB population ($p <0.0001$).

Conclusion

HNF1B deletions and duplications can be detected in a large unselected dataset. Deletions are more pathogenic than duplications. However, HHF1B duplications do appear to affect renal function, which has not been previously described. The frequency of both HNF1B deletions and duplications may be higher than previously estimated.

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An audit of end of life care for renal patients at a tertiary care centre in England

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INTRODUCTION
People dying with ESRD experience higher mortality, symptom burden, hospitalisation rates and procedure use than those with other life-limiting illnesses (1,2). Access to supportive care may also be lacking (3,4). However, patients with advance care plans are more likely to meet their end-of-life (EoL) goals (5). The Renal Association guidelines on EoL care (6) suggest the following audit measures:

1. Proportion of patients who died who were on a supportive care register (SCR)
2. Proportion of patients on the SCR with a workable advance care plan, including patient preferences and choices with respect to priorities of care
3. Number of patients withdrawing from dialysis as a proportion of all deaths on dialysis
4. Proportion of patients who achieve their preferred place of dying

These measures were used to audit care for people with ESRD in a UK tertiary renal centre.

METHODS
A retrospective audit was conducted of records for adults who died with ESRD between October 2018 – March 2019. All were receiving haemodialysis, peritoneal dialysis, transplant, or had a most recent eGFR < 10ml/min. Records were reviewed using the hospital electronic system and the supportive care team care records. A "workable advance care plan" (audit measure 2) was coded as present when an individual had both a documented preferred place of death and resuscitation status.
This audit was approved by the local Patient Safety, Assurance & Audit Service (number CA54321).

RESULTS
Of 87 records, 57 (65.5%) individuals were on haemodialysis, 15 (17.2%) were managed conservatively, 10 (11.50%) had a functioning transplant, 4 (4.6%) on peritoneal dialysis, and 1 (1.1%) had an eGFR <10 and was preparing for dialysis. Of the deaths on dialysis, 29 (48.3%) records included an entry indicating dialysis had been stopped before death.
Of the 32 people (36.8%) on the SCR, 8 (25%) had a documented preferred place of death, which was achieved for 5 (62.5%). Of those without, 11 (45.8%) died in hospital. Preferred place of death was documented for 1 person not on the SCR (1.8%). People on the SCR were more likely to have a documented DNACPR (46.9% vs 20.0%).
Individuals receiving conservative care were more likely than those receiving kidney replacement therapy to be on the SCR (40.0% vs 36.1%) or to have preferred place of death documented (26.7% vs 6.9%). However, they were less likely to have a documented DNACPR (26.7% vs 30.6%).

DISCUSSION
In a tertiary renal centre, 87 adults with ESRD died over six months. One third were on the SCR. Most deaths were amongst people receiving dialysis, and almost half stopped dialysis before dying. Preferred place of death and resuscitation status were poorly documented for all groups.
This audit suggests that either advance care planning and/or documentation of it is incomplete for individuals who die with ESRD. Whilst many deaths will have been unanticipated, it is likely that access to advance care planning needs to be improved. Further investigation is required to better-understand the factors that inhibit wider adoption and higher-quality documentation of advance care plans.

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A randomised, double-blind, placebo-controlled trial of vitamin K supplementation to improve vascular health in kidney transplant recipients: the ViKTORIES trial

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Introduction
Cardiovascular disease is a major cause of graft loss and premature mortality amongst kidney transplant recipients (KTR). Vascular stiffness (VS) and calcification (VC) are markers of cardiovascular disease which are prevalent in KTR and associated with subclinical vitamin K deficiency. We tested the hypothesis that vitamin K supplementation would reduce VS and VC in prevalent KTR in the Vitamin K for kidney Transplant Organ Recipients: Investigating vEssel Stiffness (ViKTORIES) trial.

Methods
In a single-centre, phase II, parallel-group, randomised, double-blind, placebo-controlled trial (ISRCTN22012044), KTR were randomised 1:1 to vitamin K (menadiol diphosphate 5mg) or placebo thrice weekly for one year. The primary outcome was between-group difference in VS (ascending aortic distensibility by cardiac magnetic resonance imaging) at 1 year by ANCOVA adjusted for the baseline value, age and duration of end-stage kidney disease. Secondary outcomes included VC (coronary artery calcium score on non-contrast computed tomography), cardiac structure and function (on cardiac magnetic resonance imaging), blood pressure, eGFR, proteinuria and quality of life. All outcomes were assessed by intention-to-treat with secondary per-protocol analyses. Missing data were multiply imputed as a sensitivity analysis for the main outcomes. The trial was conducted in accordance with the Declaration of Helsinki and was approved by the West of Scotland Research Ethics Committee 4 (Ref: 17/WS/0101). The results were combined in a meta-analysis with other published data.

Results
Ninety participants were randomised to vitamin K (n=45) or placebo (n=45) and included in the analysis. Baseline demographics, clinical history and immunosuppression regimens were similar between groups: mean age 57.6 ± 9.6 years, 70% male, with median time after transplantation 7.8 (IQR 3.5 - 13.9) years. There was no impact of vitamin K versus placebo on VS after 12 months (-0.2 (-0.5 - 0.2) vs. -0.3 (-0.6 - 0.1) x10-3 mmHg-1; p=0.60), nor on VC (184 (52 - 315) vs 44 (-89 - 177) units; p=0.11), nor on any other outcome measure. Medication adherence was good in both groups (90 vs. 95%; p=0.58). Achieved power was 85%. Serious adverse events were common (vitamin K: 26.7 vs. placebo: 60.0%), though all serious adverse events were classified as expected. Multiple imputation of missing data had no impact on results of VS or VC outcomes. Combining these with other published results, vitamin K supplementation has no significant observed effect on VS or VC, though with few available studies for analysis.

Discussion
In this heterogeneous cohort of prevalent KTR, vitamin K supplementation did not reduce VS or VC over 1 year. Improving vascular health in patients with established kidney disease is likely to require a multifaceted approach.

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Radiation nephropathy is associated with a glomerular thrombotic microangiopathy and progression to end stage kidney disease

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Radiation nephropathy is a rare but potential complication following total and localised radiotherapy treatment. Total body irradiation (TBI) is declining; however, newer treatments for inoperable neuroendocrine tumours (NETs) with peptide receptor radionuclide therapy (PRRNT) are on the rise. Yttrium 90-dotatoc (Y90) is a somatostatin analogue labelled with Y90 used for somatostatin positive NETs. Y90 is eliminated through the kidney and found intact in the urine, having a cumulative effect in the renal parenchyma. Despite fractionation and co-administration of renoprotective intravenous amino acids, targeted radionuclide therapy can still be nephrotoxic. Therefore, PRRNT may lead to a re-emergence of radiation nephropathy.

We reviewed at biopsy-proven radiation nephropathy in the Oxford Kidney Unit (OKU) between 2010 and 2019. Three cases were found in the pathology electronic archive: one associated with total body irradiation prior to stem cell transplantation and two cases (both in 2019) associated with Y90.

All three patients presented with hypertension, microscopic haematuria, proteinuria, anaemia, thrombocytopenia and declining renal function. A proximal renal tubular acidosis (RTA) was observed in the two patients who received Y90. Time from radiation exposure to 50% loss of estimated glomerular filtration rate (eGFR) and end stage renal failure (ESRF) was variable and described (see table). Deterioration in renal function was quicker in patients with pre-existing hypertension and in the patient with a single kidney. Both patients on Y90 received a 10% amino acid c-infusion and fractionated doses of radiotherapy. Two patients required renal replacement therapy (RRT) and the third one died as a result of a carcinoid crisis as she reached ESRF.
Biopsy features in all three patients were of an acute glomerular thrombotic microangiopathy (TMA). Chronic tubulointerstitial damage varied from moderate to severe.

We highlight that radiation nephropathy has a long latency and can present months after exposure. It tends to be irreversible. Renal biopsy often shows features of a TMA. Despite fractionation and amino acid co-administration, nephrotoxicity is an established risk factor for loss of kidney function. Patients with pre-existing hypertension and reduced kidney volume are at particular risk. We suggest patients should be counselled about the risk of progressive chronic kidney disease as a result of their treatment and a multidisciplinary approach taken in their ongoing management.

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How do primary care practitioners perceive virtual clinics for chronic kidney disease? A survey to explore how renal services could enhance support for chronic kidney disease management in primary care.

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Introduction
Our community kidney service commenced in 2016 with the aim of improving the earlier identification and management of chronic kidney disease (CKD) in primary care. A major innovation was the development of a virtual clinic that allows nephrologists to access all parts of patients' GP records (with patient consent) and give advice without patients needing to attend clinic. The virtual clinic has seen a three-fold increase in referrals (compared to previous face-to-face clinics), with 90% of patients assessed as not requiring a nephrology outpatient appointment. An expectation was that the number of referrals would decrease as GPs became more confident in managing CKD, but this has not been seen to date suggesting an exploration of how primary care practitioners perceive the service should inform future planning.

Method
A survey was developed to investigate the views of GPs and primary care nurses about the virtual CKD clinic and how nephrology services could enhance support for the management of CKD in primary care. The survey was hosted through SurveyMonkey™ and a link was emailed to over 500 GPs and primary care nurses from four Clinical Commissioning Groups.

Results
127 responses have been received to date, most (91%) from GPs. 95% had made a referral using the virtual clinic, with the majority (80%) making 0 or 1 referral per month. 73% felt confident that they know what information to include when referring, but 21% would like to know more about tests to include. A minority (6%) responded that they did not feel it was their responsibility to know which tests to include with referrals.
93% found the advice received via the virtual clinic useful with 48% more likely to refer patients since the service began. Respondents commented that the ease of access to advice without patients needing to attend hospital appointments was a facilitator for earlier referral. 26% replied that they were less likely to refer. Some cited concerns about referrals leading to extra work for GPs both in arranging tests and informing patients as contributing to reluctance to refer.
47% had not attended an education session about CKD within the past 3 years, but 59% reported feeling more confident in managing CKD since the service began. The provision of support through education sessions and practice visits as well as online resources was viewed as helpful (figure 1) but comments included concerns about time commitments. Topics identified for further education were varied and ranged from basic CKD identification to the management of advanced CKD in frail, older people.

Discussion
Our virtual CKD clinic is viewed positively by most respondents as it enables easy access to specialist nephrology advice. This has contributed to the increase in referrals and suggests that there was an unmet need for CKD advice in primary care. Confidence in managing CKD in primary care has increased but ongoing education and online resources are needed to enhance this. Development of community nephrologist roles has the potential to further support primary care education and management of patients with CKD.

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Development of a new software application (App) to enhance patient centred management of Nephrotic Syndrome.

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Young adults are a vulnerable group of renal patients who are unlikely to engage in traditional patient support networks. It is crucially important that we find ways to engage these young adults to optimally manage their condition and provide clinicians with a better understanding of the impact of disease on the patient's life. This includes aspects such as managing educational and work/career opportunities, often away from their home or local renal units, and forming relationships; little of which is understood by clinicians. It also involves the often difficult transition to adult units which can be a difficult time for the young patient. The Nephrotic Syndrome Trust (NEST) as part of the NURTuRE biobank initiative (https://www.nurturebiobank.org/) is developing a clinical application (App) for patients with Nephrotic Syndrome (NS) which will empower young adults to shape the way technology can improve the communication between patients, researchers and clinicians. This will give the patients the knowledge and confidence to share their lived experiences, so that they have a voice with clinicians and are able to find support networks that suits them. The app will ultimately help patients, particularly young adults, to become autonomous in managing Nephrotic Syndrome, will inform clinician consultation, support transition between paediatric and adult units and improve data capture to accelerate research. Importantly it will also increase the awareness of NS, help to inform better experiences and treatments, and ideally increase the number of young adults (16-25s) being registered within this and similar kidney disease cohorts.

The objective is to use technology to engage and encourage young adults; giving ownership of the project by involving them in the process. We have recruited young adults to become lead ambassadors for the project to contribute to the development of the App and to ensure its usefulness/appeal to this patient population by engaging with other young patients through a program of national, multi-disciplinary roadshows., Although initially the app will be trialled in NS it is hoped that it can be then be rolled out to other kidney disease groups. The app will be used by patient:

• to participate in their own care by keeping regular records of discrete health parameters and key aspects relating to their quality of life which can be actively used to inform their management and accelerate current research.

• develop an increase in awareness, current research and renewed understanding and treatments for NS and other renal diseases.

• ensure that quality of life indicators are taken into account during consultations so patients feel these important factors are taken into consideration.

• to feel less isolated and ensure that they have a vehicle for airing their experiences, which works with their clinicians and research. The data captured from the App will feed directly into NURTuRE and will dovetail with capturing patient-centred data, resulting in increased quality data for research, resulting in better outcomes.

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Maximising the uptake of peer support in kidney care: a national survey of renal units across the UK

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Introduction: Peer support (PS) programmes are an opportunity for people with lived experience of CKD to provide emotional and informational support to other patients who may benefit. It is shown to be valued by people with CKD and is promoted by NICE (2018) and the Health Foundation (2016). PS projects for people with CKD report poorer uptake compared with other long-term conditions. The aims of this project are to extend and update a survey of PS in kidney care in England that was first carried out by NHS Kidney Care in 2013, as part of a wider project funded by Kidney Care UK. This study has the potential to increase the uptake of PS in kidney care, ultimately benefiting patients, by better understanding the barriers and facilitators to PS, and increasing awareness and opportunity to share knowledge and resources.

Methods: The extended survey was designed and edited by project team members, with questions classified into categories: PS in your unit; your supporters; PS drivers; PS barriers; optional personal details. The survey was uploaded to Jisc Online Surveys and invitations for participation were emailed to a representative from each of the 83 main renal units across the UK. Face and content validity was increased by critical review from project team members including a patient involvement group and expert review.

Results: 42 respondents completed the survey (51% response rate), with 31 units (74%) reporting some form of PS and 11 (26%) reporting none. Of the 31 units with PS, 13 have formal PS available in which PS is provided by trained regulated patient volunteers. 11 of the 31 units offering PS reported keeping records of referrals and delivery. 25 units use healthcare professional referrals as the method of involving patients. 10 have known evaluation methods of measuring the impact of PS. The main barriers to PS being established and sustained were lack of staff time, other projects taking priority and lack of guidance/information. The main facilitators to PS were promoting PS with healthcare professionals and having staff/supporters who are passionate about PS.

Discussion: Of the 42 renal units represented, it appears PS is available for a majority yet there is opportunity to improve the service for those who already have it established. Given the majority offer no or informal PS, there is a need to more widely share peer supporter training programmes so services are safe, consistent and effective. Moreover, as units primarily use healthcare professional referrals to involve patients, units should implement a better referral tracking process in addition to an evaluative method to understand the impact PS has on patients. When considering the barriers and facilitators cited, it seems imperative that PS is promoted to practitioners by providing information on how/when to refer through a method which does not compromise their time/other commitments. For those who do not currently offer PS, there is potential for units who do have it to provide support with implementation. Utilising a multi-professional collaborative approach for quality improvement will in turn ultimately benefit patient care.

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An innovative MDT approach to optimising haemodialysis initiation

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Chronic Kidney Disease carries a high symptom and treatment burden. National guidance[1 2] recommends multidisciplinary team (MDT) input for all patients, however this can be difficult to achieve in practice. Consequently most haemodialysis (HD) patients do not receive comprehensive MDT assessments promptly, if at all; this can lead to a suboptimal approach to care.

We identified the need to optimise pathways for patients commencing HD and developed a pilot programme for new starters to HD to dialyse together in a dedicated area, offering direct input from the MDT within two weeks.

When surveyed 31 patients, who had commenced HD in the previous six months, reported dissatisfaction with early levels of information and support. 75% identified it would be helpful to initiate dialysis with new starter peers. During the six month pilot period 58 patients commenced dialysis via the new starter unit (NSU). Once patients had been in their follow on satellite unit for 3 months we asked for feedback on their experience of the NSU and received 15 responses. 80% were happy with information and education provided including awareness of self-care (73%) and home dialysis (80%). 12/58 individuals were referred for home therapies and were perceived as more comfortable transitioning by home therapy staff. 73% found it beneficial to start HD with peers.

This cohort of patients would not previously have had access to occupational therapy (OT) input. 53 patients were screened and 17 different problem areas identified requiring active OT intervention. 53 patients saw physiotherapy promptly rather than months later facilitating an increased exercise uptake (80% vs 25%) on follow-up and maintenance of physical performance at three months. Recommendations advise that all patients see renal dietitians within one month of starting HD[1]. While previously, a one month review of 43% of patients was achieved, now through small group education 100% meet this requirement potentially increasing dietary adherence. Patients were screened using the Distress Thermometer, with the average distress score of 5/10. Questionnaires enabled earlier discussion about distress and the causes, facilitating onward prioritised referral to psychology. Approximately 25% of patients received support from renal social workers benefiting in measurable ways. Early social work interventions for specific social problems reduced patients' stress levels and anxieties. Nursing staff found the dedicated area more conducive to the delivery of education and the pathway from pre-dialysis clinic to HD more seamless. Input from a consultant nephrologist helped to manage the expectations of those patients already known to the renal services as well as providing medical support to those with an unplanned start to dialysis. In addition the early medical review ensured progression with transplantation assessment and allowed early specialist referral where appropriate.

Patient reported experience measures and individual MDT outcomes show positive improvements in the HD initiation pathway. This substantiates continuation of the new starter programme with business planning underway for dedicated funding and staffing. This will ensure best practice in supporting patients via education and early access to MDT support and intervention to ensure a smooth transition and optimise quality of life.

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Collecting Renal Dietetic Outcomes to Drive Service Improvement

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INTRODUCTION: Measuring outcomes of dietetic interventions is important for evaluating the effectiveness and efficacy of dietetic care and driving service improvement. The British Dietetic Association Renal Nutrition Group introduced the Renal Dietetic Outcomes Toolkit (RDOT) in 2016, with audit highlighting their value in demonstrating effectiveness of dietetic interventions for patients with later-stage chronic kidney disease (CKD). Our department introduced dietetic outcomes in 2017 using generic guidelines based on the RDOT. The introduction of electronic patient records for renal patients in 2019 enabled effective audit of their use. We aimed to assess recording and achievement of dietetic outcomes in a single-centre cohort of CKD outpatients.

METHODS: Data for all dietetic contacts between 1st July – 30th November 2019 were extracted from electronic renal patient records (VitalData®). Demographic data (age, gender, treatment modality, dialysis vintage), reason for dietetic contact, outcome set, completion and achievement of outcomes, and barriers for non-achievement, were analysed.

RESULTS: 1650 dietetic contacts were recorded (528 patients; mean age 65 years; 61% males). Patients attending low clearance clinic accounted for 17% contacts; in-centre haemodialysis 41.5%; peritoneal dialysis 11.0% and home haemodialysis 10.5%; with mean dialysis vintage 61 months. The most common reasons for referral were reduced nutritional status (22.2%), hyperkalaemia (16.6%), hyperphosphataemia (15.4%), and CKD – mineral and bone disorder (CKD-MBD) (15.0%). Dietetic outcomes were set for 80% of contacts overall (range 63.5 - 89.0% when analysed according to treatment modality and reason for referral). The most common outcomes set were optimising biochemistry (47.8%), increasing oral nutritional intake (15.6%), maintaining biochemistry (10.3%), maintaining anthropometric measurements (5.8%) and improving fluid balance (4.3%). However, outcomes were completed for only 27.7% of contacts (range 19.8 - 34.0% according to treatment modality and reason for referral). Where outcomes were set and completed, they were achieved for 62.9% consultations (range 37.5 - 78.6% according to reason for referral - Table 1). The main barriers for non-achievement of outcomes were low motivation to change (27.9%), poor adherence with supplements or medications (25.0%), inappropriate medication dose (10.3%), anorexia (8.8%) and delays in receiving supplements or medications (8.1%).

CONCLUSION: We have demonstrated reasonable success and consistency when setting dietetic outcomes for the majority of patients. Where outcomes were completed, dietetic intervention was most effective in optimising potassium levels, and least effective in achieving salt and fluid balance, and managing malnutrition. Where outcomes were not achieved, low patient motivation and poor adherence to treatment accounted for over 50% of barriers to effective treatment, which may explain why dietetic interventions for optimising salt and fluid balance and treating malnutrition are less successful, as patient engagement with treatment is paramount. There are similarities with our results and those reported in a previous multi-centre audit using the RDOT. We acknowledge that recording completed outcomes needs to improve in some areas, therefore we have adapted departmental guidelines to support this. We also intend to undertake further work comparing outcomes with changes in parameters used to measure nutritional status, biochemistry or clinical condition, enabling outcomes to be more useful in demonstrating dietetic effectiveness.

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Nutritional assessment of a haemodialysis population: an analysis of the dietetic intervention and nutrition status.

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Introduction and Aims: National guidelines recommend the regular provision of nutritional assessment for all Haemodialysis (HD) patients. HD patients at our large inner city teaching hospital, undergo nutritional assessment by the Renal Dietitian on an annual basis, including, Subjective Global Assessment (SGA) and the assessment of biochemical parameters against Renal Association guidelines. Data is recorded at each annual dietetic assessment. This exploratory analysis aimed to examine the nutritional status of the HD population and define the types of dietetic interventions provided.

Methods: Data was collected prospectively from January 2018 to December 2018 and included SGA score, Body Mass Index (BMI), biochemistry and the type of dietary intervention provided by the Renal Dietitian.

Results: 626 patients (375 male and 251 female), had at least 1 nutritional assessment conducted, of these 212 patients were new to HD. The mean age of the population was 63 (±14) years and the mean BMI 27.3(±6.4) kg/m2. The mean potassium was 5.26 (±0.74) mmol/L and mean phosphate 1.55 (±0.52) mmol/L. 623 patients had an SGA score recorded. 82.2% (n=512) of the population were well-nourished with a SGA score A, 16.7% (n=104) were moderately malnourished with an SGA B score, and the remaining 1.1% (n=7) were severely malnourished with an SGA C score.
In 73.3% (459/626) of the consultations, dietary assessment indicated a need for intervention (Table 1), and there was an average of 1.3 interventions per person.

Conclusions: 25% of the interventions provided to the HD population in 2018 included education and/or nutritional supplements for nutrition support, despite less than 18% of the population being malnourished. This suggests that to maintain the well-nourished status in this HD population, patients may still require ongoing nutrition support even when they are assessed as well nourished.
Approximately three quarters of the population require nutritional interventions, and often more than one intervention is required during an individual annual assessment, indicating that established HD patients continue to need ongoing nutritional input.
The use of dietary assessment by dietitians identified nutritional causes for electrolyte and fluid disturbances which led to individually tailored dietary modification. Overall malnutrition may have been reduced in this cohort of patients due to the individual tailored dietetic interventions, as opposed to generalised dietary restrictions.

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The implementation of dietetic prescribing following the introduction of supplementary prescribing for dietitians.

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Background: Successful dietetic management of several complications of chronic kidney disease (CKD) and end stage kidney disease (ESKD), particularly Chronic Kidney Disease – Mineral and Bone Disorder (CKD-MBD), often involves provision of advice about medications. However, the level of involvement of dietitians in medication management varies greatly across the UK. A change of legislation in 2016 allowed dietitians to train and qualify as supplementary prescribers (SP), however there are still limitations to using this process. The aim of this work was to ascertain how dietetic prescribing has been implemented into routine practice among renal dietitian supplementary prescribers within the UK, and assess how a prescribing dietitians network can most effectively provide peer support.

Methods: A questionnaire was devised by a small working group of specialist renal dietitians who are qualified supplementary prescribers. This was electronically- distributed to members of the Renal Nutrition Group (RNG) Prescribing Dietitians Network, and all RNG members who subscribe to the RNG Discussion Forum. Results were collated and analysed to establish trends in current prescribing practices, and assess perceived benefits and potential barriers for supplementary prescribing.

Results: Twenty questionnaires were returned - 15 from RNG Prescribing Dietitians Network members (100% response rate), and five from members of the RNG Discussion Forum. Thirteen questionnaires were from qualified SP, therefore seven questionnaires from respondents still undertaking a supplementary prescribing qualification were discounted. Eleven respondents (85%) have implemented supplementary prescribing into practice, with the majority generating between one and five prescriptions per week. Similarities in prescribing practices exist for patient groups where prescribing is used and types of medications prescribed, with 100% respondents prescribing for haemodialysis outpatients and prescribing phosphate binders. Similarities in perceived benefits of supplementary prescribing are more streamlined care (81.8%) and reduced time for patients to receive medications (90.9%), whereas the main barrier to effective prescribing was the increased workload associated with clinical management plans (CMPs). There are variations in the timescale for signing CMPs, and standards for review of patients for whom prescriptions were arranged. Only 54.5% of respondents have audited practice since implementing SP. Results for the questionnaire are comprehensively detailed in Table 1.

Conclusion: There are a small number of renal dietitians already qualified as SP who have implemented supplementary prescribing into routine dietetic practice. This number is growing judging by respondents who are currently undertaking a supplementary prescribing qualification. There are several similarities in how SP are implementing dietetic prescribing into their practice, however there are variations in practice for the use of CMPs. This indicates the need for clearer nationally agreed guidance to enable CMPs to be used appropriately and effectively. Whilst there appear to be perceived benefits for supplementary prescribing among SP, only 54.5% of respondents have audited their practice since implementing supplementary prescribing, and patient satisfaction has not been thoroughly evaluated. A national audit of supplementary prescribing practices, which specifically explores how dietetic prescribing affects the medical team, time attributed to medical prescribing, dietetic outcomes, and patient satisfaction, is therefore required to evaluate the benefits of SP.

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The effects of single and multi-component exercise, nutrition and educational interventions upon clinical and health-related quality of life outcomes in persons approaching and commencing dialysis – a systematic literature review

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Background: End stage kidney disease (ESKD) and dialysis are associated with complications leading to functional decline, reduced health-related quality of life (HRQoL), increased hospitalisation and poor survival, particularly within the first year of dialysis. Exercise, education, and nutritional interventions in pre-dialysis and dialysis patients may be important to prevent nutritional decline and maintain physical function and HRQoL in persons with ESKD, although there is little published evidence to support this. We performed a systematic literature review to identify relevant studies examining the association between exercise, nutrition and education interventions and clinical or HRQoL outcomes in persons approaching and commencing dialysis.

Methods: A systematic literature search of the electronic databases MEDLINE, CINAHL, EMBASE, PubMed, and Cochrane Central Register of Controlled Trials (CENTRAL) until July 2019 was conducted. Trials and observational studies meeting pre-defined eligibility criteria using a PICO question were included. Study selection was performed in two stages: title and abstract review, and full text review. Data extraction was conducted using a form tailored to the review question. Critical appraisal and risk of bias were assessed using CONSORT and Newcastle Ottawa Scale/Agency for Healthcare and Research Quality standards checklists according to study design.

Results: Seventy-five articles were retrieved for full-text review, with 15 eligible for inclusion. Two prospective cohort studies examining the effect of exercise interventions upon physical function demonstrated significant improvements in exercise capacity (44.0%; $p<0.001$), functional ability (21-35%; $p<0.001$) and exercise tolerance (mean rate of perceived exertion 12 vs 10; $p<0.001$). One study involving retrospective analysis of an exercise intervention found reduced mortality or cardiovascular morbidity (HR: 0.60; 95%CI: 0.36-0.98; $p=0.041$) in participants with increased exercise tolerance following the intervention. One feasibility study found that combined exercise and nutritional intervention led to significant increases in exercise capacity (17%, $p=0.006$) and strength (8%, $p=0.007$), and maintained nutritional status (Subjective Global Assessment - SGA). Two randomised controlled trials (RCTs) reported that nutritional status (determined by SGA) was maintained in 78% and 83% of participants, and improved in 17% and 22% of participants ($p<0.01$) following nutritional intervention. Nine studies (one RCT, 4 prospective and 4 retrospective) were identified examining the effect of educational interventions upon mortality, hospitalisation, and HRQoL. Educational interventions were associated with lower mortality (HR: 0.59; 95%CI: 0.45-0.79; $p<0.001$) and lower hospitalisation rates (7.2 vs 10.5 days; $p<0.001$) than control group participants in the first year of dialysis. One study reported trends towards improved HRQoL following educational intervention. The heterogeneous nature of studies, including variations in study design, interventions, and outcomes, precluded meta-analysis. Methodological limitations identified in all studies included selection bias, measurement and confounding bias, use of varying outcomes, and inadequacy of study reporting.

Conclusion: To our knowledge this is the first systematic literature review on this topic. Findings, although limited, suggest that exercise, nutritional or educational interventions may lead to improved relevant clinical and HRQoL outcomes, and improved mortality and hospitalisation rates. As most interventions were single-component interventions, the effect of combined interventions is not currently known and therefore warrants further investigation in future studies.

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The effect of a multi-component lifestyle intervention on nutritional status and body composition in persons approaching dialysis

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Introduction: End stage kidney disease (ESKD) is characterised by several complications, including reduced physical function, anorexia and cachexia, which in turn often lead to reduced nutritional status and altered body composition, particularly during transition to dialysis. “PREHAB” (Pre-emptive rehabilitation in persons approaching dialysis) is a prospective randomised trial aiming to determine the effect of a multi-component exercise, nutrition and educational intervention upon clinical and health-related quality of life (HRQoL) outcomes in persons approaching dialysis, and incorporates assessment of nutritional status and body composition. The aim of this work was to assess the effect of our 3-month PREHAB intervention on changes in nutritional status and body composition prior to participants starting dialysis.

Methods: Patients with eGFR≤15ml/min/1.73m2 who were able to exercise and were anticipated to require dialysis within 6 months, were invited to participate in the “PREHAB” trial. A comprehensive baseline assessment of physical function, nutritional status, and HRQoL was undertaken using validated methods. Nutritional status and body composition were assessed using body mass index (BMI), handgrip strength (HGS), mid-arm circumference (MAC), subjective global assessment (SGA), and dual-energy x-ray absorptiometry (DXA). Participants were then randomised to the PREHAB intervention or routine care. The multi-component PREHAB intervention included a weekly 1-hour gym-based exercise circuit and a varied multidisciplinary education programme over a 3-month period. Baseline assessments were repeated in both groups after the 3-month pre-dialysis intervention.

Results: 30 participants (16 male:14 female; median age 63 years (IQR 55-70); eGFR 13ml/min/1.73m2) were assessed as shown in Table 1. The groups were well-matched for age, gender, and markers of nutritional status. At baseline, 23/30 (77%) participants were classified as well-nourished according to SGA, and 24/30 (80%) were overweight according to BMI. Markers of fat-free mass (MAC and % lean body mass (LBM)) were below reference values (MAC 33.7cm and 32.1cm; %LBM 77.2% and 67.5% in males and females respectively), and body fat percentage was higher than reference values (22.8% in males and 32.5% in females) in both groups. Most markers of nutritional status were maintained in both groups over the 3-month period, apart from a reduction in skeletal muscle mass index observed in the PREHAB group only.

Conclusion: Our observations suggest that some aspects of nutritional status and body composition may be starting to decline approximately 6 months before dialysis initiation, with values for some markers below reference values, and consistent with those reported in previous studies in the dialysis population. We did not find any significant changes in most markers of body composition and nutritional status during a 3-month pre-dialysis period in either the intervention or routine care group. Analysis from further follow-up during the first 6-months of dialysis will determine if nutritional status and body composition change during this time, and whether our PREHAB intervention offers any longer-term benefits.

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Implementation of a frailty screening programme and a modified Comprehensive Geriatric Assessment service in a Nephrology Centre

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Introduction: Frailty is highly prevalent in patients with chronic kidney disease (CKD) and is associated with adverse health outcomes. The Clinical Frailty Scale (CFS) is a validated frailty screening method in CKD populations and the Comprehensive Geriatric Assessment (CGA) is the gold standard of care for frail older people. The aims of this quality improvement project were to: (1) proactively identify frail patients with CKD using the CFS; and (2) assess and support patients identified as frail using the principles of the CGA.

Methods: A frailty screening programme was implemented in September 2018. The CFS was used in outpatient clinics, haemodialysis units and integrated into the nursing admissions process on the Renal ward. A Renal Frailty Multi-Disciplinary Team (MDT) was established, which included a clinician, dialysis sister, Kidney Choices clinical nurse specialist, dietician, renal psychologist, occupational therapist (OT) and social worker. Renal Frailty MDT referral criteria included: CFS ≥5 (or CFS<5 with concerns about mobility, cognition or nutritional status) and non-dialysis or dialysis-dependent CKD. Referred patients were triaged via telephone by an OT. Eligible patients were offered a home assessment that used the principles of the CGA, termed a modified CGA (mCGA). Patients were discussed at a MDT meeting during which a targeted management plan was created. This plan was then communicated with the wider Renal team. Data were collected between 03/09/2018 and 02/09/2019.

Results: A total of 491 patients (450 outpatients [366 non-dialysis and 84 dialysis patients] and 41 inpatients) were screened using the CFS. One hundred and sixty-two patients (33%) were screened as frail (CFS ≥5). Within the 450 outpatients, more frail patients were admitted than non-frail patients (41% vs 21%, p<0.001) and more frail patients died than non-frail patients (15% vs 2%, p<0.001). Furthermore, when adjusted for age, gender and dialysis-dependence, frailty was associated with an admission hazard ratio of 2.48 (95% CI 1.71-3.58) and a mortality hazard ratio of 9.24 (95% CI 3.39-25.20). Twenty-six patients received a mCGA (mean age 74±16 years; 12 [46%] female patients; 15 [58%] dialysis-dependent patients). Figure 1 demonstrates the number of active problems and recommended actions for each patient. The three most commonly identified problems were: falls/falls risk (n=22), mobility/function (n=20) and mood/anxiety (n=8). Eleven patients participated in telephone calls that explored their experience of the service. Most patients reported that they found the mCGA helpful. However, feedback suggested that patients would benefit from more information prior to the visit and a clearer explanation of planned interventions. During the telephone calls, patients felt able to express the concerns that they had when thinking about the future.

Discussion: Patients living with frailty and CKD have a high number of active health problems and an increased risk of hospitalisation and mortality. It is possible to successfully implement a frailty screening programme and mCGA service within Renal Services. In doing so, otherwise unknown patient needs can be identified and a holistic person-centered care plan developed that aims to improve the morbidity, mortality and health-related quality of life of this vulnerable group of patients.

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Does incremental initiation of haemodialysis preserve native kidney function ? A multi-centre feasibility randomised controlled trial.

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Background:

Incremental Haemodialysis(IHD), a method of individualising haemodialysis(HD) dose according to level of residual renal function(RRF) such that as RRF reduces, HD dose is upwardly adjusted. Retrospective data suggests potential benefit of this approach in preserving RRF, a key predictor of survival for dialysis patients.

Method:

A randomised, intention-to-treat, multi-centre trial was designed to determine the feasibility of a future definitive trial of IHD to establish if this approach preserves RRF. The trial was designed to estimate effect size of potential benefit in terms of RRF.

55 patients with renal urea clearance(KrU)≥3ml/min/1.73m2BSA and within 3-months of starting HD were randomised across 4 centres to either conventional thrice-weekly HD(3XHD) for 3.5-4 hours or IHD. The IHD protocol involved initiation of HD twice-weekly after randomisation and upward adjustment of HD frequency and time as RRF was lost.

3XHD patients were dialysed to Standard Kt/VDialysis>2.0. IHD patients were dialysed to Standard Kt/VDialysis+Standard Kt/VRRF>2.0. Both groups were dialysed to same target, except that urea clearance incorporated RRF in IHD arm. Patients were withdrawn for transplant, dialysis modality change or patient's choice. Follow up was for 6-months (primary outcome data) but secondary outcome data will be for 12-months.

The primary outcome was rate of change of RRF in the first 6-months after randomisation (effect size of intervention). Recruitability, retainability, protocol adherence and rate of adverse events were also measured as a primary objective. As a secondary outcome, we determined proportion of patients with KrU≥2 and ≥3ml/min/1.73m2BSA at 6-months. Impact of dialysis treatment was measured using questionnaire-based assessments at baseline and 6-months.

Results:

26 patients were randomised to 3XHD and 29 to IHD. Baseline demographics including age, weight, haemoglobin, blood pressure, Charleson Comorbidity Index, were not significantly different between study arms. Baseline KrU was 5.1±SD 1.8 ml/min/1.73m2BSA in 3XHD arm and 5.72±SD 2.49 ml/min/1.73m2BSA in IHD arm. At 6-months, KrU reduced to 2.68±SD 1.73 in 3XHD arm and 3.80±SD 1.85 in incremental arm. In first 6-months, 3 patients recovered to dialysis independence (3XHD=1:IHD=2). Slope of RRF was not

significantly different between two arms(p=0.39). The proportion of patients with significant KrU>2ml/min/1.73m2BSA at 6-months was significantly higher in IHD arm(92%) compared to 3XHD arm(65%), p=0.032. Rate of major adverse cardiac events, fluid overload, hyperkalaemia, vascular access events, deaths and infections did not differ significantly between groups. There were 2 deaths in 3XHD arm(4025 patient days) versus 1 in IHD arm in the first 6-months(4666 patient days).
There was no significant difference in Clinical Frailty Score, Montreal Cognitive Assessment score, depression score(PHQ-9), Quality of Life(EQ-5D-5L) and Illness Intrusiveness Rating Scale between groups at baseline and 6-months.

Conclusion:

Rate of loss of RRF(slope) was not significantly different between 3XHD and IHD arms but IHD was associated with significantly higher probability of retaining KrU>2ml/min/1.73m2. There was no evidence of any clinical detrimental effect of IHD in terms of mortality, fluid overload or hyperkalaemic events. IHD does not appear to be harmful and may confer a small benefit to preservation of RRF. A definitive study is required to define clinical benefits further.

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A cross sectional and longitudinal evaluation of plasma inflammatory biomarkers in patients with stroke and CKD

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Background

Chronic kidney disease (CKD) is an independent risk factor for stroke but stroke is also an independent risk factor for adverse CKD outcomes. Inflammation is thought to contribute to poor clinical outcomes in CKD but has not been investigated in relation to patients with stroke and CKD. This study investigated if differences exist between inflammatory biomarkers in patients with CKD and stroke compared to CKD without stroke. Further, it investigated longitudinal changes in inflammation in patients who suffer an incident stroke whilst also suffering from non-dialysis CKD (ND-CKD).

Method

This CKD Kidney Cohort Study is a UK prospective cohort of more than 3000 patients with ND-CKD patients recruited since 2002. A propensity matched sample of patients, differentiated by previous stroke at study recruitment, had stored plasma analyzed for Interleukin- 6 (IL-6), Von Willebrand Factor (VwF) and C-reactive protein (CRP). Multivariable cox regression analysed the associations between inflammation, death, end-stage renal disease (ESRD) and future non-fatal cardiovascular events (NFCVE). Changes in the biomarkers were also analyzed from annually collected samples both before and after incident stroke whilst in study.

Results

162 previous stroke patients were compared against 159 non-stroke patients at study entry. Patients were well matched for comorbidities, kidney function and demographics. There was no significant difference in inflammatory biomarkers between the two groups. Previous stroke was associated with greater mortality risk (median survival 38 months in previous stroke vs 53 months in non-stroke patients p=0.01). Higher inflammatory biomarker concentration levels were independently associated with death but not ESRD or NFCVE in the whole population. The hazard ratios (95% CI) for each 1SD increase in log IL-6, VwF and CRP for all-cause mortality were 1.35 (1.10-1.70), 1.26 (1.05-1.51) and 1.34 (1.12-1.61) respectively. Only CRP retained its independent association with death in the stroke population. There were no clinically significant changes in inflammatory biomarkers in the months approaching a stroke event or after a stroke event.

Discussion

In a matched ND-CKD population previous stroke was an important determinant of mortality. However, the adverse combination of stroke and ND-CKD does not seem to be driven by higher levels of inflammation, as biomarkers of inflammation were associated with worse outcome in both stroke and non-stroke ND-CKD patients.

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A feasibility study investigating longitudinal cognitive changes in patients transitioning from advanced CKD through to dialysis

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Background
Cognitive impairment and dementia are more prevalent in dialysis patients than in patients with non-dialysis dependent chronic kidney disease (ND-CKD). Patients who choose haemodialysis rather than peritoneal dialysis seem to demonstrate a more severe decline in cognition. There is an unmet need to study the natural history of cognitive impairment from advanced ND-CKD through to dialysis initiation into different dialysis modalities.

Methods
In this feasibility study patients who were approaching dialysis commencement were highlighted to the investigator. Patients who met inclusion criteria and consented underwent extensive and detailed battery of cognitive assessment alongside quality of life and depression assessments within 2 months prior to dialysis initiation and at 2 months after dialysis commencement. Study feasibility was assessed based on eligibility rates, consent rates, withdrawal rates and missing data.

Results
Of 116 screened patients 19 patients (median eGFR 8mL/min/1.73m2, median age 64 years) participated in the study. Reasons for non-participation were ineligibility (37%), short lead time between dialysis commencement decision and dialysis (23%) and refused consent (23%). 11 participants completed the second cognitive assessment. 47.4% demonstrated cognitive impairment at baseline using Montreal Cognitive Assessment. Most participants demonstrated longitudinal stability or improvements in cognitive scores.

Conclusion
Increasing cognitive assessor time flexibility, developing a shorter cognitive assessment battery and performing cognitive assessments in the home environment may remove some barriers to consent and retention.

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A positive Flow Cytometry XM increases AMR but not graft loss following HLA-incompatible kidney transplantation

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Background: Kidney transplantation in the presence of donor-specific HLA antibodies (DSA) is an option for difficult to match patients. Predicting the risk of rejection and/or worse outcomes remains a challenge.

Methods: National multi-centre case-control study included HLA incompatible (HLAi) kidney only transplant recipients (2011-2018) matched in a 1:2 ratio with HLA compatible (non-HLAi) controls (2015-2016). Match criteria included gender, age and donor source. HLAi was defined as the presence of DSA (DSA POS) identified by Luminex at time of transplantation irrespective of T and B-cell flow cytometry crossmatch (FCXM) status. Antibody mediated rejection (AMR), transplant- and patient survival were retrospectively analysed.

Results: Hundred-eighty patients were included in the study, of which sixty received an HLAi transplant. Mean age 46 years; 60% female, 25% received a live donor organ (cases vs controls; p=NS). Median cumulative Mean Fluorescence Intensity (MFI) at time of HLAi transplant was 3321 (IQR 1276 – 6675) which resulted in a positive FCXM in 25 (42%) recipients. All patients were CDC crossmatch negative. Forty-five (75%) HLAi recipients received lymphocyte depleting (LDa) induction therapy and 15 (25%) received an IL-2R antagonist (IL2Ra). Non-HLAi controls received IL2Ra induction. Mean follow up was 2.1 (SD±0.9) and 2.2 (SD±0.6) years for HLAi and non-HLAi respectively (p=NS).

DSA POS/FCXM POS transplantation carried an increased risk of AMR at 1 year (53%) compared to DSA POS/FCXM NEG transplants (26%) and non-HLAi transplants [(0%), p<0.001]. LDa induction was superior to IL-2Ra induction in preventing AMR at 1 year (43% vs 75%, p=0.06) in DSA POS/FCXM POS transplants, but not in DSA POS/FCXM NEG transplants (26% vs 29%, p=NS). Patients with HLA Class II DSA as predominant DSA had higher rates of AMR than patients with HLA Class I DSA (45% vs 28% AMR at 1 year, p=0.16). Graft survival at 1 year was 94% following HLA compatible transplantation, compared with 97% following DSA POS/FCXM NEG and 87% following DSA POS/FCXM POS transplantation (p=NS). Mortality risk was increased in the 2 years following HLAi transplantation (15% and 2% for HLAi and non-HLAi recipients respectively [p<0.001]); 46% and 0% of deaths were infection-related in each group.

Conclusion: In kidney transplantation, the presence of DSA and a positive FCXM carries the greatest risk of AMR, but not graft loss at 1 year compared to HLA compatible and DSA POS/FCXM NEG transplantation. Induction therapy consisting of a lymphocyte depleting agent improves AMR risk at 1 year in FCXM POS but not FCXM NEG transplants.

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Is it time to ditch HbA1c on dialysis? Results of an observational study using continuous glucose monitoring (CGM) in patients with Type 2 diabetes and chronic kidney disease (CKD) stage 3-5, and patients with Type 2 diabetes on haemodialysis.

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INTRODUCTION: Renal impairment affects endogenous and exogenous insulin metabolism, contributing to an overall decline in blood glucose levels as kidney failure progresses[1]. The situation in haemodialysis is complicated further by poor diet and irregular meals, with haemodialysis itself altering insulin secretion, resistance and clearance[2]. Current guidelines[3] advise HbA1c levels of 58 to 68 mmol/mol in the haemodialysis population to reduce incident hypoglycaemia, however HbA1c measurement underestimates true glycaemic control in haemodialysis patients[4].

METHODS: Fifty patients with Type 2 diabetes and CKD stage 3-5 (pre-dialysis), and fifty patients with Type 2 diabetes and on haemodialysis underwent CGM for 1 week. Patients continued their usual anti-diabetic medications throughout the study. Serum HbA1c and baseline measurements were obtained. A hypoglycaemic episode was noted if CGM readings were below 3.9 mmol/L for 15 consecutive minutes. Negative binomial regression analysed whether number of hypoglycaemic episodes were influenced by severity of kidney failure; first by CKD vs haemodialysis, then by CKD stage (3B, 4, or haemodialysis). Mean CGM glucose, estimated CGM HbA1c, percentage of time spent in normoglycaemia (3.9 to 10.0 mmol/L) and hyperglycaemia (above 10.0 mmol/L) were calculated, and robust bootstrapped ANOVA evaluated whether being in CKD stage 3-5 or haemodialysis influenced overall glycaemic control.

RESULTS: Mean age and weight were 69.6 years and 89.6kg in CKD patients, compared to 63.5 years and 83.7kg in haemodialysis patients. Mean serum HbA1c between CKD (58mmol/mol) and haemodialysis patients (59mmol/mol) was not significantly different (p=0.649). Haemodialysis patients had significantly fewer hypoglycaemic episodes compared to CKD stage 3-5 patients (1.5 vs 3.3 episodes, p=0.025). CKD stage 3-5 patients were 3.6 times more likely to have a hypoglycaemic episode compared to haemodialysis patients (p=0.016). The effect of CKD stage on the number of hypoglycaemic episodes was also significant (p=0.030). CKD stage 4 patients had the most number of hypoglycaemic episodes (4.5), followed by CKD stage 3B patients (2.6) and haemodialysis patients (1.5). We expected that hypoglycaemic episodes would be more frequent as kidney function declines. However post-hoc comparisons between each successive CKD stage was non-significant (CKD stage 3B vs CKD stage 4, p=0.232; CKD stage 4 vs haemodialysis, p=0.09). Mean estimated CGM HbA1c and mean CGM sensor glucose for haemodialysis patients (69mmol/mol, 10.8mmol/L) was significantly higher than that for CKD patients (56mmol/mol, 9.04mmol/L) (p<0.001). Haemodialysis patients spent significantly less time in normoglycaemia (47% vs 65%, p<0.001) and significantly more time in hyperglycaemia (52% vs 32%, p<0.001), when compared to CKD patients.

DISCUSSION: CKD stage 3-5 patients had significantly more hypoglycaemic episodes than haemodialysis patients at an equivalent HbA1c, however, this was in the context of haemodialysis patients spending more time in hyperglycaemia. Although the haemodialysis patients in our study had a serum HbA1c level at the lower end of the recommended range, CGM showed poorer glycaemic control than expected with a lower hypoglycaemic incidence than feared, suggesting current guidelines aimed at avoiding extremes of

hypoglycaemia results in significant hyperglycaemia. Utility of HbA1c targeting in haemodialysis patients needs reviewing, and CGM to monitor diabetes control should be considered in these patients.

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A single centre picture of conservative care: incidence, progression and outcomes

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Introduction
Conservative care (CC) of end stage kidney disease involves the holistic management of patients without renal replacement therapy (RRT). It is typically provided for older individuals, those with a high co-morbidity burden or a poor functional status. Outcome data, particularly allowing comparison to patients on RRT, are lacking. Our unit established a CC service in 2008. We aim to describe the incidence of CC, population characteristics, renal progression and patient outcomes in our unit.

Methods
Patients coded as starting CC between 1/1/14 and 31/12/18 were identified from the local electronic patient record and followed for a minimum of 6 months. Patient demographics, comorbidity, date of renal referral, date of CKD 4 and CKD 5 (eGFR<30 and <15ml/min/1.73m² respectively for >90 consecutive days), location and cause of death were collected.

Results
Over the study period 258 patients entered the CC pathway. 141 (55%) were men and the median age was 80 years (IQR 75-84). In contrast to the incident RRT population, higher socioeconomic status was more common (SIMD 1 11%, SIMD 5 22%). The most prevalent primary renal diagnoses were chronic kidney disease of uncertain aetiology (39%), diabetic nephropathy in type 2 diabetes (23%) and ischaemic nephropathy (14%). Median eGFR at renal referral was 23ml/min/1.73m² (IQR 17-32) and median time from referral to CC coding was 2.4 years (IQR 0.4-6.4).

Vascular disease was present in 83% of patients; cognitive impairment in 26% and assisted mobility or living in 78%. The burden of co-morbidity by the Wright-Khan index was low in 5 patients, medium in 51 patients and high in 202 patients.

Follow-up was a median of 12 months (IQR 4.5-23). During follow-up 251 patients reached CKD stage 4, 202 reached CKD stage 5 and 112 reached an eGFR of <8ml/min/1.73m² (the median eGFR at RRT start in our unit). 204 patients died of whom 50% had an eGFR <8ml/min/1.73m². The remainder had a median last recorded eGFR of 13ml/min/1.73m² (IQR 11-18). The median time from reaching an eGFR of 8ml/min/1.73m² to death was 62 days (IQR 13-243, range 0-4.6 years). Locations of death were acute hospital (47%), usual residence (30%), community hospital (16%) and hospice (6%).

Over the same time period 468 patients started dialysis at our unit with a median starting eGFR of 8ml/min/1.73m². The incidence of CC in patients reaching this eGFR was 19%.

Conclusion
Using the median eGFR for patients starting dialysis allows us to give an accurate measure of the use of CC for end stage kidney disease for individuals known to our unit: 19%. Of those individuals electing for CC, 50% died before reaching the point at which dialysis would likely have been initiated.

Patients choosing the CC pathway were older and from higher socioeconomic backgrounds than the incident dialysis population. The difference in SIMD scores is striking and future work will focus on a comparison with those patients who die shortly following initiation of RRT to improve our understanding of patient management pathways and ensure equity of access to the CC service.

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Prevention is better than cure: Reducing peritoneal dialysis exit site infections

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Introduction:

Peritoneal dialysis (PD) catheter exit site infections are an important risk factor for peritonitis, which can have a significant impact on patient outcomes. Strategies to prevent infections include exit site care, topical antibiotic prophylaxis and prompt treatment of exit site infections. Renal Association guidelines also recommend regular audit of exit site infection rates, including the causative organism, treatment and outcomes.
We aimed to assess the impact of a new catheter care bundle on our rate of exit site infection.

Methods:

A baseline audit of prevalent PD patients in our unit was undertaken in 2016. We collected the number of exit site swabs sent, the results of these swabs and infection rates (including rates of relapses and catheter removal).
We then developed a catheter care bundle in 2017 which includes:

1. Exit site cleaning protocol changed from saline to chlorhexidine wipes
2. Nasal and exit site prophylaxis with mupirocin (or alternative) for all patients
3. Protocol for treatment of infections reviewed and standardised
4. Treatment length standardised to 2 weeks

Further rolling audits were undertaken in 2018/19 to assess the impact of these changes. We also introduced a monthly multidisciplinary 'mini RCA' review of all exit site infections.

Results:

116 prevalent PD patients were identified in the 2016 baseline audit. A total of 202 exit site swabs were sent and there were 58 confirmed exit site infections (28.7%). Staphylococcus aureus was grown in 48 swabs (23.8%). 27 patients had refractory, relapsing or repeated infections, and 14 patients went on to have their PD catheters removed. There were also 7 cases of Pseudomonas infection.
In the 12 month period from July 2018 to June 2019 following the implemented changes, 106 swabs were sent from 115 patients and there were only 33 confirmed exit site infections (43% overall reduction). There were 11 Staphylococcus aureus infections, a significant reduction (p 0.003). Only 3 catheters were removed. Pseudomonas infection rates remained unchanged.

Discussion:

Following the implementation of a care bundle to improve PD exit site care, we have seen a 43% overall reduction in exit site infection rates in our unit. There was a significant reduction in exit site infections (77%) and catheter removals (79%) due to Staphylococcus aureus. This improvement is likely to be due to the increased use of chlorhexidine wipes and topical mupirocin application. These are simple and

inexpensive treatments which appear to be highly effective, although the number of patients in our study was small.

Conclusion:

The introduction of a standardised catheter care bundle led to a significant reduction in Staphylococcus aureus PD exit site infections in our unit.

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Can we ‘Fast Track’ living donor assessment? A Quality Improvement project

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Introduction:

Living kidney donor (LKD) transplantation provides the best outcomes in terms of graft function and survival for patients with end stage kidney disease1. Donor assessment is frequently time consuming and can involve multiple hospital visits. Initiatives to implement single day assessment in other parts of the UK have been shown to increase living donor transplantation rates2. As part of the KQuIP ‘Transplant First’ project in our region we identified a need to reduce delays in donor assessment in order to try to maximise the availability of pre-emptive transplantation for our patients.
We aimed to create a Fast Track LKD clinic to combine the initial investigations and assessment into two visits.

Methods:

We process-mapped our current LKD assessment pathway and identified any unnecessary steps or delays. Using Plan-Do-Study-Act (PDSA) cycles, we then developed a streamlined protocol over two appointments. The first appointment involves information gathering and preliminary blood and urine tests. The second ‘Fast Track’ clinic appointment was created to include nephrology consultation plus renal ultrasound, chest X-ray, ECG and fasting blood tests on a single day.
All potential donors who proceeded to Nephrology assessment in our unit in 2019 were included in the dataset. From June 2019 onwards, patients were entered into the Fast Track clinic when availability allowed. The number of days from first contact to transplant centre referral was collected and entered into a run chart.

Results:

A total of 28 potential donors proceeded to a Nephrology consultant appointment in our unit in 2019. Nine of these were assessed through the Fast Track clinic, and the remaining 19 were worked up using the pre-existing donor assessment pathway.
The mean number of days from first contact to Nephrology appointment was 78 days in the Fast Track clinic compared with 87 days in the conventional clinic. Total time from first contact to transplant centre referral was significantly shorter in the Fast Track clinic (93 days compared with 158 days).
Further data is being collected prospectively, including wait times for investigations and completion rates to donation.

Discussion:

Following the introduction of a ‘Fast Track’ living donor assessment clinic, we have been able to reduce unnecessary delays in LKD workup and reduce the time from first contact to transplant centre referral. Although other units in the UK have started single day LKD assessment, we felt that this might not provide enough reflection time for our patients and we opted to use two visits to complete the education and

evaluation process. The use of patient experience measures could be helpful to involve donors in future assessment pathway design.
The use of Quality Improvement methodology was helpful in overcoming some of the barriers and challenges encountered during this project. We also benefited from sharing ideas with other units through the KQuIP 'Transplant First' project and are working with our two transplant units to streamline the referral process and standardise requirements across the region.

Conclusion:

The introduction of a 'Fast Track' clinic in our unit has helped to reduce delays in LKD assessment.

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The role of serum microRNAs in the pathogenesis of IgA nephropathy

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IgA nephropathy is the most common form of glomerulonephritis worldwide with approximately 30% of patients progressing to end stage renal disease within 10 years of diagnosis, and requiring renal replacement therapy. Diagnosis requires an invasive kidney biopsy and currently there is no reliable way to predict progression early on. MicroRNAs (miRs) are short non-coding nucleotides that post transcriptionally regulate gene expression and have been shown to be dysregulated in various diseases including IgAN. The aim of this study was to investigate a potential role of serum miRs in IgAN progression.
Blood samples were collected from IgAN patients who were clinically defined as progressors (IgANp) and non-progressors (IgANnp), as well as membranous nephropathy (MN) patients (CKD positive controls) and healthy subjects. Next Generation Sequencing (NGS) was performed on processed sera. An independent set of sera were used to validate identified miRs using (RT-qPCR). Exosomes from serum were isolated using the Total Exosome RNA and protein Isolation Kit and exosome number was quantified using the EXOCET Quantification Kit.
MiRs which exhibited a ≥1.5 fold change in expression between IgAN and healthy subjects and MN were selected from the NGS data. Nine candidate miRs met these criteria; miRs -223-3p, -425-5p, 143-3p, -29a-3p and -339-5p,-122-5p, -483-5p, -144-5p and -96-5p. However, none of the nine miRs retained this significant difference following validation by RT-qPCR. Two of the miRs (miRs -122-5p and -483-5p) exhibited a 1.5 fold difference in expression between IgANp and IgANnp, healthy subjects and MN in the discovery cohort, which remained significantly differentially expressed between IgANp compared to IgANnp and healthy subjects but not compared to MN following validation. However, expression levels of miRs -122-5p and -483-5p in serum-derived exosomes were, significantly differently expressed in IgANp compared to IgANnp and healthy subjects and this time also compared to MN. ROC curves revealed that the area under the curve (AUC) between IgANp vs IgANnp for miR-483-5p was 1.00 (p=0.0004) and for miR-122-5p was 0.92 (p=0.018). Results also revealed that IgAN patients sera (both IgANp and IgANnp) contained 1.7 fold more exosomes compared to healthy subjects (p=0.02) and 1.6 fold more than MN patient sera (p=0.04) but there was no significant difference in exosome number between IgANp vs IgAnp. Moderate correlations were observed between serum exosomal miR-483-5p and proteinuria (Upcr) (R2=0.310, p=0.01), and weak but significant correlations were found between exosomal miR-483-5p expression and IgAN-associated serum analytes TNFR1 (R2=0.2462, p=0.0159) and CD27 (R2 =0.1107, p=0.0385), miR-122-5p correlated with TNFR1 levels (R2=0.1191, p=0.0414).
The data suggest that exosomal miRs could serve as biomarkers predicting IgAN progression and may also be involved in the pathogenesis of IgAN.

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Is our assessment of peritoneal dialysis adequate?

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Introduction:

The assessment of peritoneal dialysis (PD) adequacy involves measurement of small solute clearance. Renal Association guidelines advise six-monthly solute clearance testing, with a combined urinary and peritoneal Kt/Vurea of 1.7/week or creatinine clearance (CrCl) of 50L/week/1.73m2 recommended as a minimal treatment dose. Strategies recommended to preserve residual renal function include the use of angiotensin converting enzyme inhibitors (ACEi), angiotensin-receptor blockers (ARB) and loop diuretics.
We aimed to assess the frequency of adequacy testing over 1 year in our PD population, the proportion of patients meeting minimum adequacy, and the influence of primary diagnosis or medication on residual renal function.

Methods:

81 prevalent PD patients in our renal unit were identified. Clinical, demographic and prescribing data were reviewed from Proton. PD adequacy results for 12 months (1st October 2018 to 30th September 2019) were obtained from RenalSoft. Statistical analysis was carried out using Stata.

Results:

The median age was 72 years and 56% were male. Median length of time on PD was 433 days. The most frequent primary renal diagnoses were systemic disease (predominantly hypertensive and diabetic nephropathy) followed by tubulointerstitial disease. 40 patients (49%) had undergone adequacy testing within the previous 6 months, and 54 (67%) within 12 months. Of these, 69% achieved target weekly Kt/V (mean 1.9). Target creatinine clearance was achieved in 85% of patients (mean 66L/week/1.73m2). Overall, 87% of patients achieved adequate Kt/V or CrCl. Of the 17 patients who did not achieve target Kt/V, only 4 (24%) had an immediate change in dialysis prescription or modality.
ACEi or ARB's were prescribed in 44% of patients, and loop diuretics in 39%. Mean residual Kt/V was 0.84, and statistical analysis showed no significant effect of ACEi/ARB (p 0.5), diuretics (p 0.3) or primary renal diagnosis (p 0.3) on residual renal function. There was a trend towards lower residual Kt/V in females (p 0.07) and patients who had been on PD for more than 1 year (p 0.3).
There were 27 patients without an adequacy test. 17 (63%) of these had been on PD for less than 6 months.

Discussion:

Only half of prevalent PD patients in our unit had undergone adequacy testing in the previous 6 months as per Renal Association guidelines. Most of the patients who were not tested had only recently started PD. Of the patients tested, 87% were achieving minimum solute clearance. ACEi/ARB and loop diuretics were prescribed in less than half of the patients. Statistical analysis did not demonstrate an association between better residual Kt/V and the use of these medications, although the sample size was small. Solute clearance does not always correlate with patient well-being, which is also influenced by other co-morbidities and

individual circumstances. The dialysis prescription was left unchanged in 76% of patients who did not achieve a minimum Kt/V.

Conclusion:

Adequacy testing in PD patients may be more practically achieved every 12 months as a standard, particularly as changes are rarely made after 6 months. There may be no benefit in prescribing recommended medication to preserve residual renal function.

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Virtual Hypertension Clinic: Integrating Primary and Secondary Hypertension Care in North Central London

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Introduction: Hypertensive patients benefit from early control of BP to ameliorate end-organ damage. However, access to specialist care for hypertensive patients can involve long waiting times, travel and expense for patients and CCGs.
In 2016, we developed a virtual hypertension clinic in collaboration with Camden CCG to provide remote advice to GPs and triage hypertension patients to community nurse led or hospital clinics.

Methods: Two consultant nephrologists (SBW, JMC) review referrals made to the virtual hypertension clinic on the EMISWeb platform every week. EMISWeb is an electronic patient record system used to record all the clinical observations, measurements and investigation results for all patients seen in Camden primary care. At the virtual clinic, the referral, and the patient's records can be viewed with clinic BP and ABPM measurements, medications (and number of collected prescriptions), biochemistry and other special investigations and medical history. A treatment plan is written at the time of review for the GP. This may be for:

- Simple advice with a plan for pharmacotherapy with BP goals.
- Direct triage to a community hypertension nurse specialist clinic for longer consultations than possible for GPs. This includes motivational interviewing, stress workshops, lifestyle and dietary advice.
- Direct triage to hospital clinic for patients who require investigation for secondary hypertension or adherence testing.

Results:
Since 2016, 846 patients (median age 43yrs, 53% male) were reviewed.
Referral indications: Age of onset <40yrs 57%, Resistant hypertension 28%, Unusual hypertension 11%, Other 3%.
Outcomes: 35% discharged with treatment plan, 30% triaged to community nurse-led clinic, 24% triaged to hospital clinic, 11% other outcome.
The virtual hypertension clinic provided a minimum cost saving of £112.23 per patient attendance compared with traditional outpatient care.

Conclusions: Implementation of a virtual hypertension clinic offers a cost-effective, rapid referral mechanism for specialist advice, patient assessment and triage.

Disclosures: None

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Monogenic Hypertension Associated with a Pathogenic STX16 Mutation

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Hypertension is the most important modifiable risk factor for death worldwide. Finding novel model mechanisms for blood-pressure (BP) regulation is an important goal and Mendelian syndromes have been very helpful in that regard.
Pseudohypoparathyroidism type 1B (PHP1B) is an example in which affected individuals are invariably hypertensive for unknown reasons.
We encountered a 48 year-old woman with severe, five-drug-resistant, hypertension. Her father and two aunts were also severely hypertensive. Her two young sons have developed drug-dependent hypertension before age 20 years. We measured 24-h ambulatory blood pressure and excluded all known secondary causes. However, the proband's sons and their grandfather have the PHP1B phenotype, while our index patient and her two hypertensive aunts do not. The blood pressure phenotype in this pedigree suggested autosomal dominant inheritance. The Syntaxin 16 (STX16) gene encodes a snare protein and mutations cause PHP1B. Mutated STX16 causes methylation defects of Guanine Nucleotide Binding Protein, Alpha Stimulating (GNAS), a G protein regulator. Since GNAS is an imprinted gene, only inheritance from the mother causes the PHP1B phenotype. Subsequently, we sequenced STX16 in our kindred. We found a heterozygous deletion involving exons 5 and 6. We were also able to show complete loss of methylation in GNAS exon 1A. All hypertensive persons in our kindred have the STX16 mutation and are hypertensive. However, only those with maternal inheritance show the PHP1B phenotype. The methylation target region influenced by STX16 encompasses 7 genes. Our candidate is endothelin-3 encoded by EDN3. Our data separate the hypertension-PHP1B phenotypes. We imply separate mechanisms are involved. We suggest new targets of blood pressure-raising relevance, and have successfully treated these affected individuals with endothelin antagonists.

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Kidney professional experiences of managing people's advancing chronic kidney disease.

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PURPOSE: To investigate kidney professionals' experience of how to support the delivery of care for people with advancing chronic kidney disease (CKD) to inform the Yorkshire Dialysis and Conservative Care Decision Aid (YoDCA) content.

METHODS: Survey design employing qualitative methods. Semi-structured interviews elicited views about patient management and treatment decision making from eight kidney professionals recruited from three renal units in West & South Yorkshire, UK. Semi-structured interviews lasted no longer than 60 minutes and took place in clinics. They were audio-recorded, transcribed and analysed using thematic framework analysis.

RESULTS: Staff employ a mixture of face to face consultations, home visits and written information to support people with worsening CKD make decisions about treatments and care plans. Services differed in how their care is organised to support people making conservative care choices, and the training to talk about end of life care; some spoke about difficulties in initiating conversations about stopping dialysis and advance care planning. Conservative care was presented as an active option involving symptom management, advance care planning and quality of life assessment; dialysis as life-lengthening, but burdensome.

CONCLUSIONS: Although different care pathways exist between units, staff put considerable time and effort into preparing people with kidney disease to make treatment decisions, and planning for care. To facilitate staff to better support people making this choice, themes identified from staff interviews were integrated in to the Yorkshire Dialysis and Conservative Care Decision Aid (YoDCA) including: information on advance care planning, everyday activities, EKD and treatment routines, life expectancy, kidney and treatment failure, care at the end of life, and framing both treatments as active disease management options for advancing chronic kidney disease.

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The Impact of Hyperkalaemia and Its Concurrence With Cardiovascular and Renal Comorbidities on Healthcare Resource Use in The UK

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OBJECTIVES:
Hyperkalaemia (HK) is a potentially life-threatening electrolyte abnormality characterized by elevated serum potassium concentrations above 5.0mmol/L. The clinical and economic burden of HK is of concern for patients with cardiovascular and renal comorbidities. However, there is limited data on the impact of HK and its concurrence with comorbidities on healthcare resource use (HRU) in the UK. In this study we aimed to characterise HRU associated with HK hospitalisations in patients with different cardiovascular and renal comorbidities in the UK.

METHODS:
A retrospective cohort analysis was conducted using patient data from the Clinical Practice Research Datalink linked to the Hospital Episode Statistics database. The study population included patients aged ≥18 years between January 2003 and June 2018 with HK and a record of relevant cardiovascular and renal comorbidities (hypertension, heart failure, diabetes, non-dialysis dependent chronic kidney disease (CKD), dialysis dependent CKD). HRU was examined for each comorbidity considering the number of hospitalisations for HK and the prevalence of the comorbidity.

RESULTS:
The cohort consisted of 498,196 patients. Of these, 36.9% had hypertension, 33.8% diabetes, 35.1% CKD, 11.0% heart failure, and 0.6% were in receipt of dialysis. HK specific hospitalisation rates were 4.3 (95% confidence interval 4.2-4.4), 5.1 (5.0-5.3), 8.2 (8.0-8.5), 16.9 (16.2-17.6) and 62.7 (57.7-68.0) per 1,000 patient years, respectively. There were no significant differences in length of stay observed for each comorbidity (range 15.2-17.6 days). Hospitalisation rates increased with an accumulation of comorbidities. Total resource use costs were £49,745,643, £52,186,175, £76,567,465, £32,245,605 and £6,490,852 for hypertension, diabetes, CKD, heart failure and dialysis patients respectively.

CONCLUSIONS:
Understanding at risk patients could help treat/prevent HK and therefore reduce HRU. When considering HK preventative strategies, although patients with dialysis have increased hospitalisation rates, prioritising comorbidities with significant resource use has the potential to have the greatest impact on NHS budgets.

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The Association Between Hyperkalaemia Risk and Cardiovascular and Renal Comorbidities in a Large Real-World Cohort of CKD Patients

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Background and Aims: Approximately 275.9 million people globally and 5.6 million people in the UK are living with chronic kidney disease (CKD). The risk of hyperkalaemia (HK) is elevated in CKD due to renal impairment and may increase further upon treatment with renin-angiotensin-aldosterone system inhibitors, which are commonly used in many cardiovascular and renal conditions. This study aimed to assess the relationship between comorbidity burden and HK risk in a large cohort of UK CKD patients.

Method: Primary and secondary care data from the UK Clinical Practice Research Datalink (CPRD) and linked Hospital Episode Statistics (HES) were used to identify patients aged ≥18 years who had a diagnosis of stage 3+ CKD (identified as either a READ code for non-dialysis CKD stage 3+ or an estimated glomerular filtration rate (eGFR) <60 mL/min/1.73m2 without a prior READ code for dialysis) during the study period (2008–June 2018) or the five-year look-back period (2003–2007). Patient's index date was 1st January 2008 or the first date of CKD diagnosis, whichever occurred later. Diagnoses based on the presence of READ codes were used to define the accumulation of further cardiovascular or renal comorbidities of interest (resistant hypertension, heart failure, diabetes or dialysis-dependent CKD). The incidence of HK was defined as serum potassium (K+) thresholds of ≥5.0, ≥5.5 and ≥6.0 mmol/L.

Results: In total, 297,702 eligible patients had a CKD diagnosis during the study or look back periods and their mean follow-up was 5.6 (SD 3.2) years from index date. At baseline, mean age was 74.7 (11.3) years, mean body mass index was 28.3 (5.9) kg/m2, and 58.6% of patients were female.
CKD was the first diagnosis in 169,532 patients (56.9% of all CKD diagnoses), second diagnosis in 92,651 patients (31.1%), third in 32,606 patients (11.0%) and fourth or fifth in 2,913 patients (1.0%); however, only 11,129 CKD patients (3.74%) developed four or more comorbidities of interest. In total, 1.5% of the cohort (4,544 patients) progressed to dialysis and 29.6% (88,245 patients) died during the study period.
In general, the incidence of HK increased with the number of comorbidities of interest (Figure 1). At a K+ threshold of ≥5.0 mmol/L, crude incidence rate of HK was 286.5 (95% CI: 285.2–287.8) per 1,000 patient-years in patients with CKD only; this increased 2.8-fold to 806.8 (741.5–876.4) in patients with five comorbidities of interest. A similar trend was observed at K+ thresholds of ≥5.5 mmol/L and ≥6.0 mmol/L. A 5.9 fold increase was observed in crude incidence rate of HK (from 59.7 [59.1–60.3] with CKD only, to 350.3 [307.7–397.1] with all five comorbidities) at a threshold of ≥5.5 mmol/L and a 10.6-fold increase (from 9.1 [8.9– 9.4] to 96.2 [74.6– 122.2]) at the ≥6.0 mmol/L threshold.

Conclusion: This assessment of a large real-world patient cohort showed that the risk of HK in patients with CKD increases with the number of cardiovascular or renal comorbidities. Emphasis should be put on effective prevention and treatment of HK in CKD, especially in patients with high comorbidity burden.

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The High-volume Haemodiafiltration vs High-flux Haemodialysis Registry Trial (H4RT) – Recruitment progress following QRI recommendations

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Background: End stage kidney disease (ESKD) affects around 65,000 people in the UK. Almost half of these people will have blood cleaning treatment known as haemodialysis (HD) or haemodiafiltration (HDF) at a hospital. In theory, HDF should remove toxins more effectively than HD, thus improving survival, infection rates and quality of life for patients. However, this has not been demonstrated in randomised controlled trials (RCT) therefore any benefit may be being cancelled out by other factors in the HDF treatment.
Methods/design: H4RT is a non-blinded RCT comparing the clinical and cost-effectiveness of high-volume HDF compared with high-flux HD in the treatment of ESKD. Patients are randomised 1:1, stratified by site, age and residual renal function. The primary analysis will be intention-to-treat using proportional hazards regression adjusting for variables used to stratify the randomisation.
Setting: Secondary care renal units in the UK. Target population: adult patients on in-centre, maintenance HD or HDF for ESKD. Exclusion criteria: lack of capacity to consent; clinician predicted life expectancy of less than 3 months; living kidney donor transplant or home dialysis scheduled within 3 months; prior intolerance of HDF; not suitable for high-volume HDF for other clinical reasons.
Intervention: high-volume HDF (aiming for ≥21L of substitution fluid per session body surface area adjusted); comparator= high-flux HD.
The QuinteT Recruitment Intervention (QRI) has been integrated throughout the RCT to optimise recruitment by identifying difficulties as they occur and implement generic strategies to address them. Recruitment processes are being explored with reviews of centres as they open and throughout recruitment.
Progress: The study opened to recruitment in November 2017 with a target of 1550 patients by end March 2021. As of 24 January 2020, there are 28 sites open to recruitment and 968 (62%) patients randomised. A further 4 sites are in set-up.
Feedback of QRI findings to support recruitment include 1) revisiting previously excluded satellite units to increase pool of eligible patients; 2) inviting as many eligible patients as possible in each site/satellite to take part; 3) encouraging PIs/clinicians and key clinical advocates for H4RT to discuss H4RT with eligible patients ; 4) providing training and support to research nurses and renal staff in delivering body surface area-adjusted high-volume HDF; 5) discussing with high recruiting sites the potential to raise site recruitment targets.
We have run an investigator meeting, where site PIs, research and clinical staff attended a central educational training day to share learning on site-specific recruitment and clinical compliance. Additionally, the central trials team hold reviews every two months to discuss recruitment challenges and provide additional support where needed. The team provide sites with incentives, rewards, regular newsletters and social media updates celebrating success.
Conclusion

H4RT is one of the first 'efficient registry RCTs' in nephrology. Successful recruitment at 90% power will provide robust evidence to establish whether high-volume HDF is more effective at improving fatal and non-fatal cardiovascular and infection outcomes in people on haemodialysis.
Funding acknowledgement: The project is funded by the National Institute for Health Research HTA programme (project number 15/80/52).

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Patterns of Hyperkalemia Recurrence Among Chronic Kidney Disease Patients in UK Clinical Practice

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Introduction: Patients with chronic kidney disease (CKD) are at increased risk of hyperkalemia, HK (high serum potassium concentration) due to impaired renal function. This medical condition is potentially life threatening if untreated or poorly managed. This study describes the characteristics of CKD patients in the UK who experience HK and assessed the frequency of recurrent HK and time between first (index) and subsequent events.

Methods: A retrospective cohort study was conducted using linked Clinical Practice Research Datalink (CPRD) and Hospital Episode Statistics (HES) data from 01 January 2008 to 30 June 2018, with a five-year lookback period (2003-2007).
Patients were included if they were diagnosed with CKD stage 3+ (READ code or eGFR <60 mL/min/1.73m2 without prior dialysis) during the study or lookback periods and aged >18 years at diagnosis (index). Patient demographics, clinical history and baseline medication use were described. HK was defined as serum K+ ≥5.0 mmol/L. HK events occurring during the study period, but after diagnosis of CKD, were assessed. Recurrent HK was defined as any event subsequent to the first event. Time to recurrence was calculated using Kaplan-Meier.

Results: In total, 297,702 CKD patients (mean age 74.7 years [standard deviation: 11.3], male [41.4%]) met eligibility criteria. At time of CKD diagnosis, 30.6% of the population had resistant hypertension. Other prominent comorbidities included diabetes (22.24%), CKD (7.9%) and cancer (7.8%). Approximately half of patients were in receipt of diuretics at baseline (49.2%), while 32.5% and 32.0% were in receipt of beta blockers and calcium channel blockers, respectively. During follow up, 67.0% of patients received a renin-angiotensin aldosterone system inhibitor (RAASi).
147,215 patients (49.5%) experienced at least one HK event, of which 53,695 (36.5%) had only one HK event, 93,250 (63.5%) had two or more HK events and 29,413 (20.0%) had six or more events. HK event incidence was predictive of subsequent events, with the probability of experiencing a HK event increasing from 49.5% to 63.5%, 70.7%, 74.1%, 76.5% and 78.6% for patients experiencing 2-6 events, respectively. There was an inverse relationship between the number of recurrent events and time to next event, with less time between the next event for those experiencing multiple events (Figure 1).

Conclusion: This study shows that approximately half of CKD patients experienced a HK event. Furthermore, patients who experienced a HK event were at increased risk of subsequent events. Frequent monitoring of serum potassium may help reduce the burden of HK in patients with CKD.

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Reconsidering rehabilitation in Renal Medicine: assessing the impact of Therapy Assistant Practitioners in the inpatient environment.

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Background:
Physical activity has been found to have positive outcomes on patients with CKD and features in the KDIGO clinical practice guidelines for patients with CKD. It is not however routinely supported within renal units across the country.

We wanted to explore whether length of stay (LOS) could be reduced and patient flow improved by additional input to promote physical activity, particularly in older patients and those with complex needs. It was suggested that this could also improve functional outcomes and patient experience in this cohort.

Method:
2 Band 4 Therapy Assistant Practitioners (TAP) were recruited to provide an additional 75hours of therapy input per week across 30 inpatient Nephrology beds. This input consisted of both Physiotherapy (PT) and Occupational Therapy (OT) assessments for patients over the age of 80, plus anyone with complex rehabilitation needs. They also worked with nursing staff completing transfers, therapeutic washes, dressing and personal care. Further rehabilitation consisted of MotoMed for bedbound and dialysing patients, and a Breakfast Club.
LOS and patient flow (indicated by the number of renal outliers across the hospital) were measured prior to recruitment and repeated at 6 and 12 months post recruitment. Functional outcomes were measured during the project, using the Functional Independence Measure and Functional Assessment Measure (FIM/FAM) on admission and discharge between September 2017 and March 2019 and analysed using a t-test ($p=0.005$). Patient experience was measured using a questionnaire administered at discharge.

Results:
When comparing the figures pre- and post-recruitment:
- 15% decrease in renal outliers demonstrating improved flow
- LOS did not change as we had anticipated.

Furthermore, we assessed the effectiveness of the therapy delivered during the project and found:

- High level of patient satisfaction demonstrated, with a mean score of 25.6/30
- Functional scores improved in both FIM (mean 25%) and FAM (mean 10%). However, the improvement was only statistically significant in the FAM ($p=0.0038$), but not in the FIM ($p=0.0815$).

Conclusion:
The introduction of 2 Band 4 TAPs has improved patient flow within the renal inpatient environment with the number of outlying patients into other specialities reduced. Patients are demonstrating a good response to the therapy provided, both functionally and in terms of patient satisfaction. This could indicate a changing culture of the renal ward towards rehabilitation of older and more complex patients. Nurses, therapists and other ward staff work collaboratively to improve patient uptake of rehabilitation opportunities such as washing and dressing, attending groups away from bed spaces, and early mobilisation.

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Trial Designs within the Haemodialysis Population: Are we getting it right?

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Background:
There are fewer trials conducted in nephrology than any other speciality. Many trials fail to recruit to target and are therefore underpowered, resulting in unclear evidence unlikely to be implemented into clinical practice. Carefully designed trials could improve the treatment options for haemodialysis patients. This could include using designs other than individually randomised parallel group designs. Therefore, we have compared cluster and crossover randomised trials to individually randomised parallel group trials carried out in prevalent haemodialysis patients.

Method:
A search for randomised controlled trials (RCTs) in haemodialysis patients was conducted across five databases (MEDLINE, EMBASE, CINAHL, Cochrane Central Register of Controlled Trials and ClinicalTrials.gov) in October 2019. The first publication of a stepped wedge trial in haemodialysis was in 2013, so we searched from 2013-2019. We included RCTs of adults receiving at least 3 months of haemodialysis. In eligible studies we compared the sample size sections to the CONSORT requirements and assessed recruitment targets, attrition rates and primary outcome result.

Results:
We identified 906 RCTs of which 734 (81%) parallel group randomised trials, 13 (1.4%) cluster randomised trials, including one stepped wedge, and 145 (15.9%) crossover trials were identified. Data were extracted for all cluster randomised trials, 10 randomly selected crossover trials and 20 randomly selected parallel group trials.

The total sample size required was not reported in 46% (n=6) cluster trials and 60% (n=6) crossover trials, with only 37.5% (n=3) of cluster trials and 50% (n=4) of crossover trials providing a justification for their sample size. However, 75% (n=15) of parallel group trials provided justification for sample size and reported the total sample size required.

A CONSORT flow diagram was reported in 70% of cluster and crossover trials assessed, with 39% recruiting to target. This compares to a similar number of parallel group trials using a CONSORT flow diagram (65%), with 55% (n=11) recruiting to target.

The average number of participants at the start of a cluster trial was 470, compared to 26 in crossover trials and 93 in parallel group trials. Cluster trials had an average attrition rate of 25%, the average attrition rate was 14% in crossover trials and 15% for parallel group trials. Eighty five percent (n=11) of cluster trials had a primary outcome reaching statistical significance, however only 20% (n=2) of crossover trials and 45% (n=9) of parallel group trials reached statistical significance.

Conclusion:
Cluster and crossover randomised trials are poorly reported. There was insufficient information provided for sample size calculations to be replicated in majority of trials, however more parallel group trials reported

their sample size calculations, and more recruited to target. A large proportion of crossover trials, and less than half of parallel group trials assessed did not have a primary outcome reaching statistical significance, suggesting these trials could have been underpowered. Improvements in the design, conduct and reporting of cluster, crossover and parallel group trials in the haemodialysis population is urgently required.

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Using whole-exome sequencing to identify PKD1 and PKD2 in 50,000 UK Biobank participants

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Introduction
A revolution in cost and availability of genome sequencing is changing the use of genetics in research and clinical care. A number of studies have demonstrated that genetic testing using whole-exome sequencing (WES) detects monogenic causes of kidney disease in a significant number of patients with predefined clinical phenotypes and/or strong family histories of kidney disease.
Autosomal dominant polycystic kidney disease (ADPKD) is an inherited monogenic renal disease characterised by the accumulation of clusters of fluid-filled cysts in the kidneys caused by mutations in PKD1 or PKD2 genes. We aimed to take advantage of newly available datasets with WES and medical information on 50,000 people from the UK Biobank (UKBB) to identify PKD1 and PKD2 variants, and to compare their phenotypic features to people with ICD 10 codes for PKD in UKBB.

Method
We analysed data from the subset of 50,000 individuals from UK Biobank (n=500,000) who have had WES data released. We looked for mutations in both PKD1 and PKD2. Our primary analysis involved looking for a subset of mutations, protein truncating variants, that had a very high likelihood of being disease causing. We performed standard quality control which included visual inspection and assessing individual mutation on genome databases.

Result
We found 53 protein truncating variants (44 in PKD1 and 9 in PKD2). The Average age for those with mutations is 57, the same as the UKBB population. We excluded 33 of these as unlikely to be mutations on the basis that they were either very common variants amongst the general population therefore unlikely to be pathogenic or did not pass visual inspection on IGV plot. This left 20 likely pathogenic mutations (13 PKD1 and 7 PKD2). An ICD 10 code for PKD on hospital records was found in 8 of those with mutations. The 8 individuals with mutations and ICD 10 code had a more severe phenotype; 7/8 (88%) were hypertensive compared with 6/12 (50%) in those with mutations but without ICD10 code for PKD. Their renal function was worse (63% v 15% had CKD, eGFR 53 v 80, p=0.01) and 1 individual received a renal transplant. There were no reported intracranial aneurysm or haemorrhagic stroke in people with mutations in UKBB ICD 10 codes.

Conclusion
Our data demonstrate we are able to find disease causing mutations in PKD1 and PKD2 and link this to phenotype. People with protein truncating mutations and hospital codes for PKD had independent evidence of kidney disease however those with a mutation but no ICD 10 code of PKD could either have undiagnosed PKD, or a non-pathogenic mutation. The genetic complexity of PKD1 and 2, and the difficulty of ascertaining mutations with exome sequencing means that further work needs to be done to see if prevalence of PKD, and in particular undiagnosed mutations, could be assessed using WES from the complete UKBB dataset when available.

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What are patients' experiences of cannulation for haemodialysis?: A qualitative systematic review

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Introduction: Cannulation is an essential procedure to be able to use arteriovenous (AV) access for haemodialysis. The Chronic Kidney Disease Patient Reported Experience Measure survey identifies that renal patients' experiences of cannulation for haemodialysis is sub-optimal, negatively affecting experiences of renal care. However, this phenomenon is poorly understood. Qualitative studies examining experiences of renal care often illuminate cannulation as an issue, but there is no existing systematic review on this subject.

Methods: A protocol was developed using ENTREQ and PRISMA-P as guidance, and registered on PROSPERO (CRD42019134583). Meta-aggregation was the synthesis methodology used, to allow a complete overview of current research findings and prevent reinterpretation of a poorly understood phenomenon. Two authors independently screened articles, assessed the quality of studies and extracted data. Non-English articles were translated. The meta-aggregation of findings were analysed at a group author meeting. The strength of synthesised findings are being assessed using CONQual, to complete the systematic review.

Results: The database search identified 246 articles, with 137 remaining after removal of duplicates. Following title and abstract screening, 71 articles remained and a further 20 were identified from reference lists. 90 articles underwent full text screening, with one dissertation in Portuguese pragmatically excluded. Following full text screening, 27 articles remained which described 26 different studies. Quality assessment indicated that the quality of studies varied from poor to excellent.

Three synthesised findings were produced, as follows:
1) Cannulation for haemodialysis is an unpleasant and abnormal procedure that is difficult for patients to experience. It causes pain, an abnormal appearance of the AV access, dependency and feelings of vulnerability.
2) The necessity of cannulation for haemodialysis was recognised by patients. Success was not just about a painless needle insertion, but also having an unproblematic haemodialysis session. This necessity for haemodialysis increased worry about multiple needle attempts and worry about success of the needle insertion.
3) Patients needed to survive an unpleasant, necessary and repetitive procedure to enable a life-sustaining treatment. They learned to tolerate the needle insertions even though they remained difficult. Feelings of safety made the cannulation easier to tolerate and were increased by trust and confidence in the cannulator. Exerting control helped patients manage this procedure and self-cannulation was one way they developed control. Some patients avoided needle insertions by either using a different form of dialysis or reducing the frequency of their haemodialysis.

Discussion: Cannulation for haemodialysis is a difficult procedure for haemodialysis patients to experience. This difficulty is exacerbated by the necessity of success to be able to receive haemodialysis. Patients' use various techniques to adapt and cope with this procedure, however it remains unpleasant and difficult.

The frequency of cannulation, alongside the link with a necessary life-sustaining treatment, makes cannulation for haemodialysis a unique procedure. It is important that renal healthcare professionals understand the impact of cannulation on haemodialysis patients. This systematic review aims to illuminate patients' experiences of cannulation for haemodialysis, increasing understanding and providing insight as to how healthcare professionals can promote a good cannulation experience.

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Increasing self-management in non-dialysis CKD patients: exploring potential patient characteristics of low and high patient activation levels

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Purpose: Understanding the factors that influence health-related self-management behaviour is an important step in preventing disease progression and improving outcomes in chronic disease including CKD. The concept of patient activation (PA) encompasses a patient's confidence, knowledge, and skills to self-manage their chronic condition. Low activated patients are more likely to be hospitalised and have poorer self-care, and may require targeted education about their condition and their own role in their healthcare. Individuals with high PA are more likely to engage in health programmes and have a positive health status, and have different support needs to maintain and extend their self-management behaviours. Limited research on PA within CKD populations exists, with very little focus on non-dialysis CKD patients in the UK in particular. Increasing PA in patients with non-dialysis CKD may be an important facilitator in preventing further health decline. As such, recognising which patient characteristics are associated with low or high PA may help target patients who need more support.

Method: Patient activation was assessed via the Patient Activation Measure (PAM), a well-validated 13-item instrument assessing an individual's perceived ability to self-manage their health. The results categorise respondents into four activation categories (1 being lowest and 4 highest). In this study, 165 non-dialysis CKD patients (53% female, mean age 68.4 (±12.5) years, eGFR 42.6 (±18.9) ml/min/1.73m2) completed the PAM and provided self-reported demographic and clinical information (age, sex, education, ethnicity, co-morbidities). Data was analysed by Chi-squared testing and univariate linear modelling.

Results: 80/165 (48%) of the cohort reported low activation (PAM Levels 1 and 2), and were older (p=.026), had a lower eGFR (p=.021), and more co-morbidities (p=.002) than those in PAM Levels 3 and 4 categories. Individuals with Level 1 activation had a mean of 2.9 (±1.4) co-morbidities (excluding CKD) compared to 1.3 (±1.1) in Level 4 individuals (p=.002). Prevalence of diabetes (type 1 or 2) was higher in those with low PA; 15/30 (50%) in Level 1 vs. 4/26 (16%) in Level 4 (p=.048). There was a non-significant relationship between PA and systolic blood pressure (p=.074) and education status (p=.080). PA was not associated with gender or ethnicity (data not shown).

Conclusions: The results demonstrate that older age, greater number of co-morbidities, and lower eGFR are associated with lower PA in patients with non-dialysis CKD. This data did not show a significant association between PA and educational status or ethnicity. Our research identifies several patient characteristics associated with PA and therefore can be used to target individuals in need of self-management support. Further research is needed to identify additional associated lifestyle factors and develop targeted interventions to improve PA.

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Life Threatening Haemorrhage – turning a negative into a positive.

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Introduction

In July 2018, a chronic dialysis patient suffered a cardiac arrest and subsequent death following a massive haemorrhage from her left brachio-cephalic arterio-venous fistula. The patient was 61 years old at time of death and she had been dialysing for 10 years. Prior to death she had been thoroughly assessed and reviewed by the vascular access surgeons, having had two herald bleeds from her fistula.
It was crucial for both staff and patients to learn from this tragic event. A programme of education was put into place and implemented.

Methods

Multi-disciplinary meetings were held to agree what education and resources were required. Education was required across all disciplines to ensure that people were prepared and aware of what to do in such an emergency.
On-going resources developed by the VASBI/BRS sub-committee on life threatening haemorrhage (LTH) were utilised, including fistula advice cards for patients. Small bottle tops, such as a milk bottle top, are recommended for use in stopping a LTH. These were issued to all patients with the advice cards and a pair of gloves in a clear red plastic bag. Instructions were made available as to how to use the bottle top. Sterile tops were sourced for urgent use in the dialysis units.
Posters were designed and printed, which took the form of a storyboard showing a patient with a bleeding problem post dialysis, going on to then safely using the bottle top and transferring to the Emergency department. These are displayed in all units. Discussions with ambulance staff / transport drivers were also carried out.
Meetings were held with the staff involved with the patient at the time and discussions were held over the telephone advice that had been issued. A short staff training video was produced. This comprised three patient scenarios, each increasing in severity and demonstrating what the nurse should do in each case.
An escalation algorithm for serious bleeding was developed for use by staff. This, along with the other resources, was rolled out to the staff in the Emergency Department.
Since the incident a new system of scoring fistulae has been introduced using the VASBI/BRS pre cannulation scoring system, to highlight and monitor aneurysmal fistulae. In addition prolonged bleeding post dialysis is also recorded at every session. This is regularly audited.

Results

Regular Audit for each month highlights patients with prolonged bleeding post dialysis, who need further investigations. One of our patients has successfully used the bottle top prior to needing fistuloplasty.

75% of Staff have been trained and voiced increased confidence in dealing with such a scenario. Continuing work is needed to maintain the level of knowledge and awareness surrounding this topic as staffing inevitably changes. Patients are also prepared for this complication.

Discussion

As far as is possible, all attempts have been made to try and prevent any further catastrophic incidents of this nature. Continuous scrutiny is however critical in continuing to assess for this complication in the dialysis unit to ensure the safety of patients on dialysis.

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Knowledge of renal diet amongst haemodialysis unit nursing staff: Results from a multicentre based questionnaire

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INTRODUCTION: Patients with end-stage kidney disease may undergo haemodialysis as treatment of their condition. The majority of patients choose in-centre haemodialysis. As well as haemodialysis, patients usually have to follow dietary restrictions to maintain biochemistry levels. Dietary advice should be tailored and most patients have access to a renal dietitian. It is acknowledged, however, that dialysis unit nursing staff also provide diet related advice to patients. In order to get an understanding of the level of dietary knowledge, nursing staff employed at our Trusts haemodialysis units were invited to complete a questionnaire.

METHODS: A renal dietitian devised a questionnaire with 26 questions about potassium, phosphate, fluid and salt to determine whether nursing staff provide diet related advice, their confidence levels and knowledge of these areas. Respondents were asked to identify foods rich in potassium and phosphate from a list of 36, this corresponded with available patient dietary information. Nursing staff were also asked whether they adjust patient's dry weights and what factors they considered. Finally nurses were asked if they would like further diet related education and their preferred delivery format.

RESULTS: Thirty nine questionnaires were returned. 76% of respondents were nurses, 14% healthcare assistants and 10% dialysis assistants. 87% had worked within renal dialysis for more than one year. Most nursing staff provided diet advice with 78% discussing potassium, 62% phosphate, 51% salt and 92% fluid. Confidence levels in giving advice for different topics are detailed in table 1, more than half were confident or very confident in giving advice in all topics. 49% and 57% of respondents were able to identify the correct target biochemistry range for potassium and phosphate respectively. Identification of foods rich in potassium and phosphate are summarised in table 2, many identified incorrectly. Respondents were asked apart from diet what else can contribute to hyperkalaemia and hyperphosphatemia. Medication was identified by 83% and problems with access by 80% for hyperkalaemia but only 43% answered high blood sugars. For hyperphosphatemia 80% identified missing or cutting short dialysis, 51% identified problems with access and 20% incorrectly thought high blood sugars. Asking about fluid allowance 95% of respondents knew this was dependent upon urine output, but only 33% advised on specific fluid allowances. Dry weights were adjusted for patients by 78% of respondents but only by +/- 0.5kg, and factors such as oedema, breathlessness and cramps were considered. 97% would like further dietitian led education around diet and preferred single topics at their own units.

DISCUSSION:
The questionnaire results indicate that whilst confidence levels around renal diet are high amongst haemodialysis nursing staff the level of knowledge was variable and may result in patients receiving incorrect dietary advice. What is reassuring is that nurses are interested in dietitian led training which is planned to be delivered later this year. The questionnaire will be repeated after this training to assess improvements in knowledge.

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Are plant based milks of nutritional and dietary value for patients with chronic kidney disease?

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INTRODUCTION: Plant based milk sales within the UK have increased with a recent report suggesting that 23% of us have used these in the 3 months to February 20191. Following a tailored renal diet is a cornerstone of treatment for patients with chronic kidney disease, with milk generally restricted to a half pint daily. This helps to ensure that levels of potassium and phosphorous are kept at safe levels to minimise potential health risks such as CKD-MBD and cardiac arrhythmia. Protein requirements also vary dependent upon the stage of kidney disease with a requirement of 0.8-1.0 g/kg ideal body weight (IBW)/day for patients with stage 4-5 CKD not on dialysis and 1.0-1.4g/kg ideal body weight for patients on dialysis2. Plant based milks generally contain less potassium and phosphorous than cows milk which may be beneficial for renal patients, and apart from soya based milk, protein content is less but current level of understanding is poor.

METHOD: In order to provide appropriate dietary advice to our patient group our renal dietetic department undertook a tasting and evaluation session of 8 varieties of plant based milks. We tasted fresh and UHT and tried different brands of the same type of plant based milks. This was done to gain a better understanding of their nutritional content and taste with tea, coffee, cornflakes and porridge and on their own.

RESULTS: Nutritional values of the plants based milks we trialled are detailed in Table 1. Cows milk contains about 93-96mg of phosphorous per 100ml, the phosphorous content of the plant based milks ranged from 5.2 to 97mg per 100ml. Potassium content of cows milk is 155-162mg per 100ml with all plant based milks who reported potassium content having less than 73mg per 100ml (range 6.3-73mg). Protein content of cows milk is 3.5g per 100ml, the only comparable plant based milk was soya which contains 3.4g per 100ml, the other plant based milks contain minimal protein content (range 0.1 to 1.1g per 100ml). All milks, who reported calcium content, had similar levels of 120mg per 100ml. Plant based milks cost significantly more than cows milk (£0.05 per 100ml) the cheapest soya is £0.09 per 100ml up to £0.27 per 100ml.

DISCUSSION: Using plant based milks will reduce the potassium and phosphorous content of the diet which may be beneficial to renal patients. Pre dialysis renal patients, where protein requirements are reduced, may also benefit from switching to non soya plant based milks to reduce protein intake. Dialysis dependent renal patients have increased protein requirements so the use of plant based milks may have an impact on their protein intake, especially if they follow a vegan diet and this needs to be considered in the overall dietary assessment. Renal dietitians need to be aware of the difference in the nutritional profile of plant based milks when providing dietary advice to the renal patients in order to provide appropriate tailored advice.

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Tissue resident macrophages turn inflammatory in a mouse model of peritoneal dialysis induced fibrosis.

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Peritoneal dialysis (PD) has significant initial benefits to patient autonomy, survival rates and healthcare costs compared to haemodialysis. However, prolonged PD is associated with severe side-effects, including peritoneal sclerosis and bowel obstruction, negating these initial beneficial effects. Of note, the induction of pathological consequences in PD is closely correlated to repeated episodes of peritonitis and activation of the immune system. In particular macrophages have been shown to promote the pathology. However, in other fibrotic diseases macrophages can also inhibit and in some cases even revert disease progression. Recent advances in macrophage biology suggest this divergent function may be due to the prevalence of macrophage subpopulations with differing ontogeny. Monocyte-derived, inflammatory macrophages have been suggested to promote fibrosis, whereas tissue-resident macrophages are rather considered anti-fibrotic. Thus, we explored the role of tissue resident macrophages in a murine model of PD-fluid induced fibrosis. Here we show that during PD tissue resident peritoneal macrophages gradually lose their homeostatic phenotype, correlating with the length of treatment. Moreover, tissue resident macrophages from PD-fluid injected animals gradually became pro-inflammatory responding more quickly and strongly to external stimulation both in vitro as well as in vivo. Consequently, animals subjected to repeated PD-fluid injection showed enhanced inflammation during bacterial inoculation. These data indicate that tissue resident macrophage during PD may promote disease progression through enhancing inflammatory responses and increase the risk of peritonitis.
These data highlight the ongoing adaptation of the immune system to an altering environment and identifies a novel therapeutic avenue in the treatment of PD associated pathologies by limiting tissue resident macrophage promoted inflammation.

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The Benefit to the Renal Community of the NIHR 70 @ 70 Nurse and Midwife Research Leadership Programme

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Background
Patients admitted to research active hospitals have more confidence in staff, are better informed and have better outcomes and research active trusts have improved staff morale and recruitment. Nurses and midwives have an unparalleled contribution to make to the development of patient centred research, prioritising frontline care issues. Despite being by far the largest group of healthcare professionals across the NHS, the proportion of nurses and midwives undertaking research is significantly less than other health professions. This is reflected across the renal speciality, as well as the wider research community. It is recognised that nurses and midwives require additional support to operationalise their research potential.

Methods
In 2019 the NIHR developed a senior nurse and midwife research leadership programme -NIHR 70@70 Nurse and Midwife Research Leaders - with the aim of strengthening the voice and influence of nurses and midwives within research across healthcare. The programme funds 70 senior nurses and midwives to drive forward the nursing and midwifery research agenda both within organisations and strategically as a unified group of senior staff. Whilst the programme is essentially organisationally based, it encourages the Chief Nursing Office One Professional Voice campaign providing an opportunity for speciality-specific collaborations to influence the research agenda and promote research opportunity within specialisms. With two renal nurses and one renal midwife in the first cohort of 70@70 Nurse and Midwife Research Leaders the renal community looks to benefit from this.
Findings
The programme is in the first of a 3 year tenure and as such, collaborations are in their infancy. Work is beginning however, to look at how nurses within the Renal speciality can be supported to undertake high quality research and ensure impact to quality of patient care offered to patients with kidney disease nationally. Discussions of how non-medical clinical academic careers can be supported and embedded within the renal field are under way. In addition, developing the expertise of renal research delivery nurses is a focus in order to ensure that delivery of renal clinical trials is of the highest quality. Collaboration with associated charities and sources of research funding is also essential.
Conclusion
The NIHR 70@70 Nurse and Midwife Research Leader programme is an opportunity for nurses and midwives who are committed proactive champions for nursing and midwifery research to drive forward real change across the research system. Promoting the importance of an integrated research culture to improve quality of care and health outcomes is essential. Whilst the programme encourages participants to develop capacity and capability for research within their organisations, broadening this focus to include intra-specialty collaboration within the renal community could lead the way in developing future research leaders and supporting the identification of direct care research priorities within kidney care.

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Novel medium cut-off high-flux dialysis membrane (Theranova) improves patient haemoglobin and reduces erythropoietin resistance index.

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Introduction:
Theranova is a novel medium cut-off high-flux dialysis membrane. It has been reported to provide better middle and large molecule clearance compared to conventional high-flux haemodialysis (HD) membranes and comparable clearance to haemodiafiltration (HDF) membranes, using regular pre-existing HD environments. However, experience of its clinical utility is as yet unclear, as are its effects on patients' biochemical parameters and outcomes. We hypothesised that the new membrane may improve inflammatory markers and patient symptoms so we undertook a single site prospective observational quality improvement project to determine the effect of changing membrane on prevalent HD patient cohort. Here we report our experience after four months of use.

Methods:
As routine standard of care, one of our dialysis units changed over to the Theranova membrane in April 2019. To ensure there was no detriment to the quality of dialysis provided, patients' routine haematological and biochemical parameters (Hb, Ferritin, Alb, CRP, PTH, PO4 and EPO dose) as well as validated patient experience and symptoms questionnaires (EuroQual:EQ-5D-5L and Kidney Disease Quality of Life:KDQOLTM-36) were collected prior to the change-over and then again four months later. Relevant approval was sought from our hospital's clinical effectiveness unit for this quality improvement project (QI-project Ref:10054).

Results:
In total, 38 patients completed both the initial and four months post survey. The average age of the cohort was 46.5 years and 64% were male. There were no patient or equipment related adverse events during or following dialysis sessions attributable to the Theranova membrane. Following four months of treatment, patients had a significant improvement in mean serum haemoglobin, ferritin and albumin levels, and had a decrease in their erythropoietic resistive index (EPO-RI; weekly Darbepoetin dose/weight/haemoglobin concentration).There was no significant difference in patients' phosphate, PTH levels and CRP over this time. Results are shown in table 1. There was no significant difference in patient experience or symptoms, including cramps, muscle soreness, dry skin and general energy levels (results not shown).

Discussion:
Theranova appears to safely useable within a stable cohort of prevalent haemodialysis patients in a pre-existing dialysis environment with no attributable adverse events. We found no difference in patient symptom and quality of life scores following the change to a high-flux medium cut off dialysis membrane, but there did appear to a significant improvement in patients' haematological parameters and consequent reduction in their require erythropoietin dose.

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Do visual aids and “shock tactics” improve understanding of the clinical consequences of hyperphosphataemia and increase motivation to manage phosphate levels in haemodialysis patients

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Introduction: Chronic Kidney Disease - Mineral and Bone Disorder (CKD-MBD) describes abnormalities related to bone metabolism and vascular calcification caused by changes in calcium, phosphorus, parathyroid hormone (PTH) and vitamin D levels. Studies have shown a strong association between elevated phosphate and calcium levels and mortality in dialysis patients1. It has been observed that the general understanding of the clinical consequences of elevated phosphate levels is fairly poor in our dialysis population which results in multiple follow-ups to re-inforce the information. Shock tactics and visual aids have been used in public health promotion campaigns in recent years but these have shown questionable effectiveness2. This intervention aims to provide a new education tool in the management of hyperphosphataemia to improve patients’ understanding and motivation in the self-management of hyperphosphataemia such as taking phosphate binders and following a low phosphate diet.
Methods: The intervention used visual aids and “shock tactics” to provide education on the clinical consequences of hyperphosphataemia. It was delivered at one haemodialysis unit between July and August 2019. A questionnaire was completed by 24 patients with assistance from the dietitian, pre and post the intervention. It included a mix of qualitative and quantitative questions that evaluated patients’ perceived knowledge, patient’s actual knowledge and patients’ reported phosphate binder adherence. A follow-up questionnaire was completed 1-2 months following the intervention evaluating the same parameters as well as patients’ views on the intervention. The results were analysed by evaluating patients’ knowledge, determining the average of the scaled questions, and calculating percentages where relevant.
Results: Patients’ perceived knowledge of the clinical consequences of hyperphosphataemia was a mean of 3.3 and 6.2 (out of 10, with 10 indicating greatest understanding) pre and post intervention respectively. Patients’ actual knowledge of clinical consequences of hyperphosphataemia also improved in 67% of patients. The number of patients following a low phosphate diet increased from 17% to 88% after the intervention. The level of non-adherence to phosphate binders on a daily or weekly basis decreased from 42% to 21% after the intervention. Additionally, 100% of patients reported that they found the pictures helped their understanding of the consequences of hyperphosphataemia. 93% of participants on binders reported that the pictures motivated them to take their binders more often, and 92% reported that the pictures motivated them to follow a low phosphate diet.
Conclusion: Shock tactics and visual aids are a useful tool for improving patients’ understanding around the clinical consequences of hyperphosphataemia, as well as improving motivation and reported adherence to follow a low phosphate diet and take phosphate binders where prescribed.

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Single nucleus RNA sequencing identifies new classes of renal proximal tubular epithelial cell in a chronic renal fibrosis model

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Introduction: In the injured kidney, Proximal Tubular Cells (PTC) play a central role in nephron recovery versus fibrosis. Heterogeneity in PTC responses to injury is well-documented but poorly-characterized. Here, for the first time, we have determined PTC responses at the level of individual cells in CKD, by single-nuclear RNA sequencing (snRNAseq).

Methods: Kidneys were harvested from naïve mice and mice with CKD induced by chronic aristolochic acid administration (AAN). Nuclei were isolated using Nuclei EZ Lysis buffer. Libraries were prepared on the 10X platform and snRNAseq completed using the Illumina NextSeq 550 System. Genome mapping was carried out with high -performance computing (Supercomputing Wales), downstream bioinformatics analyses used Seurat and DoubletFinder.

Results: A total of 23,885 nuclei were sequenced and analyzed. All major renal cell types were successfully delineated. Some renal lineages share multiple common genetic features, which has complicated their recovery in discrete clusters in recent landmark studies. These include mesangial cells, fibroblasts and subcategories of PTC, each of which was separated successfully in our data analysis. Further, in data from injured kidneys, we isolated three new clusters of distinct, injury-associated PTC. Each injury-associated cluster has a unique gene expression signature, including multiple genes previously associated with renal injury response and CKD progression.

Conclusions: SnRNAseq is a highly valuable tool enabling the dissection of cell-type and cell-subtype-specific responses. Our data provide to our knowledge the first detailed report of gene expression in PTC segments in mouse kidney. We further identify three previously unknown, injury-associated PTC clusters. These exhibit highly specific and restricted gene signatures, including canonical PTC injury genes previously assumed to be expressed at low level throughout injured PTC on the basis of bulk expression analyses. Comprehensive pathway and receptor-ligand analyses in these clusters will be required for us to understand their significance, and has strong potential to improve understanding of PTC responses to injury.

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Profiling the Frailty Demographic of Renal Admissions

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Background:
Frailty is defined as a medical syndrome with multiple causes and contributors that is characterised by diminished strength, endurance and reduced physiologic function that increases an individual's vulnerability for developing increased dependency and/or death. Frailty is an identified issue within the renal unit in Nottingham University Hospitals (NUH). The aim was to profile the frailty demographic of renal admissions whilst investigating the feasibility of routine frailty assessments. This was preliminary work to a wider programme of work concerned with frailty amongst the renal population.
Methods:
Data was collected for all admissions on 2 renal wards; 20 bedded general renal ward and 12 bedded acute renal ward. Nurses and physiotherapists were asked to use the Rockwood Clinical Frailty Scale to assess ever patient over the age of 65 for 2 months between November 2019 and January 2020.
Results:

- 50% of patient admissions within the renal area were over 65.
- Out of this cohort (n=123), 62% had frailty assessments at admission. 20% were exempt from assessment due to being end of life, critically unwell or a day case admission.
- Therefore in total 82% of in patients clinically assessed for frailty.

Discussion:
These findings show that frailty can be assessed on admission, and that it can be done during the busiest time of the year in winter. Nurses were unable to assess frailty, although a band four physiotherapist rehab assistant found it very easy to include this into their caseload. Nurses did not appear to be as engaged with frailty assessment. This may be due to workload, lack of perceived responsibility for frailty assessment or lack of understanding of the global impact of frailty on care. In contrast, the physiotherapist assistant perceived it to be a core element of their role and could easily include a frailty assessment within their current patient assessment.
The results also show that frailty is an issue within acute renal admissions, as currently nearly half of patient admitted to hospital as acute renal admissions are deemed to be frail. Despite this, within this Trust, there is currently no structured guidance on how this influences care decisions and little additional support is offered to these patients to aid recovery or expedite discharge.
Next steps would be to begin to develop ways in which routine frailty assessments can be communicated across the multi-disciplinary team in order for them to inform care decisions. Further work is also required to assess nursing perceptions of frailty and educate the multi-disciplinary team on its value and importance.

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Occupational therapy needs in a new starter haemodialysis population

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It is recommended to have integrated and co-ordinated care across the renal pathway to meet the increasing complexities of patients, and renal patients have been shown to have amongst the highest levels of complexity.[1 2] The DOPPS study highlights that haemodialysis (HD) patients have higher levels of functional dependence compared to the general population especially in the younger age range, they advocate for more of an emphasis on symptom management alongside traditional dose-related dialysis care to improve patient outcomes and reduce withdrawal from treatment.[3] Occupational Therapists (OTs) are dual trained across both physical and mental health so can consider the entirety of an individual's needs by assessing and providing interventions across physical, cognitive, environmental and societal barriers. Interventions can include activity analysis and modification, energy conservation, environmental adaption, teaching coping strategies and behaviour changes.[4]

Fatigue is reported to affect between 60-97% of HD patients but does have a tendency to be underreported, overlooked or be seen as an unavoidable side effect of treatment; it can restrict a person's ability to complete daily occupations, affect personal and medical relationships and impact on attendance/compliance with appointments and treatments.[5]

Historically in this Trust OT would only see patients referred as inpatients on the wards, on the acute dialysis unit and more recently referred via the kidney clinic. In response to the introduction of a pilot new starter unit for all new HD patients, OT established a pathway which aimed to proactively screen all patients for OT intervention and symptom education.

48 patients were screened over a six month period which included completing a comprehensive OT initial interview and the EQ-5D-5L.[6] Five patients were missed due to low staffing levels. 17 symptom concerns in total were identified, patients tended to report multiple symptom burden with fatigue (74%) and sleep (36%) being highlighted as common symptoms impacting on daily occupations. On average patients scored their overall health as 61/100 on the EQ-5D-5L. OT interventions included symptom management education, equipment provision and onward referrals. 11% required associated follow-up assessment at home.

By establishing a new way of working and seeing patients earlier in the pathway OT has been able to address previously unrecognised and unmet occupational needs in the HD population. Outcomes have shown the importance of having OT as an integral part of the renal specific MDT to ensure patients received holistic and comprehensive assessments as they transition to HD. Future work and development should continue to optimise the service provision to manage the symptom burden on dialysis patients and reduce the impact on daily activities and quality of life. The service would benefit from tailored self-management patient information for sleep and fatigue to normalise the experience of these common symptoms and support self-efficacy. OT is well placed to be able to develop these resources and play a pivotal role within renal services to raise the profile for symptom management to be an integral part of HD treatment and optimise patient's engagement in meaningful occupations for quality of life.

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An evaluation of a nurse led Tolvaptan (Jinarc) service for the treatment of Autosomal Dominant Polycystic Kidney Disease (ADPKD) in a UK district general hospital.

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INTRODUCTION: Tolvaptan (Jinarc) is a drug that was approved by National Institute of Health and Care Excellence (NICE) in 2015 specifically for the treatment of Autosomal Dominant Polycystic Kidney Disease (ADPKD). Tolvaptan is a vasopressin receptor antagonist which is used to attenuate the progression of kidney disease, delaying the need for dialysis or transplantation.The Trust covers a predominantly rural population and patients were travelling a considerable distance to neighbouring hospitals to receive such treatment. It was therefore recognised by the renal department within our Trust that there was a clear need for a Tolvaptan service to be delivered locally. In 2018, the renal department within our Trust launched a new nurse led service providing Tolvaptan for ADPKD patients living within our locality. We describe how our service operates along with an evaluation of the patient's biochemical outcomes. METHOD: With the support of our pharmacy department, local Clinical Commissioning Group (CCG) and other hospitals with an established Tolvaptan service, we successfully obtained approval for an independent nurse led service to be developed. Patients who meet the criteria for Tolvaptan are referred to the service and jointly discussed with the renal specialist nurse and the renal consultant. The patient is then contacted by telephone and offered an appointment to receive education in relation to taking this drug. A trust based patient education leaflet is posted to the patient prior to this appointment. Once the patient has consented to treatment, Tolvaptan is prescribed by the renal specialist nurse prior to the clinic visit and prepared by the pharmacy department for patients to collect on the day of their clinic visit. Patients routinely attend monthly clinic visits until they are stable on treatment.Patients are advised to have their blood tests taken at specific times and the results are appraised by the renal specialist nurse. The necessary dose adjustments of Tolvaptan are then made and further prescriptions issued.Following stabilisation of treatment patients blood tests continue to be monitored on a monthly basis and the results are discussed with the patients during a telephone consultation. RESULTS: Following commencement of the service in April 2018 to present day, a total of 7 patients have received Tolvaptan. Results are illustrated in the attached table and graph.CONCLUSION: A nurse led Tolvaptan service for ADPKD patients was successfully designed and implemented in our hospital. All 7 patients have shown improvement or stabilisation of their glomerular filtration rate (GFR) following the introduction of this drug. None of the patients have experienced or reported any harmful adverse effects of taking the drug. No patients have discontinued treatment and all are concordant with blood test monitoring and telephone consultation discussions at the specified time. We recognise that education in primary and secondary care is needed to capture additional patients who may not be known to the renal team who would potentially benefit from Tolvaptan treatment.

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The impact of enteral nutrition in patients with kidney disease, either during an acute admission or in patients admitted electively to treat malnutrition

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Introduction: Malnutrition is common in patients with kidney disease with a prevalence of 28-54% for those on dialysis and 42-75% of patients with an acute kidney injury. Enteral nutrition (EN), either nasogastric (NG) or nasojejunal (NJ) can be used to prevent deterioration of nutritional status and/or to treat malnutrition, when a food first approach and oral nutritional supplements have failed. The aim of this service evaluation was to investigate the impact of EN provision on patients with kidney disease during an acute admission and in patients who were admitted electively for supplemental EN.

Methods: Data was collected prospectively for all adult patients admitted to two renal wards who received EN (either via NG, NJ or gastrostomies) from August 2018 to August 2019. Demographic data, dry weight, subjective global assessment (SGA) score, estimated oral intake (kcal/protein) and mortality data were collected. A paired t-test was performed between data collected on admission and at discharge.

Results: Over 1 year, 46 patients (mean 63 years, SD +/- 13) received EN: 39 as part of their acute admission and 7 were elective admissions for supplemental EN. The length of admission ranged from 4-225 days (median=26 days) and length of feeding ranged from 0.5- 114 days (median=10.5 days). Six months prior to admission, 28 out of 46 patients had lost weight and of these, 12 patients had lost significant body weight (15-30% weight loss). Out of the 39 acute admissions, 14 died during the admission. Throughout admission, average weight increased in the elective admissions group ($p=0.008$) but decreased in the acute admissions group ($p =0.004$), however 2 patients were unable to be weighed (n=23 for acute admissions). The number of patients with an SGA score of 1-2 (malnourished) increased in the acute admissions, but decreased in the elective admissions (see Table 1.) Both groups showed significant increase in calorie and protein intake throughout admission ($p <0.01$).

Discussion: On average, patients showed significant increase in oral intake after EN was initiated which suggests it may help to stimulate appetite. However, improvement in patient's clinical condition, inflammation and reason for admission are also contributing factors. EN is often used when patients are medically unwell; the need for EN during an acute admission may be a predictor of in-hospital mortality, as 14 out of 39 patients died. Elective admission patients showed an improvement in nutritional status which supports the evidence for early nutritional intervention and elective admission for malnutrition, where other nutrition interventions have failed. Further data is being collected on all patients at 6 months post discharge to establish the longer term outcomes of enteral nutrition.

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Development of a Questionnaire to Capture Patients' Perspectives of Needling for Haemodialysis

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Introduction: Patients' experiences of cannulation for haemodialysis, whilst necessary, is a poorly understood phenomenon. Patients' experiences of cannulation can be poor, with the procedure causing pain; anxiety about success and complications; and feelings of dependence and vulnerability. No questionnaire exists to fully capture patients' perspectives of their cannulation.

Methods: We aimed to develop a Patients' Perspective of Needling questionnaire (PPN). The results of a systematic review (CRD42019134583) were used to identify potential themes for inclusion. 6 renal patients from 2 renal centres attended a group meeting, where they reviewed these themes and identified relevant content for the PPN. The initial PPN included 22 questions over 4 sections– pain, worry, problems and interaction during needling.

The PPN underwent face validity, internal consistency, convergent validity and test retest reliability tests from data collected at 2 renal centres. 12 haemodialysis patients undertook the face validity test. 80-100 haemodialysis patients will complete questionnaires to provide data for internal consistency, convergent validity and test-retest reliability tests. Data collection will be completed by March 2020.

Results: 12 participants were identified for the face validity test, via purposive sampling. This ensured a range of haemodialysis patients and practices were represented in the small sample, as summarised in Table 1.
Participants were asked to rate (between 1 and 7) how easy each section of the PPN was to understand (1=Did not understand at all; 7=Easy to Understand); the relevance of each section (1=Not Relevant At All; 7=Completely Relevant) and overall completeness of the PPN (1=Not at all; 7=Complete). The median score for completeness of the PPN was 6.0 (Inter-quartile range (IQR) 6.0-7.0). Median understanding and relevance scores for each section are summarised in Table 2.

Free text comments indicated the questionnaire was easy to understand and the content was relevant, although some participants did not understand the words 'Interaction' and 'Insertion'. These were altered in the next draft of the PPN. Participants suggested use of local anaesthesia should be included. This did not meet the purpose of the questionnaire, so was not included. However, this highlighted that local anaesthesia use provides context to the results of the PPN and should be collected separately.

Discussion: Patients found the PPN is easy to understand and relevant to gain their perspectives of their needle insertion. Current data collection and testing will provide further data on the validity and reliability of the questionnaire. The final PNN will provide a valid and reliable tool to enable capture of patients' perspectives of their cannulation for haemodialysis, which can be incorporated into studies that evaluate cannulation, vascular access and associated interventions.

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Rapid improvements in pre-emptive transplant listing and living donor transplant by a multidisciplinary team on the KQuIP Transplant First QI project.

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Pre-emptive kidney transplant from a living donor is the gold standard treatment for CKD stage 5. In 2017 at our centre, 9% of patients started renal replacement therapy with a pre-emptive transplant (national average 9%) while the best UK centre achieved 28% (ref 1). At our local transplanting centre, 65% of patients entered the transplant list pre-emptively (ref 2) but our centre (non-transplanting) lacked reliable data on its individual pre-emptive listing performance. There were noticeably fewer living donor transplants during 2017 and increasing delays with transplant workup tests. We commenced the KQuIP Transplant First project in mid-2018, aiming to use quality improvement methods within a multidisciplinary team to improve living donor and pre-emptive transplant rates.

Methods

A multidisciplinary team of nurses, doctors, patients, managers and an IT analyst studied baseline performance utilising lean and QI methods including process mapping and root cause analysis. We attended three regional KQuIP training days to learn QI skills. We created a project driver diagram and designed plan, do, study, act (PDSA) cycles to test improvements in the primary drivers of engagement (donors, recipients and staff) and workup pathways (donor and recipient). Data was collected from the electronic patient record, anonymised and entered into the KQuIP Transplant First measurement tool. Charts were created via the LifeQI web platform.

Results

The number of living kidney donations increased by 82% from 17 (2018) to 31 (2019). The number of patients listed for deceased donor transplant increased by 68% from 94 (2018) to 158 (2019) with 60% of patients listed pre-emptively. A one-stop recipient workup clinic was created which included dobutamine stress echo and halved the waiting time from 8 weeks to 4. Extra live donor assessment clinics are now held on Saturdays.

Root causes of problems with recipient transplant workup included late referral for workup, multiple cardiology tests spread over 3-8 weeks, administrative delays and knowledge gaps. Analysis of the living donor pathway revealed problems relating to donor engagement, radiology tests and inadequate live donor nurse hours per week.

PDSA cycles included creation of one-stop recipient workup protocol; extra workup clinic appointments; weekend live donor assessment clinics; appropriate early discussion of pre-emptive living donor transplant when eGFR ≤25 ml/min; staff teaching sessions; engagement posters; BAME engagement events and enhanced MDTs including cardiologists.

Conclusions

Our multidisciplinary team has successfully achieved improvements in living donor transplant and transplant listing, supported by the KQuIP Transplant First project team. Additional improvements are expected during 2020 and beyond. The project has raised the profile of pre-emptive and living donor transplant in our centre as well as providing support and QI training to a diverse team which will facilitate future improvement work. Patient involvement including from the BAME community was crucial to our success and will continue to drive ongoing improvements.

1. UK Renal Registry 21st Annual Report (2019) - data to 31/12/2017
2. NHS Blood and Transplant Annual report on Kidney Transplantation (2019)

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Nutritional and biochemical outcomes in the pre-dialysis stage of Chronic Kidney Disease: a comparison of two UK renal units

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Introduction: Once patients with Chronic Kidney Disease (CKD) commence dialysis, NICE guidelines recommend regular dietetic input (NICE, 2018). The provision of dietetic services pre-dialysis varies between UK renal units. This service evaluation compared nutritional and biochemical outcomes from two pre-dialysis services; Hospital X (HX), with access to a renal dietitian at each patient's appointment, and Hospital Y (HY), with limited access to a renal dietitian.

Methods: Data was collected retrospectively for all patients who commenced dialysis in 2018. Measurements included plasma potassium, plasma bicarbonate, plasma phosphate, body mass index (BMI), weight change, oral nutritional supplements and medications (phosphate binders, sodium bicarbonate and anti-hypertensives). Data was collected at three nephrology appointments: in the two months prior to starting dialysis (C1), at 6 months prior to dialysis (C2) and at 12 months prior to dialysis (C3).

Results: Data was collected for 57 patients at HX and 62 patients at HY. Patients saw the renal dietitian significantly more at HX in the year prior to dialysis than at HY (mean number of contacts at HX 3.8, compared to 0.1 at HY, $p<0.001$). There was no difference in BMI or weight change between the two units, though more oral nutritional supplements were prescribed at HX at C1 ($p<0.05$).

HY had a significantly lower mean potassium result at C1 (K 5.1mmol/L at HX, K 4.8mmol/L at HY, $p=0.02$), C2 (K 5.3mmol/L at HX, K 4.8mmol/L at HY, $p<0.001$), and C3 (K 5.2mmol/L at HX, K 4.7mmol/L at HY, $p<0.001$). HY had significantly higher usage of sodium bicarbonate at time points 1, 2 and 3 ($p<0.01$, $p=0.03$, $p<0.01$ respectively) with a significantly higher dose at each point ($p=0.001$, $p<0.01$, $p=0.001$ respectively). Mean phosphate was lower at HY at C2 (P 1.67mmol/L at HX, P 1.47mmol/L at HY, $p<0.01$). There was no difference in the number of patients on phosphate binders at any point.

Discussion: These results should be interpreted with caution. The service evaluation did not include patient-related experience measurements (PREMS), which would have allowed assessment of the quality of dietary advice.

Despite minimal dietetic input, patients at HY had lower potassium and phosphate results. This was not accompanied by a lower mean BMI or greater weight loss. Weight is a poor marker of nutritional status in this population due to possible fluid retention. Although efforts were made to account for fluid overload retrospectively, this was subjective and open to error. Collecting Subjective Global Assessment (SGA) and handgrip strength would have improved this project, but was not routinely completed by either unit.

There are multiple possible explanations why patients at HY had lower mean potassium levels, such as differences in sodium bicarbonate use, timing of starting dialysis, or varying protocols and targets. This service evaluation shows that we should not rely solely on biochemical parameters to measure

effectiveness of renal dietetic input. Further research is needed to investigate the outcomes of individualised renal dietetic advice.

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Patient experiences of food and diet to inform the development of a renal cookbook

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Introduction
People from ethnic minority groups are at greater risk of developing chronic kidney disease (CKD), yet there are no culturally diverse renal cookery books available. A collaborative project between the Arts and Humanities Research Council (AHRC) and the Trust developed a set of cards with recipes by patients from diverse backgrounds which was received enthusiastically. A full cookbook is now in development and this qualitative study aimed to ensure that the cookbook content is based on patients' dietary preferences and needs.

Methods
Interviews were conducted with patients receiving haemodialysis at the main centre and two satellite units, with open questions focused on: how people felt about food and what they enjoyed to eat; the most difficult aspect of food/diet; what strategies had been used to overcome potential difficulties. Interviewees were also asked about the cookbook and suggestions for its development. Twenty-two people (8 men/14 women) were interviewed whilst having their dialysis: 3 African/Caribbean; 7 south-Asian; 12 white British. The length of time on dialysis was 1-25 years. The interviews lasted 10-25 mins, with three being undertaken via a translator. Interviews were recorded with permission, transcribed and thematic analysis undertaken.

Findings
Changes to the way people felt about food started well before dialysis commenced, with changes mostly due to nausea, loss of appetite and a metallic taste. Many spoke of 'having to eat to live' rather than enjoying their food. Most people did not eat away from home, but family members were happy to accommodate the dietary changes required. A majority had got into a routine of eating the same foods each week, and a couple said they had not made any dietary changes at all. Favourite foods such as fruit were badly missed. There was some talk about 'not doing what I should' and testing the boundaries of what they could eat, by relying on blood results. The most difficult aspect for most people was the reduced fluid allowance "If the tap was running, I'd want to lick it."

Interviewees said that the most useful recipes would be those with a good photograph, few ingredients and quick to prepare. It was unlikely that they would have the time or the inclination to follow a detailed recipe. Snacks were often mentioned, as many people felt too tired to prepare fresh food after dialysis. The 'swaps' in the draft recipe book were popular. Many spoke of not liking spicy foods and were not keen to try new things. One interviewee said, "Put in stories from people that say, I've battled, and this is how I've managed".

Discussion
Although difficulties with diet and fluid are well-known in those receiving dialysis, the depth of feeling about food was stark and for some was perceived to strongly impact on their life quality. This study has demonstrated the importance of actively involving patients receiving dialysis in the development of a cookbook (rather than asking for volunteers). Taking their experiences into account is critical to the cookbook's usefulness and value.

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Improving clinical monitoring and governance of the renal homecare service for erythropoietin stimulating agents: a quality improvement project

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Background
An internal review of the erythropoietin stimulating agents (ESAs) home delivery service for renal patients revealed a number of quality issues such as use of hand-written prescriptions leading to errors and illegibility and inconsistencies with the registration process and inadequate data management. Also, there was no pharmacy involvement to support clinical assurance and adherence to best practice recommendations and to the Royal Pharmaceutical Society professional standards for homecare services (1). The review also revealed one of the 2 existing homecare providers was not included in the East Midlands technical contract, which would undermine the region's tendering processes and potentially lead to financial penalties. Another key driver for change was the Trust's requirement to collect patient level data in order to achieve the Medicines Optimisation CQUIN. As a result of these findings, a series of changes were introduced as a quality improvement project.

Method
The project was led by the homecare and pharmacy teams and a business case was approved for additional pharmacy resource. A process map detailing the ESA homecare provision was created to summarise the current position. After identifying and consulting with key stakeholders, processes were refined and finalised, resulting in a detailed action plan and timeline to undertake the transition to a new ESA homecare service, fully compliant with relevant regulations. This plan involved creating new patient communication and information materials and transitioning of all affected patients to a homecare provider on the East Midlands contract. All patients were registered with written consent obtained using nationally approved homecare documentation. Newly designed prescriptions in electronic format were introduced which were clinically screened by a pharmacist. Secure prescription transport arrangements were introduced and prescription data management and invoice processing were carried out by the pharmacy homecare team.

Results
The project was successfully completed within the agreed time scales with no incidents, no missed deliveries or disruption in medication supplies as a result of the transition. The pharmacist clinical screening process of all prescriptions has provided additional quality assurance by identifying inappropriate prescribing (e.g. patient passed away, haemoglobin above target) and liaising directly with prescribers to resolve these issues. Patient level data is collected consistently, providing robust audit trail. In addition, the involvement of the homecare pharmacy team has provided additional financial governance through contractual price adherence and invoice management. This was a cost-neutral exercise in terms of drug acquisition and delivery costs.

Discussion
Implementing the new service has led to closer integration of teams (clinical, administrative, pharmacy teams, managers, patients groups and homecare providers). The inclusion of the renal and homecare pharmacy teams has improved patient safety and governance of the service. A full patient and prescription

dataset has facilitated internal audit and evaluation of the service. It will also be used to inform future commissioning reviews and further quality improvement work.

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Involving a haemodialysis patient in a systematic review: A clinician and patient perspective

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Introduction: In recent years, there has been a drive to include patients in the design and implementation of research, through the incorporation of Patient and Public Involvement (PPI) representatives. This is to ensure research is relevant, meaningful and develops feasible interventions. INVOLVE have provided guidance on PPI in research. However, there is little guidance on how to include patients in a systematic review.

We completed a systematic review (CRD42018094656) examining studies that compare cannulation techniques for haemodialysis. We decided to include a patient undergoing regular cannulation for haemodialysis, to assist in evaluation of studies.

Methods: The patient included had an interest in supporting the systematic review and is an amateur writer with good English language skills. Support activities were designed with him, to facilitate his involvement, ensuring he was fully able to appropriately interpret and appraise studies. This included:

1) A clinical librarian provided bespoke teaching on how to critically appraise research
2) A glossary of terms for the patient to refer to whilst reading studies
3) A summary of data extraction from other authors was provided with each article
4) A bespoke review form designed to capture his own perspective on each study, which included an opportunity for him to highlight any areas of uncertainty.
5) Following completion of the bespoke review form, the patient had opportunity to discuss findings with the lead researcher.

All activities coincided with the patient's normal haemodialysis treatment.

Following data extraction from other authors and development of themes for discussion in the narrative synthesis, the information from the patient review form was incorporated into the narrative synthesis. Following completion of the systematic review, a summary of his experiences of being part of the systematic review was developed with the patient.

Results: The results from the patient review form and discussion with the patient indicated he understood the studies he reviewed. The patient's perspective highlighted aspects related to studies that were relevant and incorporated into the narrative synthesis. This included providing context to pain results and a reminder of the consequence of changing practice based on research where bias potentially influenced results. All the points the patient highlighted were also identified by other co-authors, however the patient's perspective brought a new, different and appropriate emphasis, reminding the team of the practical application and potential consequence of findings for haemodialysis patients.

The patient felt all the tools to facilitate is involvement were useful and assisted his reviews of studies.

Discussion: Including patients in systematic reviews provides a different perspective on the relevance and interpretation of research findings. However, their involvement requires facilitation and resources to ensure their contribution is valuable and the rigor of systematic review is maintained. For this patient, the tools developed facilitated his involvement and enabled him to provide an independent opinion on studies. Further work needs to be completed on how to include patients in systematic reviews and formally evaluate

their contribution. However, in this systematic review, this patient's contribution added value, meaning and context to the findings.

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Individuals commencing haemodialysis frequently have unmet physiotherapy needs identifiable by early physiotherapy intervention

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Background:
Individuals on haemodialysis may have access to a physiotherapist, but to our knowledge this is not routinely when starting haemodialysis and locally it can be 6 months after commencing treatment and with a focus on supporting exercise on dialysis. It is however recognised that haemodialysis comes with significant physical symptoms amenable to physiotherapy input[1].
Methods:
Participants: All Individuals commencing haemodialysis in a new starters unit at a metropolitan Centre of Excellence for chronic kidney disease (CKD) over a seven month period in 2019.
Aims:
For a physiotherapist to complete a comprehensive physiotherapy assessment for all individuals within 2 weeks of the commencement of haemodialysis.
To identify the physiotherapy needs in this cohort of patients and the appropriate management required.
The following data was collected for all patients:
Patient satisfaction with exercise information provided
Grip Strength (Kg) as a surrogate for global strength[2]
Duke's Activity Status Index (DASI) (out of 58.2) as a measure of functional capacity[3]
Falls History
Current physical activity levels
Prevalence of fatigue
Mobility

Results:
Assessment findings:
63 individuals received a comprehensive physiotherapy assessment within 2 weeks of their first dialysis session. 9 patients were not assessed within this time due to staffing. They were followed up at a later date but are not included in data analysis.
Dissatisfaction with exercise information before physiotherapy review was 64% but reduced to 6% after. 92% of individuals had a grip strength lower than expected norms (mean 61% of expected, SD 20%) and mean reported DASI scores were 26.2 (SD 14). 63% of individuals experience some level of fatigue. 39% of individuals reported at least one fall in the past 6 months and 5% reported multiple falls. 25% of individuals reported not completing any regular exercise and only 14% met physical activity guidelines[4]. 29% of individuals mobilised with walking aids and 5% required assistance for ambulation.

Interventions required:
All individuals received education and advice around physical activity and exercise for the management of CKD and associated secondary complications. Where indicated onward referrals and sign posting to renal specific exercise programmes (renal rehabilitation class or exercise on dialysis) and generic local exercise options (e.g. exercise on referral) along with tailored home exercise programmes were completed. These were aimed at improving uptake of exercise among this patient group to manage the symptoms they identified such as reduced exercise tolerance, shortness of breath, fatigue, strength or balance impairments

and for weight management. In addition to these, referrals on to outpatient and community physiotherapy services were made to manage musculoskeletal dysfunction, falls and reduced mobility as required.

Conclusion:
Within weeks of starting haemodialysis, individuals with CKD already present with a number of undesirable symptoms amenable to physiotherapy such as reduced strength, falls, low exercise participation, fatigue, reduced functional capacity and shortness of breath. Patients also lack sufficient information around the role of exercise in the management of these. Early comprehensive physiotherapy assessment is indicated to address these unmet needs in otherwise un-referred individuals.

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Post-discharge risk stratification after AKI. An external validation and decision curve analysis of two risk models.

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Background and Aims:
There is limited evidence to inform which people should receive follow up after AKI and for what reasons. Here we report the external validation (geographical and temporal) and potential clinical utility of two complementary models for predicting different post-discharge outcomes after AKI. We used decision curve analysis, a technique that enables visualisation of the trade-off (net benefit) between identifying true positives and avoiding false positives across a range of potential risk thresholds for a risk model. Based on decision curve analysis we compared model guided approaches to follow up after AKI with alternative strategies of standardised follow up – e.g. follow up of all people with AKI, severe AKI, or a discharge eGFR<30.

Methods:
The Alberta AKI risk model predicts the risk of stage G4 CKD at one year after AKI among those with a baseline GFR>=45 and at least 90 days survival (2004-2014, n=9973). A trial is now underway using this tool at a 10% threshold to identify high risk people who may benefit from specialist nephrology follow up. The Aberdeen AKI risk model provides complementary predictions of early mortality or unplanned readmissions within 90 days of discharge (2003, n=16453), aimed at supporting non-specialists in discharge planning, with a threshold of 20-40% considered clinically appropriate in the study. For the Alberta model we externally validated using Grampian residents with hospital AKI in 2011-2013 (n=9382). For the Aberdeen model we externally validated using all people admitted to hospital in Grampian in 2012 (n=26575). Analysis code was shared between the sites to maximise reproducibility.

Results:
Both models discriminated well in the external validation cohorts (AUC 0.855 for CKD G4, and AUC 0.774 for death and readmissions model), but as both models overpredicted risks, recalibration was performed. For both models, decision curve analysis showed that prioritisation of patients based on the presence or severity of AKI would be inferior to a model guided approach. For predicting CKD G4 progression at one year, a strategy guided by discharge eGFR<30 was similar to a model guided approach at the prespecified 10% threshold (figure 1). In contrast for early unplanned admissions and mortality, model guided approaches were superior at the prespecified 20-40% threshold (figure 2).

Conclusion:
In conclusion, prioritising AKI follow up is complex and standardised recommendations for all people may be an inefficient and inadequate way of guiding clinical follow-up. Guidelines for AKI follow up should consider suggesting an individualised approach both with respect to purpose and prioritisation.

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The first 100 days: a single centre experience of the updated 2019 NHSBT kidney transplant allocation policy

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Introduction:

In 2019, the NHSBT allocation system for deceased donor kidneys was updated to prioritise highly sensitised patients and those with high matchability scores (MS). The aim was to address inequalities in waiting time for highly sensitised or difficult to match patients, and to improve disparity between Caucasian and Black, Asian and minority ethnic (BAME) kidney patients on the waiting list.

Methods:

The new allocation system was introduced in September 2019, resulting in an immediate increase in the number of offers for patients with high MS. We undertook urgent multi-disciplinary review of all patients on our transplant waiting list with MS 8-10 to i) identify those for whom a 2-2-2 mismatched graft was deemed unacceptable ii) to update their acceptable mismatch accordingly to reduce the number of unsuitable offers and iii) to review after 1 year to ensure that this did not significantly limit access to transplantation. After 100 days of the new allocation system, we performed a retrospective analysis of our patients with high MS to assess the impact of the allocation update and the outcomes of transplants performed in this population.

Results:

We identified N=118 patients active on our kidney transplant waiting list with MS 8-10, representing approximately one third of our population. 46% were female, median age 48 yr, median CRF 100% and median waiting time 1900 days. The matchability scores were: 8 (36%), 9 (27%) and 10 (37%). After MDT review, we changed the acceptable mismatch from 2-2-2 to 2-2-1 in N=61 (52%) patients.
During the first 100 days of the new allocation system, we performed 47 deceased donor kidney transplants, with 47% BAME recipients compared to 25 and 36% respectively during the same period in 2018. N = 22 transplants were in patients with MS 8-10 (19% of high MS patients). 45% of these transplants occurred in patients with MS 10, 59% were Level 4 mismatches and there was a non-significant trend towards more transplants in blood group B recipients. 32% of transplants were in patients whose acceptable mismatch had been changed to 2-2-1. The age mismatch between donor and recipient exceeded 25 years in N=3 cases. There were 2 episodes of early graft loss (1 thrombosis, 1 death with a functioning graft). There were 2 episodes of early rejection (1 Banff 1B and 1 Banff 2A), both successfully treated. The median eGFR was 48 ml/min after a median follow up period of 3 months.

Conclusions:

The updated allocation policy has led to prompt transplantation in approximately 20% of our highly sensitised and difficult to match wait-listed patients with favourable short term outcomes. More transplants were performed compared to 2018, and in a higher number of BAME recipients. MDT review of all patients with MS 8-10 has limited the number of offers which may have posed an unacceptable immunological risk.

Further follow up and ongoing assessment is required to establish the longer term implications of the policy change.

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Prevalence and prognosis of hyperkalemia in people hospitalised with and without AKI

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Background and Aims:
Hyperkalemia is a clinical emergency associated with kidney diseases and hospital mortality. It may be apparent on initial hospital presentation, or develop during the course of admission, and can occur in the context of AKI. The prevalence of hyperkalemia across these different presentations and contexts is not well described. No work has previously described whether the prognosis of hyperkalemia varies depending on timing of presentation, or on AKI status defined by KDIGO creatinine change biochemical criteria.

Methods:
We constructed a cohort of all adult residents in Grampian (North Scotland) admitted to hospital in 2012 (n=28462). We used a validated and replicated KDIGO based definition of AKI to identify AKI using serial serum creatinine values. We determined the presence of hyperkalemia (serum potassium >= 6 mEq/L) both on first blood test on presentation to hospital, and also during the course of hospital admission. We explored the outcome of 30 day mortality within subgroups of AKI status and timing of hyperkalemia. Covariates of interest included age, CKD, medications prescribed in the preceding 90 days and comorbidities (ICD-10 hospital episode codes). The relationship between hyperkalemia and 30 day mortality was determined using multivariable logistic regression.

Results:
Of 28462 hospital admissions, 247 (0.9%) presented with hyperkalemia, whereas 560 (2.0%) had hyperkalemia during the course of hospital admission. Hyperkalemia was common in the presence of AKI (4.2% at hospital presentation, 9.3% during hospital admission and rising to 24.5% during AKI stage 3). Hyperkalemia was uncommon in the absence of AKI (0.3% and 0.7% respectively) (OR AKI vs no AKI 13.9, 11.6-16.6). Other factors associated with hyperkalemia were male gender (OR 1.5, 1.3-1.8), age >70 years (OR 2.4, 2.0-2.9), CKD based on eGFR or proteinuria (5.5, 4.6-6.5), diabetes (OR 3.4, 2.8-4.0), heart failure (OR 3.0, 2.4-3.7), RAAS blockers (OR 2.4, 2.0-2.9), trimethoprim containing antibiotics (OR 2.2, 1.7-2.8)), non-RAAS antihypertensives (OR 1.7, 1.4-2.0), but not NSAIDs (OR 0.9, 0.7-1.1). Hyperkalemia mortality (AKI vs no AKI) was 31% vs 29% when presenting at admission, or 34.3% vs 27.8% when occurring during hospital admission. Although absolute risks were similar irrespective of AKI, the excess relative mortality risk associated with hyperkalemia was lower for those with AKI (OR 2.7, 2.1-3.4) than those without AKI (OR 9.5, 6.8-13.2), which may be explained by a higher mortality for those with AKI even without hyperkalemia.

Conclusion:
Hyperkalemia is associated with a high mortality even in the absence of AKI and irrespective of the timing of presentation. Management protocols should draw attention to this poor prognosis across all clinical contexts. As hyperkalemia usually occurs within the context of AKI, it should prompt clinicians to consider ongoing close observation for emerging AKI even when AKI is not yet evident on blood tests.

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Sharing experience of implementing Dietitian prescribing – forewarned is forearmed.

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On completion of a non-medical prescribing qualification, Dietitians are now able to prescribe for their patients as a Supplementary Prescriber (SP) using a Clinical Management Plan (CMP). Prescribing of medications by Dietitians used in the management of Chronic Kidney Disease – Mineral Bone Disorder (CKD-MBD) will have potential benefits for all stakeholders however, changing roles and new processes need to be embedded in practice and evaluated. As financial and workplace support is necessary to allow this extended role to be introduced, it is important to share perspectives so that those considering entering into this new arena are prepared and benefit from the experiences of others.

Two Dietitian prescribers from one Nephrology Department have reflected on their journeys from completing the non-medical prescribing course to implementation of the qualification in practice. Positive and negative aspects have been observed and sharing of these will inform future Dietitian prescribers. Key reflections are described below.

Positives
- Increase in knowledge, skills and confidence through undertaking the course
- Role fully supported by Clinicians
- Enhanced working relationships and mutual respect
- More timely prescribing of binders
- More coherent approach
- Closer monitoring as fully invested in maximising treatment / more momentum
- Patients have all agreed to Dietitian prescribing when asked for their consent
- Patients seem to like the open discussion about options and appear to respond well to the confidence and authority when Dietitians are able to make diet and medication recommendations concurrently and independently

Negatives
- Supplementary prescribing is a less familiar format of non-medical prescribing in most NHS Trusts affecting ease of implementation.
- Clear national guidance on the detail of working as a supplementary prescriber is lacking
- Different NHS Trusts are endorsing different practices of using CMPs
- CMPs are cumbersome and, depending on how they are used locally, can affect timeliness of prescribing
- Roles and responsibilities between Clinicians, Dietitians and other non-medical prescribers are still being established
- More time-consuming as often exposing other issues (may be beneficial to patients)
    - Many patients don't know what medications they take
    - Spending time contacting General Practitioners (GPs) and pharmacies to clarify current medication status
    - GP records and hospital records for medication don't always match
    - Dosette boxes can complicate medication changes
    - Often uncovering other medication issues which then need to be referred back to Clinician

These early reflections will help to prepare new Dietitian prescribers for their developing extended roles. Insight into potential challenges will enable a more streamlined transition while assuming the increased responsibility. Perspectives of all stakeholders should be sought to broaden understanding of the impact of Dietitian prescribing. Patient views are critical to ensure it is an acceptable change for them and is beneficial. Working as Independent Prescribers will negate many of the negative reflections.

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Incident CKD Over 5-Years in a Population-Based Study of Apparently Healthy Young Adults at Risk of Mesoamerican Nephropathy (MeN)

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Introduction:
Mesoamerican Nephropathy (MeN) has led to the death of tens of thousands of young adults across rural Central America. We recently reported eGFR decline of over 30mL/min/1.7m² over 2 years among substantial numbers of apparently healthy young adults from rural communities in northwest Nicaragua. The consequences of this early loss of eGFR is not known.

Methods:
The original 350 participants (a rural, population-based sample, aged 18-30 years, male:female ratio 3:1, without reported diabetes, hypertension or CKD) from the study have been followed-up annually for a further 3 years (visits 6-8). An additional 417 men and women (ratio 1:1) recruited using the same criteria in October 2018, have also now been followed up for 1 year (visits 7 and 8). Serum creatinine was measured in two batches (visits 1-5 and visits 6-8) in the UK at laboratories using IDMS reference standards. Historic samples were retested to capture batch effects and results from the second batch normalised to the first. eGFR was then calculated by CKD-EPI formula. Baseline CKD was defined as an eGFR<60mL/min/1.7m² on the first two visits and de novo CKD was defined as those participants from the original cohort without baseline CKD who developed an eGFR <60mL/min/1.7m² on at least two serial measurements without recovery.

Results:
Mean bias between the two batches of creatinine tests was minimal (-0.6micromol/L; 95%CI -1.5 to 0.3). Across all participants at baseline (mean age 23.3 years) 87% of men and 98% of women had an eGFR≥90mL/min/1.7m², but despite excluding those self-reporting kidney disease, 3% of males had CKD at this time. In the original cohort, 90% participants attended ≥5 of the 8 study visits. eGFR varied substantially visit-to-visit such that 38% of men and 6% of women had an eGFR<90mL/min/1.7m² at some point during the 5- year follow-up. Furthermore, among men (but not women), 9% had an eGFR<60mL/min/1.7m² (at ≥1 visit),
4.2% developed de novo CKD and 0.8% (n=2) died from kidney failure over the follow-up. The distribution of eGFR for males and females over the 8 visits (60 months) is shown in the Figure.

Discussion:
Within person eGFR fluctuates substantially in this population at high-risk of MeN. This likely reflects important biological effects making longitudinal studies critical for disease insight. Nonetheless over time there is both a substantial loss of eGFR across the population and unprecedented rates of incident CKD among young men. When compared to the reported prevalence of CKD stages 3-5 of 0.1% amongst men of a similar age-range in England, the calculated incidence of de novo CKD in males of ~1% per year in our study, underlines the scale of the problem. There is an urgent need to understand the aetiology of MeN so preventative measures can be instituted.

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Auditing the nutritional care process on an acute renal ward

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Introduction
Malnutrition is a common complication of chronic kidney disease (CKD) and end stage kidney disease (ESKD), due to fatigue, food distaste, and nutrition impact symptoms such as nausea, dysphagia, early satiety, and poor appetite. Dietitians have a key role in managing malnutrition, however for this to be effective, access to relevant medical, social and nutritional information is necessary, alongside co-operation from the multidisciplinary team in implementing nutritional care plans. We noted that some referrals were incomplete, and nutritional care plans were not being fully implemented, therefore we aimed to audit compliance with the nutrition care process on an acute renal ward.

Methodology
Patients admitted to the renal ward and referred for dietetic advice or currently under the care of the dietitian were included. An audit tool was devised, incorporating demographics, referral type, reason for referral and appropriateness of referral, number of days from referral to the patient being seen; and aspects of the dietetic care process, including recording of weight, food intake, and provision of supplements and snacks. Data were collected using the audit tool at the time of initial dietetic assessment. Data were analysed to determine reason for referral, and the effect of this upon the quality of both the nutrition care process and nutritional documentation by nursing staff.

Results
84 patients met initial inclusion criteria. Four patients were excluded as they moved to outlier wards, therefore data for 80 patients (mean age 69 years; 65% male, 35% women; 46% on dialysis with average dialysis vintage 4 years) were analysed. The most common reason for referral was nutrition support. Referrals were deemed appropriate for 75 (94%) patients. The mean number of days from referral to dietetic assessment was one working day. There was no significant difference between reason for referral and number of days to dietetic review (0-4 days; p=0.18). 71/80 (89%) patients had a recent weight documented, and where this was not available it was predominantly due to patients being too unwell. Food charts were available for 48 patients, with 36 (75%) being fully completed. 52/80 patients were prescribed snacks as part of their nutritional care plan, however 40 (77%) did not receive snacks within 2-3 days. Only 12 patients (23%) received snacks in a timely manner. 29/80 (36%) patients required nutritional supplements as part of their care plan, with 25 (87%) receiving supplements as prescribed.

Summary
Overall the nutrition care process was efficient for the majority of patients in this audit, which will help to prevent deterioration in nutritional status during their hospital admission. Several aspects of nutrition care plans were implemented well, including completion of food record charts, recording weight, and providing supplements. However, provision of snacks was poor and requires engagement from the Trust to refine this process. A limitation of this work is that the nutritional status of participants was not recorded as part of the audit, and this should be included in future work.

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Cinacalcet: an audit of prescribing practices and clinical effectiveness. Is it time for change?

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Background

End-stage renal disease (ESRD) results in hyperphosphatemia and hypocalcaemia from impaired renal phosphate clearance and reduced synthesis of 1,25-dihydroxyvitaminD. As a result, Secondary hyperparathyroidism (SHPT) occurs in almost all patients with ESRD and is associated with cardiovascular and soft tissue calcification – major contributors to morbidity and mortality.

Routine management of SHPT includes dietary phosphate advice, binders and vitamin D analogues. Surgical parathyroidectomy or cinacalcet is reserved for those refractory to standard treatment.

Cinacalcet is a high-cost drug, directly commissioned by NHS England. To ensure the use of cinacalcet remains clinically and cost effective, the National Institute for Health and Care Excellence (NICE) set prescribing criteria for the initiation and ongoing use. In a climate of increasing fiscal pressures, it is anticipated that Trusts will soon be asked to provide evidence that cinacalcet prescribing meets NICE recommendations.

Aim

To investigate whether patients are being prescribed Cinacalcet according to NICE guidance

Objectives

1. Assess if patients have a serum PTH >85pmol/L and normal-high serum calcium (≥2.05mmol/L) on commencement of Cinacalcet
2. Assess if ≥30% PTH reduction is achieved at 4 months

Method

A clinical audit was undertaken of all patients currently prescribed Cinacalcet on our Trust's renal database, PROTON (n=69). Of these 15 were excluded for the following reasons: 1. Cinacalcet being commenced by another Trust 2. <4 months from initiation 3. Insufficient data.

Retrospective PTH, calcium and phosphate results were recorded at initiation of cinacalcet, and at 4 and 12 months.

Results

Only 39% (n=21) had a PTH >85pmol/L on commencement of cinacalcet whereas 100% of patients (n=54) had a normal-high calcium; median 2.52mmol/L (2.13-3.00). Of the 45 patients that had PTH levels checked at 4 months, 42% (n=19) achieved a ≥30% reduction; median 20% (-228% to 89%). At 12 months 75% had

achieved ≥30% reduction; median 49% (-98 to 100%). 41% of patients (n=22) had their cinacalcet dose increased; the median number of days until the first dose titration was 119 (31-321).

Discussion

All patients met the calcium criteria at initiation of cinacalcet, but the majority had a PTH below 85pmol/L. Scrutiny of the data and clinical letters revealed hypercalcaemia as the indication for initiation in patients with a PTH level within target range.

Our data also showed occurrences of a PTH rise during cinacalcet treatment, suggesting either non-adherence or sub-therapeutic dosing. In addition, dose titrations did not meet the 2-4 weekly recommendations set out in the British National Formulary; this is likely to have had an impact on effectiveness.

Limitations of the audit include timeliness of cincalcet being added to PROTON; time delays between prescribing and receiving; possible non-adherence; and supply problems.

There may be clinical rationale for prescribing cinacalcet outside NICE criteria; however, with increasing financial constraints there is justification for a critical review of both prescribing and monitoring processes. It is imperative to ensure clinical and economical effectiveness through regular monitoring, timely dose titration, and encouragement of adherence. In an already stretched nephrology service this may warrant the need for a designated cinacalcet/mineral bone clinic.

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Experience of the implementation of a local safety standard for renal procedures

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Introduction
Dialysis catheter procedures and kidney biopsies are an integral part of kidney patient care. Fortunately major complications are infrequent, however, can and have occurred. Root cause analyses reflect a complex interaction of human factors contributing to an adverse event. In addition to review of adverse incidents, reflection on learning from WHO checklists in surgery and the National Safety Standards for Invasive procedures (a), we have developed a programme of improvement in our renal procedures service.

Methods
We conducted a service evaluation of renal procedures from September 2017 to February 2018. Descriptive statistics were used. Data was collected from our clinical databases, the hospital (PIMS) and renal (Renalware) electronic patient record. We also conducted an informal survey of procedures consultants and trainees. We then developed a multi-disciplinary team (MDT) quality improvement work stream to identify, implement and evaluate service changes.

Results
Identifying the challenge:
September 2017 - February 2018:
256 haemodialysis line insertions (84 tunnelled), 46 line removals.
Complications:

Carotid artery puncture	2
Arrhythmia (self-limiting)	2
Guide wire not advancing	18
Malplacement	1
Haemothorax/Cardiac Arrest	1

124 recorded kidney biopsies – 72 native and 52 transplant;
Complications: 5 insufficient sample, 2 post-biopsy bleeds with one requiring transfusion.

Service review: Major complications were discussed in the Mortality and Morbidity Meeting.
However, we had no embedded process for routine data collection and review of renal procedure activity, including the number of cancelled or postponed procedures or compliance with using the pre-procedure safety checklists.
Concerns were raised regarding possible incomplete data;

Qualitative feedback: highlighted the need for improved communication, planning of the number of procedures scheduled and co-ordination in delivery.

Implementing Service change:
1. Introduction of renal procedure LocSSIP and enhanced renal safer surgery procedure checklists
2. Successful business application for a new dedicated band 6 role in renal procedures
3. Daily email to procedures team with planned procedures for the next day

4. Procedures diary with specific procedure time slots
5. Daily procedures team safety huddle
6. Prospective procedure data collected
7. Monthly workstream to review performance
8. Change in training approach for SPRs: systematic consolidated training periods to competence

Re-audit
September 2019 - December 2019:
149 procedures were performed; 30 native biopsies, 27 transplant biopsies, 24 LA PD tube insertions; 9 LA PD removals; 6 LA PD repositions; 56 haemodialysis lines inserted and 17 removals
100% checklist concordance (including wire removal documentation) for PD/tunneled Haemodialysis catheters.

Complications:

Post biopsy Bleed	2
femoral artery puncture	1
Arrhythmia (self-limiting)	1
guide wire not advancing	1

Qualitative feedback: Improved procedural planning and team satisfaction.

Discussion:
We have worked to standardise and harmonise our approach to renal procedures with pathway and role clarification for our MDT. Essential to our progress has been a dedicated skilled band 6 nurse to lead and facilitate the planning/ delivery of our procedures and implementation of our LocSSIP. Next steps: to continue PDSA process and incorporate routine patient experience data to inform further QI cycles.

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Coexisting direct and indirect mechanism of renal damage in monoclonal gammopathy

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Monoclonal gammopathy of clinical significance (MGCS) is an umbrella term which has been coined to include myriad conditions attributed to monoclonal proteins which are capable of inducing end-organ damage but do not meet the criteria for the diagnosis of symptomatic multiple myeloma, Waldenstorm macroglobinaemia or chronic lymphocytic leukaemia. The term, monoclonal gammopathy of renal significance (MGRS), also become increasingly recognized by nephrologists and hematologists as a spectrum of renal diseases related to the monoclonal gammopathy. The mechanisms of renal damage in MDRS may involve by direct deposition of the monoclonal immunoglobin or by activation of the alternative pathway of complement by the monoclonal immunoglobin and often these mechanisms may coexist in the same patient. Here, we present a case of thrombotic microangiopathy which later found to have amyloid nephropathy in subsequent renal biopsy in previously diagnosed patient of monoclonal gammopathy. The patient initially presented with haemoptysis and haematuria secondary to severe thrombocytopenia and evidence of microangiopathic haemolytic anaemia in prompt peripheral blood smear. Urgent treatment with plasma exchange was started and the patient responded favourably to the treatment. Subsequent renal biopsy revealed L chain-type amyloidosis.

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Associations with peritoneal dialysis treatment failure for children and young adults in the UK

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Background:
Of prevalent 16-30-year olds on kidney replacement therapy (KRT), 73% are transplanted, 23% receive haemodialysis (HD) and only 5% receive peritoneal dialysis (PD). Yet 30% of incident young adults start KRT on PD with use of HD being more frequent.
Multiple studies of older adults report biopsychosocial factors are associated with peritoneal dialysis failure. However, we lack evidence to understand the suitability of PD in young adulthood.

We aimed to use data from the Surveying People Experiencing young Adult Kidney failure (SPEAK) study to report PD treatment failure in children and young adults and explore associations with clinical and psychosocial variables.

Methods:
Retrospective cohort study using SPEAK study data. SPEAK was a cross-sectional survey study linked to UK Renal Registry data which recruited 16-30-year olds receiving KRT from 2015 to 2017.
PD failure was defined as PD to HD treatment change. Individual timeline data (ranging from 1987 to 2015) were used to create a conditional risk-set for multiple failure data with age as time-varying. Kaplan-Meier survival curves and log rank tests were used to assess associations with PD failure. A multivariable model was created using Cox proportional hazards with clustering at the participant level and stratification by failure number.

Results:
Of timeline data (n=911), n=470 had ever received PD, of which n=119 had >1 PD entry. The cohort was 50% male and 85% white. The most common primary renal diseases (PRD) were glomerular diseases (32%) and structural kidney disorders (30%). There were 209 PD failures in n=609 PD episodes over a 757-year risk period. Median time to PD failure was 0.9 years. One-year PD survival was 71% (95% confidence interval 67, 75) and 5-year PD survival 37% (28, 46).
Figure 1 displays a coefficient plot from multivariable Cox regression. Risk associations were seen with older age group (15-19 years, p=0.003; 20-24 years, p<0.0001; 25-30 years, p=0.001) and PRD (systemic diseases, p=0.02).
Of those with systemic diseases, PD failure was most common in those with renovascular diseases (64%), compared to other conditions including diabetes (50%), haemolytic uraemic syndrome (42%) and renal vein thrombosis (29%).
Data was available of the cause of PD failure in n=84 cases. The most common causes were infection (48%), compliance issues (21%) and mechanical problems (19%).

Conclusion:
This study reports PD failure rates in UK children and young adults. Although over half (52%) experience PD, on average treatment failure occured after 10 months. PD treatment failure is associated with young adulthood and renovascular diseases. Infection, compliance and mechanical problems are the leading causes of PD failure. Young adulthood is a time of changing service provision and appears a high-risk period

for KRT in general, not only for kidney transplant survival. As 43% of young adults on KRT have low medication adherence, assessing compliance in clinical practice may inform future treatment plans. Further work will involve reporting patient experiences through qualitative interviews. This is important to understand which clinical parameters are useful to predict and what support is needed to enable optimal treatment outcomes for patients.

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Caring for diabetic patients on unit haemodialysis: a quality improvement project based on Joint British Diabetes Society guidelines

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Introduction
Diabetes is the leading cause of CKD and ESRD in the UK 1. Both diabetes and CKD are associated with significant morbidity and mortality, and combined, even more so 1; for example suffering with greater frequency for foot ulcers 2. Management of patients with diabetes occurs in both primary and secondary care; the structure of services vary across the UK and previous reports have found that patients have frequently fallen in the gap, with no consistent diabetes care from either sector 3. Anecdotally, this situation is compounded for patients who require dialysis, some of whom report having no regular review of their diabetes management. Guidelines published in 2016 by Joint British Diabetic Societies, with the RA highlighted these "organisational difficulties that patients with diabetes on regular hospital haemodialysis experience and the great need for the organisation of their care to be better managed."4. These guidelines cover items including organisation of care, assessment of glycaemic control, anti-diabetic therapies and dietary recommendations.

Methods:
Using these guidelines we audited practice at our Haemodialysis Unit. It is a 24 bed, NHS-run dialysis unit, serving around 100 haemodialysis patients. We first conducted the audit in 2018 and again in 2019 after implementing changes. The data was collected by a Renal Registrar and the HD Unit diabetes link nurse, by patient interviews and electronic records.

Results:
There were 29 patients with diabetes in 2018 and 25 in 2019. Key results are shown in Figure 1. In 2018 we found that a proportion of our patients had no regular diabetic review (28%), were unaware of the importance of heal relief during dialysis, not having at least annual foot reviews, and were not having regular blood glucose (BG) checks pre- and post- dialysis treatment. Positively, every patient was having regular dietetic review, provided by the Renal Dieticians
We implemented simple measures to help improve the areas which had been particularly poor. These included:

- Making patients aware of the role of the diabetes link nurse
- Brief education for patients, provided verbally by the auditing doctor, and re-enforced later by the HD unit diabetes link nurse. This included the importance of using heal relief and encouraging patients to be pro-active in taking care of their diabetes
- Re-labelling the treatment folders so that diabetic patients were easily identified by dialysis nurses
- Co-ordinating with the hospital podiatry team to ensure regular podiatry checks are done on the haemodialysis unit

In 2019 key areas had improved (more frequent BG monitoring, regular podiatry review and increased use of heal relief), but there were still a number of patients who reported having no annual diabetic review and HbA1C levels have increased out of desired range (>68 mmol/mol) in a small proportion: 15% in 2018, 20% in 2019.

Conclusion:

There are still areas which could be improved, notably co-ordination of care to ensure all patients have a diabetic review annually. We hope these changes will contribute to reducing foot ulceration particularly.

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Should clinicians enquire about joint symptoms routinely in haemodialysis patients?– results from a pilot survey

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Background:

Joint pain is a significant problem amongst patients on maintenance hemodialysis. In many cases it is may be due to non-dialysis related arthritis, renal osteodystrophy or a few hemodialysis patients may have amyloid deposition which leads to wide range of rheumatic manifestations such as carpal tunnel syndrome, destructive arthropathy and tendon contractures.
Most clinicians do not routinely ask for symptoms of musculo-skeletal manifestations during clinic consultations unless the patient raises the issue. We sought to assess how common joint symptoms are in our HD patients.

Methods:

Data on joint problems were collected in a form of questionnaire which was randomly distributed to 50 chronic hemodialysis patients.

Results:

Most respondents were male (60%) with an average age of 70 years. 58% were of Caucasian ethnicity 29% Afro-Caribbean and 13% Asian. 60% of the cohort had been on dialysis for less than 5 years. Half of the patients had some form of joint manifestation in form of pain, swelling or stiffness. Lower limb symptoms were common common with the knee joint was most commonly affected followed by the ankle joints. Correlation of joint symptoms to calcium and PTH levels showed that 60 % of patients with symptoms had a raised PTH and 33% had hypocalcaemia.
The severity of Joint Pain was mild to moderate in 35% of patients with the rest reporting severe pain for which they took codeine based painkillers daily. Half the patients were on Vitamin D analogues and phosphate binders.

Discussion:

Data from this limited sample of our hemodiaysis patients shows that joint manifestations and pain are common within this population and impacts on patients quality of life. Codeine ingestion is a common issue in our dialysis patients with joint complaints. Following this we have commenced a QIP to actively manage pain in our patients and we would recommend that clinicians pre-emptively ask if patients are troubled with joint pains during routine clinic consultantions to ensure specialist refferal if necessary.

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Urine biomarkers for Acute Kidney Stress in Major Elective Surgical Patients – a feasibility study.

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Behaviour change towards preventing hospital-acquired acute kidney injury rather than implementing renal replacement therapy bundles once the event has occurred is becoming evident in various clinical settings. Biomarkers that provide information about the state of the nephrons prior to acute kidney injury (AKI) being evident (cf. conventional creatinine methods) have been well documented. The composite biomarker [TIMP2]x[IGFBP7] can indicated renal stress within the nephrons prior to detection of functional change. The test marketed as NephroCheck®, Biomérieux is the first FDA-approved test for AKI.
Our study assessed the feasibility of introducing urinary measurements into the patient pathway for major elective, non-cardiac surgery and gathered patient-based examples of potential benefits of a non-invasive biochemical assessment of renal function. We have used Tissue Inhibitor Metalloproteinase 2 (TIMP2) and Insulin-Like Growth Factor Binding Protein 7 (IGFBP7) as indicators of acute kidney stress.
Fifteen adult patients were identified using our pre-operative risk assessment tool. This scoring system is capable of identifying patients at risk of developing AKI following elective major surgery (in-house verification). Patients with a high score were identified and given the opportunity to consent to participation on the day of surgery. [TIMP2]x[IGFBP7] requires 100 µL of urine sample for analysis. A positive result was given by using a cut off of > 0.3. Samples were collected from catheters already in place for routine patient management at 4 and 12 hours post-operatively. Care pathways and management of renal function according to existing protocols remained in place and unchanged. The study was ethically approval by the NHS Research Ethics Committee (IRAS 239519).
15 patients were classified as high risk of developing AKI with the pre-operative AKI risk score (mean score = 28.5 ± 14.6 %). The mean age = 74 years and mean BMI = 28.6. There was no significant difference in pre-op and post-op creatinine measurements. Negative results ([TIMP2] x [IGFBP7] = < 0.3) were seen in 4/15 patients at 12 hours post-operatively, indicating low risk of AKI within the next 12 h. None of these patients went on to develop AKI in the following 7 days after surgery. Furthermore, 3 of these 4 patients also had negative Nephrocheck® results at 4 hours post-op. Positive Nephrocheck® results were seen in 11/15 patients at 12 hours post-operatively. Six of these patients had a positive Nephrocheck® score at 4 hours. Three patients with positive Nephrocheck® at 12 hours developed AKI within 48 hours following surgery, before standard creatinine measurements indicated AKI. These cases were investigated further to identify possible causes of AKI and implications of having an 'early warning' of AKI were assessed.
We have shown in this feasibility study that it is possible to incorporate timely collection of urine samples for [TIMP2]x[IGFBP7] biomarker assessment at 4 and 12 hours post-operatively. In this small trial the negative predictive value was 100 % with a positive predictive value of 27 %. Larger studies are required to prove the usefulness of Nephrocheck in risk assessment of AKI in high risk post-operative surgical patients.

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Sex and the risk of acute reduction in kidney function after renin-angiotensin blockade: parallel analyses of a primary care cohort and two randomised trials

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Sex and the risk of acute reduction in kidney function after renin-angiotensin blockade: parallel analyses of a primary care cohort and two randomised trials

Introduction: Men and women respond differently to renin-angiotensin system blockade. However, it is unknown whether women are more likely to have a reduction in kidney function after initiating angiotensin converting enzyme inhibitors (ACEIs) or angiotensin receptor blockers (ARBs), and if so, how this might affect long-term adverse outcomes. In this study of individuals initiating ACEI/ARBs, we aimed to: 1) examine the relationship between sex and change in kidney function; and 2) examine the sex-specific associations between change in kidney function and long-term adverse cardiovascular, kidney and mortality outcomes.

Methods: We conducted parallel cohort studies using the UK Clinical Practice Research Datalink (CPRD) and combined data from patients randomised to ACEI or ARB in the ONTARGET and TRANSCEND randomised controlled trials (RCTs). We estimated changes in kidney function by calculating the percentage change in estimated glomerular filtration rate (eGFR) using pre- and post- ACEI/ARB initiation serum creatinine measurements. We defined an acute reduction in kidney function as a relative decrease in eGFR ≥15% and compared with those with a change in eGFR <15%. Firstly, we examined the association between sex and the change in eGFR after initiating ACEI/ARB, adjusting for potential confounders using logistic regression. We further stratified the analyses comparing men to women by age, baseline eGFR, baseline proteinuria, retinopathy, peripheral arterial disease, heart failure or decreased blood pressure. Secondly, we used adjusted Cox proportional hazards models to investigate the associations between change in eGFR and adverse cardiovascular, kidney and mortality outcomes; an interaction term was fitted to investigate whether these associations varied by sex. We conducted a number of sensitivity analyses including examining different levels of change in kidney function.

Results: We included 196,596 individuals from CPRD and 9123 individuals from the RCTs. In both CPRD and RCT settings, in strikingly similar findings, we found that female sex was associated with an increased risk of post-ACEI/ARB-initiation eGFR reduction ≥15% (Odds ratio, 95% CI: CPRD: 1.19, 1.14-1.24; RCTs: 1.35, 1.19-1.56) (Table 1), after multiple adjustment, including body weight. We observed increased long-term risk of kidney disease, cardiovascular events in CPRD and mortality associated with eGFR decrease ≥15% (Figure 1); there was no evidence to suggest that these associations differed by sex. Results were similar in all sensitivity analyses and for different levels of kidney function decline.

Discussion: Women are at greater risk of reductions in kidney function after ACEI/ARB initiation than men, and the association between kidney function and clinical outcomes did not vary by sex. If the association between acute drop in kidney function and adverse outcomes is causal, a greater proportion of women initiating ACEI/ARB would be at risk of adverse outcomes.

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Awareness and perceptions of home therapies amongst in-centre haemodialysis population.

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Background:
Home dialysis is associated with improved patients' experience and outcomes compared to in-centre conventional haemodialysis (HD). However, home therapies, which are peritoneal dialysis (PD) and home haemodialysis, remain under-utilised with wide variation of uptake across renal centres in the UK. Studies regarding barriers to home therapies uptake amongst in-centre HD population are limited.

Objectives:
To examine the awareness and explore the perceptions of home therapies amongst in-centre HD patients in a single renal unit.

Methods:
We conducted a cross-sectional survey of patients receiving in-centre HD in a single renal unit in the UK in 2019. Data was collected using a paper questionnaire consisted of nine questions. Free text area on the questionnaire was provided to explore concerns about home therapies.

Results:
Of the 380 patients receiving in-centre haemodialysis, 94 (male: 50; female: 44) completed the questionnaire. The mean age was 69 (SD: 14) year-old. Most patients (98%) reported to be aware of home therapies, predominantly home HD (96%) compared to PD (82%). They recalled being made aware of the options of home therapies by dialysis nurses (48%), doctors (47%), chronic kidney disease nurses (29%), other patients (9%) or relatives or friends (5%). Overall, 36% patients had previously considered home therapies whilst a further 6% had previously been on home therapies. Better flexibility and freedom (59%), improve quality of life (21%), improve energy level (18%), better blood pressure control (15%), reduce medication burden (15%), improve sleep quality (15%), reduce recovery time (13%) and improve survival (12%) were perceived as the benefits of home therapies by some of the patients. Conversely, 7% did not believe home therapies as having added beneficial. With regard to barriers to home therapies, five themes emerged from the qualitative data, namely (1) environmental constraints, concerning limited space or young children at home, or lack of social or medical support in the community; (2) negative emotions of loneliness, being overwhelmed, lack of confidence or not wanting to be a burden to family members; (3) physical limitations, due to old age, poor mobility or low blood pressure; (4) inability to perform home therapies, with regard to self-needling or commitment to higher dialysis frequency associated with home haemodialysis and (5) complications of home therapies, concerning infections, raised blood glucose or weight gain.

Discussion:
Majority of the patients receiving in-centre haemodialysis were aware of the options of dialysing at home. However, a significant number of the patients surveyed were not fully aware of the benefits of home therapies. In addition, this study also highlighted the social, emotional and physical barriers perceived by the patients to home therapies. Such issues identified by this study will help to tailor patients' education

provided by the healthcare professionals and aim to empower patients to consider home therapies as viable options of treatment.

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Perceptions of home therapies amongst in-centre haemodialysis nursing staff in a single renal unit

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Background:
Majority of patients with end-stage renal disease (ESRD) in the UK receive in-centre conventional haemodialysis (HD). Home therapies, which are peritoneal dialysis (PD) and home haemodialysis, remain under-utilised with wide national variation of uptake. In-centre HD nurses has the most direct contact time with patients and are therefore well-positioned in engaging and supporting their patients who might benefit from home therapies. However, there is limited information on perceptions of home therapies amongst in-centre HD nursing staff.

Objectives:
To explore the knowledge and perceptions of home therapies amongst in-centre HD nursing staff in a single renal unit.

Methods:
We conducted a cross-sectional survey of in-centre HD nursing staff in a single renal unit in the UK in 2019. Data was collected using a paper questionnaire consisted of seven questions. Free text area on the questionnaire was provided to identify nurses' perceived gap of knowledge on home therapies.

Results:
A total of 55 nurses completed the questionnaire. Of the surveyed nurses, 64% stated that they did discuss about home haemodialysis with their patients, whilst 58% did so about peritoneal dialysis. Amongst those who did talk about home therapies with their patients (35 nurses), 29%, 40%, 23% and 8% did so on weekly, monthly, six-monthly and yearly basis, respectively. More than a third (36%) of the nurses never raised the topic of home therapies with their patients. The majority of the nurses (82%) reported knowing 'how to identify patient who is suitable or interested in home therapies' whilst 18% did not. Increase flexibility and freedom (93%) and improve quality of life (76%) were the two most common perceived benefits of home therapies by the in-centre HD nurses. Other perceived benefits included improve sleep quality (48%), improve energy level (44%), improve blood pressure control (33%), improve patients' survival (29%), reduce recovery time (24%) and reduce medication burden (15%). Non-compliance (35%), living alone (35%) and advanced age (24%) were the three most frequently cited factors precluding patients from having home therapies by the nurses. Perceived knowledge gap amongst in-centre HD nurses on home therapies included clinical management of home therapies, operation of home dialysis machine and suitability or referral pathway for home therapies.

Discussion:
Majority of the in-centre HD nurses self-reported to be able to identify patients who are suitable for home therapies, however, more than a third never engaged in home therapies discussion with their patients. Most nurses were aware of the benefits of home therapies with regard to flexibility and quality of life but less so of the potential clinical benefits of blood pressure control and medication burden. The study also highlighted nurses' gap of knowledge on suitability, referral pathway and clinical management of home therapies. The results of this study had been used to guide education session on home therapies for in-

centre HD nurses, which aim to empower the nurses in engaging and supporting suitable patients to consider home therapy options.

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Meeting the needs of frail patients with Chronic Kidney Disease (CKD): Patient and staff perceptions.

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PROBLEM: Frailty is common amongst patients with kidney disease with a prevalence in dialysis patients of up to 73%. (1). Little is known about patients' perceptions of frailty or staff knowledge and confidence in managing frailty in this patient group.

PURPOSE: The purpose of our study was to ascertain the perceptions of patients and staff of the problems that frail renal patients experience and how these are addressed by healthcare providers. We also aimed to identify the educational needs of staff in relation to frailty, to inform the design of dedicated resources and a local support pack to assist staff in managing frailty.
DESIGN: Two separate questionnaires were designed, one for staff and one for patients. The patient questionnaires were administered by the nurse specialist whilst patients attended for their clinic appointments. The staff questionnaire was distributed both electronically and in paper format across the renal directorate. Patients perceived as frail were identified by members of their teams for inclusion in the study. Patients who did not have mental capacity or who could not speak English were excluded. Analysis was completed with SmartSurvey and Excel.
FINDINGS: 100% of patients agreed to take part (N=60). The demographics of patients are outlined in Table 1. The most common problem reported by frail patients was with mobility (80%), with 37% reporting falls. Mobility issues were most prevalent in patients receiving RRT (100% of PD patients, 81% of patients with a transplant and 79% of HD patients) but also affected 67% of frail patients with CKD. 45% reported memory problems with 7% finding this negatively impacted their medical care.
55% were worried about their future. The most common fears were of losing independence and burdening their families. Overall only 35% thought the multidisciplinary team were aware of their issues and only 15% felt these issues were addressed either very well or quite well. 40% thought their issues were not very well addressed at all.
The staff response rate was 27% (N=93). Figure 1 demonstrates the professional groups who participated. The mean number of years of renal experience was 13.6 (range 0.3-38). Staff's confidence in assessing and managing frailty was rated at 5/10 on average (range 0-10). 42% of staff did not know of any frailty assessment tools. 71 % reported no previous training in assessing frailty while 78% reported no training in managing frailty. Staff felt that frailty assessments would be most beneficial in haemodialysis, followed by in-patients, then PD, CKD and transplant clinics.

CONCLUSION & RELEVANCE:
We identified a large unmet need amongst our frail renal patients. This was consistent with a large proportion of staff reporting a lack of awareness and training in this area. Increasing staff knowledge and confidence in relation to frailty in our renal department through a range of education strategies and resources, will aim to empower staff to identify, assess and manage the issues most important to our frail, renal patients.

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A 10-year review of renal artery stenting in 55 studies

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We performed a review on all renal artery stenting performed at the Birmingham Heartlands Hospital over 10 years from 2008 to 2018. Information on 55 individual cases were collected from our computer data system.

Patient Demographics
Data was collected on 53 patients who had 55 renal artery interventions. Their demographics are displayed in Table 1.

Results
The main reason for intervention in these group of patients was resistant or difficult to control hypertension (44%). Other reasons for referral were part of an endovascular repair (33%), flash pulmonary oedema (11%), CKD with heart failure (7%) and CKD with a single kidney (5%). 46% of patient had a CT angiogram to confirm the diagnosis or renal artery stenosis, 18% had a MR angiogram and 36% had a fluoroscopic angiogram.

All patients were on a number of antihypertensive agents pre and post procedure. There was no significant difference in the number of agents pre-procedure (median= 3, n=55) versus 6 months post procedure (median=2, n=55) and pre procedure Versus 12 months post procedure (median=2, n-55). This remained consistent for the group of patients whose indication was resistant hypertension (Table 2).

There was a significant drop in systolic BP (>10mmHg) pre-procedure (medium 163.5mmHg, n=55) and post procedure (median= 150mmHg, n=55) in all patients (p=0.02). This remained consistent when the 44 patients who required the procedure for resistant hypertension were analysed. In this subgroup of patient, the drop is SBP was higher (>15mmHg).

There was no significant change in eGFR pre-procedure (median 52.6 ml/min, n=55) and post procedure (median=55.5ml/min, n=55) in all groups. Out of the 7 patients who had the procedure for recurrent admissions with flash pulmonary oedema, 3 patients (42.8%) continued to have such episodes. Overall, the procedure was relatively safe with very few non-fatal complications (5.4% of procedures).

Conclusion
In Summary, we analysed 55 renal artery stenting procedures over a 10-year period at the Birmingham Heartlands Hospital. This was a relatively safe procedure which significantly contributed to a drop in systolic blood pressure but no change in the number of antihypertensive medications taken pre and post procedure. The majority of patients had no change in eGFR with the procedure.

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Sikh and muslim perspectives on kidney transplantation.

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Background

Kidney transplantation offers patients with end stage renal disease (ESRD) better survival when compared to dialysis for those who are well enough to undergo the procedure. Typically, ethnic minorities experience longer waiting times on transplant lists in comparison to Caucasian patients. It is believed that this inequality stems from a particularly high need for kidney transplantation combined with a low rate of deceased donation among black, Asian and minority ethnic (BAME) groups. This is in addition to blood group and tissue incompatibility with the majority of donors who, in the UK, are of Caucasian origin.

Despite the documented benefits live kidney donor transplantation (LKDT) rates are low, and decreasing, among UK BAME communities. Research indicates that ethnic minorities experience a number of barriers to LDKT; notably, patients' reluctance to initiate conversations about LDKT and insufficient information about donation and surgery.

This work was the first phase of a larger project aiming to increase the visibility of LDKT among BAME communities by producing, testing and piloting a video-based intervention about LDKT in these communities in the United Kingdom. This initial phase of the project scoped the views and perspectives around LDKT of members of the BAME community.

Methods

Three focus groups were held during December 2018 and January 2019. They were stratified by religion and experience. They included Sikh and Muslim donors and recipients of both live and deceased transplanted kidneys. The focus groups were recorded, transcribed verbatim and data was analysed thematically.

Results

- Religious issues. For both Muslim and Sikh groups it was important that organ donation and transplantation was commensurate with their religious beliefs. It was much easier for Sikh participants to align transplantation with their religious beliefs than for Muslim participants.
- Lack of knowledge within the community. There was a general lack of understanding about transplantation within both Muslim and Sikh communities and this reduced the offer and uptake of LDKT. There was however, the possibility of utilising extended family, some of whom lived overseas, within these communities to participate in LDKT once knowledge about this process was improved, thereby increasing the pool of potential live donors.
- Timing. Both recipients and donors required time to come to terms with their role in the LDKT process. Being on the national deceased waiting list appeared to inhibit consideration of live donation.
- Identification with transplantation. Participants needed to be able to identify with transplantation as an option for them and their cultural groups specifically. Being able to do this more easily would assist them in coming to a decision about transplantation in a more timely manner. This would entail having community members or religious leaders delivering information about transplantation.

Discussion

This work has highlighted the complexity of information giving and decision making within BAME communities. Whilst some issues are unique to these communities, some are applicable to many transplant donors and recipients irrespective of cultural group. The next stage of the project is to develop an appropriate video-based tool to address these highlighted issues within these BAME communities.

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An audit on using the Malnutrition Universal Screening Tool (MUST) in a UK renal inpatient population

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Introduction: The prevalence of malnutrition has been demonstrated to be between 45-53% of the renal inpatient population in the UK (Jackson et al, 2018; Lawson et al, 2012). Consequently, prompt and accurate nutritional screening on inpatient admission is essential to improve prognosis. National (NICE, 2006) and local guidelines recommend that all patients should be screened for malnutrition on admission to hospital and then weekly using a tool such as MUST. Nutrition specific nursing care guidelines (NCG) have been implemented in this NHS Trust alongside MUST to assist ward staff to treat patients with renal disease who have been identified as at risk of malnutrition. Due to increasing numbers of 'inappropriate' dietetic referrals, an audit was completed to assess the compliance of the renal wards in completing nutritional screening and adhering to the appropriate NCG
Aim: To audit the completion rate of MUST and adherence to nutrition specific NCG on two renal inpatient wards at a large teaching hospital in the UK.
Methods: A case note review of electronic nursing notes including MUST documentation, prescription charts and food record charts for all renal inpatients was conducted over two days by a health and human sciences student. The number of patients with MUST documentation completed within 48 hours of admission and then weekly, was calculated. The adherence to MUST score specific NCG were assessed to ascertain whether the correct nutritional care plan was being followed; including whether patients were being referred to the dietetics team appropriately. A questionnaire was also given to a subset of the renal ward staff to enable an in-depth interpretation of the audit results.
Results: Data was obtained for 24 inpatients (50% males). MUST was completed within 48h of admission for 50% patients (n=12), and weekly in 20% patients (n=1). Based on the completed MUST scores and the specific NCG, 25% patients requiring a food chart had one in place and 100% patients requiring dietetic referral were referred. Renal nursing staff (n=5) voiced that they had all received MUST training but 60% felt that there were barriers to completing MUST in renal patients and 40% felt that it was an inappropriate nutritional screening tool in the renal population.
Conclusion: This audit indicates that MUST is poorly completed and nutrition specific NCG are not adhered to. Subsequently, this can result in delayed identification of patients at risk of malnutrition requiring dietetic intervention. This can affect patient recovery and clinical outcome. In addition to the barriers voiced by renal nursing staff regarding MUST, recent research has questioned the sensitivity of MUST in renal inpatients (Jackson et al, 2018). Therefore, it is felt that the introduction of a validated renal specific nutritional screening tool and dietetic led training programme is indicated. This is hoped to improve staff confidence and awareness of nutritional screening as well as improving patient outcomes.

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A Quality Improvement project (QiP) to improve patient experience by reducing waiting time for a blood test appointment

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Introduction
Renal and kidney transplant patients often require interval blood tests in between appointments in between routine appointments. We do not have arrangements in place to have this undertaken reliably in primary care due to lack of commissioning. In our unit, these blood tests are requested electronically via Electronic Patient Record (EPR) and patients are booked into a Bloods Only (BO) appointment.

Following a patient complaint, it emerged there was no official pathway for such patients who were facing extensive waiting times to only have a blood test amongst other clinic patients. Patients were also being asked by clinical staff to turn up for a blood test without requesting these tests on EPR or booking a BO appointment resulting in delays and staff frustration.

Based on these challenges, we developed a QiP to improve the patient journey when they are asked to come in for a BO appointment.

Aim
To reduce the length of waiting times for patients attending BO appointments.

Methods
We undertook a stakeholder analysis and met with representatives from different staff groups to undertake process mapping, develop a driver diagram and specify our QI measurements. Patients felt that a waiting time of less than thirty minutes would be acceptable and this also meant that they did not have to pay for parking.

QI Measurements
Outcome: 95% of patients must have bloods done within 30 minutes of arrival
Process: % of BO patients who have an appointment on EPR or valid EPR request made in advance of patient arriving at the department.
Balancing measurements: Staff survey

Data collection was done using log sheets where phlebotomists recorded whether BO patients had appointments and EPR blood requests. Patient surveys provided data about the length of waiting time and ratings of their overall experience. Staff surveys assessed clinicians' attitudes to the current process and 90% indicated the need for a better pathway.

We used the model for improvement and Plan Do Study Act (PDSA) cycles for our project.

PDSA 1:
A Standard Operating Policy (SOP) was developed to request blood tests and schedule an appointment and communicated to clinical staff via emails and at meetings.

PDSA 2:
Laminated version of SOP was placed in clinic rooms to remind staff. Patient information leaflets were developed to raise awareness to empower patients to ensure clinicians requested blood tests on EPR and to contact reception team to book appointments.

The outcome and process measures were plotted on run charts to assess response to our interventions.

Results
Between September 2019 and January 2020, waiting times under 30 minutes increased from 55% to 100%. Percentage of valid EPR blood requests increased from 75% to 85%.

Conclusion
Our QI approach has improved patient's journey and waiting time for a BO appointment. We believe this is due to involvement of various staff groups early in the project through stakeholder engagement and staff survey. We are continuing to monitor the progress so that any new challenges identified can be dealt early to ensure that the outcomes are sustainable.

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A randomized, controlled trial of rituximab versus azathioprine after induction of remission with rituximab for patients with ANCA-associated vasculitis and relapsing disease

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Background/Purpose: Rituximab is an effective therapy for induction of remission in ANCA-associated vasculitis (AAV). However, the effect of rituximab is not sustained, and subsequent relapse rates are high, especially in patients with a history of relapse. The RITAZAREM trial (ClinicalTrials.gov identifier: NCT01697267) is an international, multi-center, open-labelled, randomized, controlled trial of patients with AAV with relapsing disease comparing the efficacy, after induction of remission with rituximab, of two relapse-prevention strategies: repeat dosing of rituximab or daily oral azathioprine.

Methods: Patients with AAV were recruited at the time of relapse and received induction therapy with rituximab and glucocorticoids. If remission was achieved by month 4, patients were randomized in a 1:1 ratio to receive either rituximab (1000 mg every 4 months for 5 doses) or azathioprine (2 mg/kg/day) as maintenance therapy. Patients were followed for a minimum of 36 months, with the primary outcome being time to disease relapse. The formal hypothesis testing plan initially considers the hazard ratio for relapse across all time periods. If, and only if this global test is significant at a 5% level then the hazard ratios during the treatment period and the follow-up periods are considered separately.

Results: 190 patients were enrolled and 170 randomized at 4 months (85 to rituximab; 85 to azathioprine). The data are complete on all patients up to at least month 24. Median age was 59 years (range 19-89), with a prior disease duration of 5.3 years (0.4-38.5). 123/170 (72%) patients had a history of testing positive for anti-proteinase 3 ANCA; 47/170 (28%) for myeloperoxidase ANCA; 104/170 (61%) were enrolled having suffered a major relapse, and 48/170 (28%) received a pre-specified higher dose glucocorticoid induction regimen (Table 1).

Rituximab was superior to azathioprine in preventing disease relapse with a preliminary overall hazard ratio (HR) estimate of 0.36 (95% CI 0.23-0.57, p <0.001) and a during-treatment HR estimate of 0.30 (95% CI 0.15-0.60, p<0.001) (Figure 1). After adjustment, none of the randomization stratification covariates (ANCA type, glucocorticoid induction regimen, or relapse severity) had a significant differential effect on the primary outcome. By 24 months after entry, 20 months after randomization, 11/85 (13%) patients in the rituximab group had experienced a relapse compared to 32/85 (38%) patients in the azathioprine group. In the rituximab group 2/11 (18%) relapses were classified as major, compared to 12/32 (38%) in the azathioprine group. 19/85 (22%) patients in the rituximab group and 31/85 (36%) patients in the azathioprine group experienced at least one severe adverse event (SAE). 25/85 (29%) and 42/85 (49%) patients in the rituximab group developed hypogammaglobulinaemia (IgG <5g/l) and non-severe infections respectively, compared to 21/85 (25%) and 41/85 (48%) in the azathioprine group.

Discussion: In the RITAZAREM trial, following induction of remission with rituximab, rituximab was superior to azathioprine for preventing disease relapse in patients with AAV with a prior history of relapse. There were no new major safety signals for use of these medications in this population.

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Feasibility and acceptability of high intensity interval training and moderate intensity continuous training in renal transplant recipients: The PACE-KD study

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Introduction: Cardiovascular disease (CVD) is a major cause of morbidity and mortality in renal transplant recipients (RTRs)(1). General CVD risk scores underestimate the risk in RTRs who also exhibit elevated inflammation and impaired immune function. Exercise has a positive impact on these unique factors in patients with chronic kidney disease (2) but there is limited rigorous research in RTRs, particularly surrounding the feasibility and acceptability of high intensity interval training (HIIT) versus moderate intensity continuous training (MICT).

Method: 24 RTRs (eGFR 55 ml/min/1.73 m² [26-90]; age 48 years [27-76]) were randomised to: HIITA (n=8; 4, 2 and 1 min intervals; 80-90% of watts at peak oxygen uptake ($\dot{V}O_2$ peak)), HIITB (n=8, 4×4 min intervals; 80-90% $\dot{V}O_2$ peak) or MICT (n=8, ~35.5 min; 50-60% $\dot{V}O_2$ peak) for 24 supervised sessions on a stationary bike (approx. 3x/week over 8 weeks). Assessments were completed at baseline, mid-training, and immediate and 3 months post-training (3). Specific criteria for progressing to a larger efficacy trial were co-produced between researchers, clinicians, and patients (Table 1) using a condensed version of a previously reported method (4).

Results: There is a population of 400-420 RTRs registered with University Hospitals of Leicester NHS Trust's outpatient clinics. There were 111 eligible participants following screening of 185 RTRs (60%), 26 of whom were recruited (23%).

Twenty participants completed the intervention, 8 of whom reached the required intensity (HIIT A, 0/6 [0%]; HIITB, 3/8 [38%]; MICT, 5/6 [83%]). Although participants completed 92% (average) of the 24 sessions, there were 105 cancelled/rearranged sessions (illness 68, other commitments 33, investigator illness 4) and an average duration of 10 weeks to complete the intervention. Outcome completion was 'green' for $\dot{V}O_2$ and physical function and 'amber' for survey pack completion. Fifteen participants completed the 3 month follow-up visit (5 were lost to follow-up).

Discussion: This is the first study to report the feasibility of HIIT in RTRs. Although fewer RTRs met the required intensity for the HIIT protocols than MICT, there were no serious adverse events reported. There were a large number of sessions cancelled due to illness which could be attributed to the immunosuppressed state of these participants. We would recommend further exploration into the feasibility of different HIIT protocols potentially with shorter intervals and less intense recovery periods in order to facilitate the achievement of the required intensity.

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A comparative study exploring the facilitators and barriers of the non medical prescriber role within the haemodialysis unit.

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Introduction:

There are now over 50,000 non-medical prescribers (NMPs) in England but there are few within renal Haemodialysis(HD) units. NMPs have been identified as having positive effects on patient outcomes, improving patient-centred care, being cost-effective and safe for patients. There is little contemporary literature regarding the implementation of NMPs on an HD unit. Many HD units are located within the main hospital sites but are seen as outpatient facilities. It is in fact, more of a hybrid context, sharing characteristics of both inpatient and outpatient areas.

The aim of the research was to identify the facilitators and barriers of the NMP within the HD unit amongst different levels of staff.

Method

A comparative pilot study was conducted using semi-structured in-depth interviews using a topic guide in 2 HD units situated in the UK East Midlands. One had implemented the NMP role on the HD unit and the other had not. 3 interviews were carried out in each unit with the HD unit matron, a senior member of the medical team and an experienced staff nurse. The interviews were audio-recorded and transcribed verbatim. The data was analysed thematically using an open coding approach.

Results

Three themes were identified, the NMP role, support of NMPs and safety.

NMP role. Potential benefits of improved care delivery and a more holistic approach. Barriers were reservations about the scope of work and cost of training.

Support of NMPs. Medical staff had reservations about changing the division of labour and how NMPs would be supported in the early stages of the role.

Safety. Those who had experience of implementation of the role reported increased safety, but those who had no experience of the role in practice had concerns about its safety.

Issues of the role's safety had not identified within the existing literature but was found to be the most prevalent issue within this study. Facilitators and barriers appeared to be interlinked and dependent on context. A barrier for one individual or establishment could be a facilitator for another and vice versa. Experience and exposure to the NMP role was fundamental to perspective of the role.

Discussion

Overall, it was identified that the NMP role should be person-specific rather than band-specific; the correct person should take on the role, rather than merely one of the more senior nurses in the particular HD unit. Implementation takes time, requires good relationships between healthcare professionals and a multidisciplinary approach in order to be successful. Perceived barriers often become less problematic once the role is implemented and better understood.

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Pain management in calciphylaxis: A knowledge, attitude and practice survey among physicians

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Background
Calciphylaxis is a rare disease usually seen in patients with end-stage renal disease. Pain is a hallmark of this disease and can be extremely difficult to control. Anecdotal data suggests that pain management in calciphylaxis is unsatisfactory with differing practice, variable across the United Kingdom (UK) and also around the world.

Aim
This knowledge, attitude and practice (KAP) survey aims to gather information on the current practice in the management of pain in patients with calciphylaxis.

Methodology
A pre-tested online questionnaire was circulated among physicians (renal and palliative care) involved in the management of pain in calciphylaxis. (https://www.gmann.co.uk/ website/calciphylaxis-pain-management-survey.cfm). The questionnaire included a mix of open-ended questions and questions with drop down options.

Results
One hundred and six clinicians responded to the survey of which 60 (57%) respondents were from palliative medicine and the remainder 46 (43%) were from renal medicine. There were 31 (30%) respondents, across both specialties who had not encountered any patients with a diagnosis of calciphylaxis (renal-2, palliative care-29). 18% of renal physicians refer patients to palliative care team, 32% refer to pain team and 50% refer to both. Only 3% of the palliative medicine respondents indicated that they'd received a referral from the renal team at the time of diagnosis. Opioids were the preferred initial drug of choice for the management of all types of pain although the preferred drug varied with the specialities (Fig-1). Paracetamol was universally selected as the preferred first-choice adjuvant agent for management of all types of pain. Additional procedures to aid pain management (epidural analgesia and nerve blocks) were used by 6.6% of respondents. A majority (83%) felt the presence of infection impacts on the effectiveness of pain control. The importance of advanced care planning was also highlighted with 72% undertaking advanced care planning discussions often or most of the times.

Conclusion
In conclusion, there was wide variation in the current practice of management of pain in calciphylaxis, with variation between renal specialists and palliative care specialists. Referral to pain specialists is not universal despite the severe nature of the pain experienced by patients with calciphylaxis. The data generated will enable to us to develop practice guidelines to support complex pain management in a group of patients with multiple comorbidities.

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Hemodiafiltration maintains a sustained improvement in BP compared to conventional hemodialysis in children - the HDF, Heart and Height (3H) study

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Introduction: Fluid overload, hypertension and cardiovascular disease are common in children on dialysis. In adults, hemodiafiltration (HDF) may reduce cardiovascular mortality, but data in children are scarce. A non-randomized parallel-arm study to compare outcomes on conventional hemodialysis (HD) versus post-dilution on-line HDF - the HDF, Heart and Height (3H) study – has shown a significant difference in 24-hour ambulatory mean arterial pressure standard deviation score (MAP-SDS), with 81% of HD and 38% of HDF patients having MAP-SDS above 2SD of normal at 12-month follow-up. However, the trend in BP over time and risk factors for hypertension were not studied.

Method: This is a post - hoc analysis of the 3H-dataset. The time-averaged 24-h mean arterial pressure (MAP) was used for the analyses and hypertension defined as 24-h MAP standard deviation score exceeding the 95th percentile.

Results: All 133 children who completed 12 months follow-up in the 3H study were included in this post - hoc analysis. 78 (59%) were on HD and 55 (41%) on HDF. At baseline MAP-SDS was > 95th percentile in 64 (82%) of children on HD and 23 (41.8%) patients on HDF, but these data are skewed by a high percentage of prevalent dialysis patients in the study. Both incident and prevalent HD patients increased their MAP-SDS from baseline to 12-months ($p = 0.007$ and $p = 0.004$ respectively), whereas there was no change in incident or prevalent HDF patients ($p = 0.38$ and $p = 0.11$ respectively). 43 (55%) of HD patients and 23 (42%) of HDF patients were on antihypertensive medications, and uncontrolled hypertension (BP>95th centile on medications) was present in 38 (88%) of HD patients and 6 (25%) of HDF patients. In the stepwise logistic regression at baseline, independent risk factors for hypertension were gender (OR 2.29; 95%CI 1.06–4.96; $p=0.04$) and inter-dialytic weight gain at baseline (OR 1.3; 95%CI 1.1–1.55; $p=0.004$). Over the one-year study period, MAP-SDS increased by 39% in HD patients and 12% in HDF patients ($p< 0.001$) (Figure). Significant risk factors for hypertension over time were dialysis modality (OR for HD compared to HDF 7.65; 95% CI 3.23 – 18.12; $p< 0.001$), inter-dialytic weight gain (OR 1.21; 95% CI 1.05 – 1.39; $p=0.007$), and dialysate sodium (for 1 mmol/L increase in dialysate sodium MAP-SDS increased by 1.1mmHg ; 95% CI 1.01 – 1.21; $p=0.04$).

Discussion: Children on HD compared to HDF had a 7.6-fold higher 24-hr MAP-SDS and a sustained increase in BP over the one-year study period. Higher inter-dialytic weight gain and higher dialysate sodium levels were associated with a higher MAP-SDS in both groups.

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Within-patient relationships between ultrafiltration and fluid gains in haemodialysis patients

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Background
Despite the now-widespread use of haemodialysis treatment, optimal fluid management in long-term dialysis patients remains challenging. Whilst the between-patient factors affecting target weight and ultrafiltration have been well studied, little is known regarding the within-patient factors affecting these relationships.

Methods
Dialysis data for a group of stable haemodialysis patients, from 4 dialysis units, were analysed over a period of one year. All weights and volumes are expressed as percentage of target weight.

Results
From 100 patients (aged 28–89, mean 65.4, 54% male) observed over a year, complete data were available for 15530 dialysis sessions, and 13027 combinations of dialysis session plus the following inter-dialytic interval.

Mean arterial pressure dropped by 3.5(+/-14.6)mmHg during dialysis, with a significant correlation ($p<0.05$) between pressure drop and ultrafiltration volume in 26 patients (mean R=0.09, mean regression gradient 3.2).

In 87 patients, inter-dialytic fluid gain correlated strongly ($p<0.05$) with the previous dialysis session's ultrafiltration volume (mean R=0.37, mean regression gradient 0.20) suggesting a significant role of ultrafiltration volume in driving subsequent fluid intake behaviour (thirst).

Unsurprisingly, more fluid was gained over longer inter-dialytic intervals: mean(sd) weight at the start of dialysis was 103.2(1.0)% after a 3-day gap and 102.5(1.0)% after a 2-day gap, with this difference being significant ($p<0.05$) in 87 patients. However, fluid gain was non-linear, diminishing during longer inter-dialytic intervals: mean(sd) daily inter-dialytic fluid gain was 1.13(0.38)% during the 3-day gap vs 1.21(0.53)% during the 2-day gap ($p<0.05$ in 36 patients), implying that at least a third of patients consume less fluid during the 3rd post-dialysis day.

Conclusion
Inter-dialytic fluid gain is strongly dependent on ultrafiltration during the previous dialysis session, and diminishes during the inter-dialytic interval. Large ultrafiltration volumes, which have historically been perceived as the inevitable result of large fluid intakes, are actually a cause of thirst and large fluid intakes in haemodialysis patients. These data, derived from within-patient analyses, strongly challenge our conventional understanding of dialytic fluid management.

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Predicting Progression of Chronic Kidney Disease Using Machine Learning

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Introduction
Analysis of routinely collected data stored in primary care electronic health records (EHR) may allow development of tools to predict adverse outcomes in patients with chronic kidney disease (CKD). Concurrent increases in the amount of data stored in EHRs, and the computational power and sophistication available to analyse these data, has raised interest in the use of machine learning (ML) techniques to predict patient outcomes. We examined if ML methods might be better than a standard statistical technique at predicting progression of CKD in a large cohort derived from a primary care EHR.

Methods
We used a previously published dataset (Mathur et al BMJ Open 2018; 8: e020145) of 25 to 85 year old individuals with baseline diagnoses of Type 2 Diabetes Mellitus and CKD (eGFR < 60ml/min). The outcome was an eGFR fall of 5ml/min or greater in a single year. Logistic regression was used as the standard statistical technique, and compared to the ML modeling techniques of random forests (RF) and radial support vector machines (SVM). Highly correlated variables and variables with near zero variance were removed in pre-processing leaving 21 predictor variables for modeling. K-nearest neighbour imputation was used for missing values and predictor variables were centred and scaled prior to analysis. All models were trained to optimise the Receiver-Operator Characteristic (ROC) on 75% of the dataset. The remaining 25% was used for model testing. All analysis was performed using the R statistical computing language.

Results
The dataset comprises 33,171 patient years of CKD follow up from 6,631 individuals. 7,119 (21.5%) of observations showed the outcome of CKD progression of >5ml/min/year.

The logistic regression model predicted CKD progression with an accuracy of 77.5%, which was similar to if no information were known above the proportions of progression/non-progression in the data (the no information rate (NIR)), (P-value for accuracy above NIR 0.92). Of the two ML models, RF outperformed SVM in prediction of CKD progression (accuracy of 80.1% and 79.0% respectively. P-values for accuracy above NIR 3.9x10-6 and 0.034 respectively. See Table).

Positive predictive values for ML methods were 0.66 for RF and 0.61 for SVM, comparing favourably to traditional prediction methods such as the Kidney Failure Risk Equation (KFRE) whose PPV varies between approximately 0.15-0.30. However, negative predictive values and ROCs were modest for all models (see Table and Figure), and inferior to that seen with the KFRE.

Conclusion
This preliminary analysis illustrates that ML methods may be useful to predict progression of CKD from routinely collected EHR data. However, the performance metrics of all techniques illustrate a need for further research into the optimal use of ML in this setting.

Differences between predictive models and the KFRE may be explained by the highly diverse nature of this dataset (40% of individuals identified as BME), the scarcity of proteinuria measurements in primary care records, and the fact the models in our study remain unvalidated in an independent dataset.

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Pauci-immune vasculitis presenting as granulomatous glomerulonephritis - an elusive diagnosis on many levels

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A 41 year old occupational therapist presented with a three day history of headache and lethargy on a background of one month of increasing fatigue, myalgia, weight loss, fever and night sweats. Born in the United Kingdom with West Indian ancestry; her past medical history included pregnancy related lymphocytic hypophysitis, chronic immune thrombocytopaenic purpura and thalassaemia trait. On examination she was febrile with no focal source of infection. Baseline laboratory workup revealed microcytic anaemia (Haemoglobin 79g/L), raised inflammatory markers (CRP 183 mg/L) and mild renal impairment (creatinine 118 µmol/L). Cross sectional imaging showed no evidence of recurrent lymphocytic hypophysitis and a mildly enlarged lymph node medial to the left kidney. Serum immunology including ANA, ANCA and anti-GBM were negative. A polyclonal increase in IgG was noted with no paraprotein. Extensive testing did not identify an infectious cause.

Her pyrexia continued with a rising CRP and further weight loss; the diagnosis remained elusive despite reviews by multiple specialities including endocrinology, gastroenterology, infectious diseases, respiratory, rheumatology, haematology and renal medicine. PET imaging showed mildly active abdominal nodes and a very mildly active spleen suggesting the possibility of a lymphoproliferative disorder; bone marrow trephine biopsy was reactive with anaemia conistent with chronic disease and thalasaemia trait with no features of haematological malignancy. Renal ultrasound revealed slightly enlarged kidneys.

A renal biopsy was performed 47 days after initial presentation in the setting of progressive renal impairment with minimal proteinuria (Cr 247 µmol/L; eGFR 20 ml/min/1.73m^2; ACR 11.3mg/g). Urgent assessment of hematoxylin and eosin sections was reported as granulomatous interstitial nephritis with prominent neutrophils in the interstitium, raising suspicion of tuberculosis and prompting initiation of anti-tuberculosis therapy. Histological examination of the rest of the slides with special stains found the granulomatous lesions to be localised to the glomeruli, suggesting an unusual presentation of pauci-immune necrotising vasculitis. Rapid resolution of pyrexia and improvement in creatinine followed initiation of high dose prednisolone. A second renal biopsy was performed two months later due to plateauing of serum creatinine and rising urinary protein levels (Cr 194 µmol/L; ACR 166.8mg/g), showing response to treatment with non-circumferential, fibro-cellular to fibrous crescents with no established cortical chronic damage. Serial CT showed reduction in lymphadenopathy with no features of lymphoproliferative disease.

Mycophenolate mofetil was commenced with two doses of rituximab. Following good initial response with reduction in proteinuria, her renal function continued to deteriorate prompting counselling regarding a likely need for future renal replacement therapy. Renal function remains stable 18 months following initial presentation (Cr 252 µmol/L; eGFR 20 ml/min/1.73m^2; ACR 40mg/g).

This case describes an unusual presentation of pauci-immune vasculitis presenting as a systemic illness with pyrexia of unknown origin and weight loss prior to the development of established proteinuric renal disease. The unusual histological appearances added to diagnostic uncertainty. In the absence of established evidence guiding appropriate management we opted for a trial of corticosteroid treatment with use of mycophenolate mofetil and rituximab once the diagnosis became clearer, achieving a degree of disease stability but unlikely avoiding future renal replacement therapy.

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A UK perspective of dialysis modality choice amongst healthcare workers.

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Background
It is believed that healthcare workers would choose home-based dialysis treatment for themselves from work done previously but there is no information on the same available from the UK .

Methods
We conducted an anonymised online survey of UK renal healthcare workers on their preferred dialysis modality if they needed dialysis. In addition to collecting their baseline demographics, we asked "Assume you are an otherwise well 40-year-old (and, separately, 75-year-old) person approaching ESRD. You have no living kidney donor options at present. There are no contraindications to any of the following dialysis options. Which renal replacement therapy would you choose?"

Results
A total of 858 individuals participated in the survey. The median age 44.3 years, 70.2% were female, 37.4% were doctors, 31.1% senior nurses and 15.2% junior nurses or health care assistants. The remainder were allied healthcare staff including dietitians and pharmacists. Over 60% of respondents had been involved in renal healthcare for over 10 years.

There was a preference for peritoneal dialysis (PD) over in-centre haemodialysis (50.47% v. 6.18%; p <0.001 for 40 year and 49.18% v. 17.83%%; p<0.001 for 75 year old assumption) and home haemodialysis (HHD) (50.47% v. 39.28%; p<0.001 for 40 year old and 49.18% v. 18.41% for 75 year old assumption). There was a preference for HHD over in-centre haemodialysis if the respondents assumed, they were 40 years old (39.28% v. 6.18%; p <0.001) but not if they assumed, they were 75 years old (18.41% v. 17.83% p=0.778). There was a preference for automated peritoneal dialysis over continuous ambulatory peritoneal dialysis for both assumptions, 40 years old (34.85% v. 15.62%; p <0.001) and 75 years old (36.48% v. 12.7%; p<0.001). There was no difference in choice of treatment between doctors and senior nurses. Junior nurses and health care assistants, however, preferred haemodialysis over PD (p<0.001). The area of work had an impact on choice of treatment with the more staff involved in the care of HHD choosing HHD when compared to staff looking after patients receiving PD (<0.01).

Discussion
Our survey has shown that most healthcare workers in renal medicine, irrespective of age, gender, role and experience would choose home-based dialysis, in contrast to current practice in the UK where less than 20% of dialysis patients are on home therapies. Further work is needed to look at the disparity between clinician preference and patient reality.

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HDx using medium cut off dialysers: A better way to dialyse?

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Introduction:
Inadequate dialysis has been linked to reduced quality of life and increased morbidity. This is especially significant in long-term haemodialysis patients who are almost entirely dependent on good quality dialysis to remove toxins.
HDx is a new type of haemodialysis being introduced using Theranova® dialyser. This claims to have medium cut-off membranes, functioning similar to a kidney, hence providing better clearance of middle molecules, whilst selectively preventing loss of proteins from the body.
To test the safety and efficacy of HDx using Theranova® it was tried it in a cohort of patients in the form of an audit.
Primary objectives were to observe safety of HDx and its effect on life quality.
Secondary objectives were to determine whether HDx improves blood biochemistry, with a reduction in medication & transfusion needs.

Methods:
Thirty seven haemodialysis patients were switched from hemodiafiltration to HDx, out of these 3 patients were transplanted, 2 died, 1 switched back and 7 were transferred to satellite units. Audit was continued with the remaining 24 patients.
All patients completed an Integrated Palliative Care Outcome Score (IPOS) prior to commencing on HDx and then at six months.
Blood parameters including phosphorous, calcium, haemoglobin, Ferritin and CRP were measured monthly and mean values of 6 months before and after HDx initiation were compared.
Comparison of erythropoietin, intravenous iron and packed red blood cell transfusion requirements pre and post HDx commencement were also undertaken.
Results:
No obvious adverse effects were noted with use of HDx dialysis.

All patients had an improvement in overall IPOS scores after being on HDx for 6 months.

Erythropoietin dose reduction was noted in 13 patients; in 2 patients requirement remained the same, higher does were needed in 9 patients, however 3 of them previously transfusion dependent required no further transfusions.

There was an overall reduction Iron requirement. 11 patients had a dose reduction, with 4 of them longer requiring iron. Transfusion dependence also decreased.

No increased clotting risk was noted in patients who were switched from Evodial (heparin coated dialyzer membranes) to HDx .

With regards to inflammation we noted no significant changes in CRP, ferritin levels and other blood parameters.

Discussion:

Looking at our cohort of patients we concluded that HDx is safe to use with no obvious adverse effects.
It seems that use of HDx is particularly helpful in improving quality of life in dialysis patients as indicated by improvement in IPOS scores. IPOS is a validated questionnaire to measure symptoms and concerns in patients with advanced illnesses. As life quality is a major concern in dialysis patients, this outcome is of particular significance.
HDx was also helpful in reducing the overall burden of transfusions, iron and erythropoietin requirements. This is beneficial in overall patient health and cost burden.
Based on the above it was found that HDX was safe and effective in this patient cohort, however large-scale studies will be required for more conclusive evidence.

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Measuring health literacy in end stage renal failure patients receiving haemodialysis and peritoneal dialysis in clinical practice – a cross-sectional study

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Introduction
There are many system-driven and individual factors that determine the greater health literacy in chronic kidney disease (CKD). Limited healthy literacy is common in CKD, which is associated with higher morbidity and mortality[1]. Since these greatly impact on the successful management of their disease, it has important implications on self-management to promote effective patient-centred care.

Of the many validated tools looking at health literacy, Rapid Estimate of Adult Literacy in Medicine (REALM) is a 66-item word recognition test most widely used in research setting[2]. Scores range from 0 to 66 with lower scores representing more limited health literacy. Limited health literacy is defined as a REALM score < 60[3]. A second tool is the Brief Health Literacy Screen (BHLS) which has been validated for use in ESRF patients[4]. The questionnaire contains three questions 1) How confident are you filling out medical forms by yourself? (2) How often do you have someone help you read hospital materials? (3) How often do you have problems learning about your medical condition because of difficult understanding written information? with the scores being added to give a high or low literacy level.

Methods
Adult haemodialysis patients from 4 urban dialysis facilities participated in the cross-sectional study whilst they attended their session. The 2 health literacy measures were administered. Another subset of peritoneal dialysis-dependent patients was approached to undertake the questionnaires when they attended the clinic in the outpatient setting.

Results
A total of 73 patients (42 male and 31 female) were interviewed, with an average age of 62.3 years. 56% (n=41) scored low literacy level in the BHLS, with 4% (n=3) unable to complete the questions due to severe language barrier. Within the REALM outcome 60% (n=44) of patients scored grades less than high school, with 27% (n=20) scored 3rd grade or below.

Discussion

Our limited study shows that there is a high incidence of low literacy rates among dialysis-dependent patients in our local hospital. The use of 2 tools has enabled us to gauge usability and following this pilot we have made recommendations to the patient advisory group at our local hospital to adopt routine administration of health literacy questionnaires to better understand and tailor the health information that are provided to patients, especially those suffering from chronic health conditions. This should in the medium to long term improve quality of care provision in clinical practice.

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An Audit of Management of Patients Presenting with Exercise Induced Rhabdomyolysis

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Background
Exercise induced Rhabdomyolysis is a rare but potentially debilitating condition which can present a risk of permanently impaired renal function. There is some evidence for certain strategies for management of exercise induced rhabdomyolysis, however there is no consensual guideline within the trust.

Aims
In this study we aimed to retrospectively audit the management of patients that presented with exercise induced rhabdomyolysis in one tertiary centre.

Methods
We performed a retrospective audit of all patients presenting to the Acute Medical Ward in one tertiary centre with exercise induced rhabdomyolysis from 2013 to 2018. Data included patient demographics and an assessment of management including: amount and type of fluid used and instructions about alkalinisation of urine and measuring urine output. Biochemistry data (including creatinine and creatine kinase) were collected throughout admission.

Results
Between 2013 and 2018, 26 patients presented to one hospital with exercise induced rhabdomyolysis. 84.6% (n=22) were male and 15.4% (n=4) were female. The average patient age was 28.5 years (22-47). The mean creatinine at presentation was 147.5µmol/L (180-1347µmol/L). The average creatine kinase level at presentation was 46718U/L (69-172,160U/L). The average peak creatine kinase was 52739.9, and peak creatinine was 157.5µmol/L. 30.7% had an acute kidney injury on admission. Once admitted 15.4% of patients had specific plans in the ward round about alkalinising urine and administering sodium bicarbonate. 38.4% of patients had their urine output carefully monitored. 80.7% were solely managed with intravenous fluids, with 11.5% given intravenous sodium bicarbonate. 7.7% were managed in the high dependency unit with intravenous fluids and higher monitoring, with 7.7% requiring renal replacement therapy. The average discharge creatinine was 85.1µmol/L (66-111µmol/L). On discharge, 38.5% of patients had follow-up as an outpatient.

Discussion
Heterogeneity exists between the management of exercise induced rhabdomyolysis in our trust. We used our results to draft a pathway adopting a 'high-out, high-in' strategy with alkalinisation of the urine, to guide management of this condition.

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A national survey of non-face-to-face services for Chronic Kidney Disease in the UK.

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Introduction

The early identification and management of patients with CKD can slow or halt progression and potentially reduce long term morbidity, mortality and costs. Non-face-to-face models of care for CKD are increasingly being introduced in the UK to reduce waiting times for access to nephrologists, enable the earlier detection and management of CKD in primary care and improve clinical outcomes. To date, there is no data on the nature and distribution of such models of care in the UK. We studied the landscape of these services in the UK to inform commissioning and clinical strategy.

Methods

An electronic survey was distributed to all renal Clinical Directors in the UK and completed over August/September 2019. We asked for details of the provision of any non-face-to-face services for CKD, service delivery details and commissioning aspects.

Results

Responses were obtained from 35 of the 72 (49%) renal units over a wide geographic distribution of the UK. Of those responding, 32 (91%) were offering alternatives to outpatient based face-to-face appointments and in many cases units offer more than one type of service. These include - standard NHS advice and guidance through the e-RS system (n=20, 77%), telephone consultations with patients (n=13, 50%), advice based on access to primary care record with no access to GP consultations/letters and no ability to document in the primary care record (n=13, 50%), email advice to GPs (n=10, 38%) and shared, remote access to the full primary care record in which nephrologists can leave entries (n=2, 8%) The majority of these services had been running for between 12 and 24 months. One had been running for a decade.

46% (n=16) of responders had a trigger tool/automated alert in primary care systems to identify patients with rapid progression of CKD. A similar number offered some form of community outreach visits of nephrologists and/or nurses into primary care settings for teaching and MDTs.

Nineteen, (73%) of these new models of care had a contract with commissioners. There were a variety of funding models, with some units obtaining reimbursement from more than one source. 52% (n=14) were funded by the national advice and guidance tariff, 33% (n=9) had a block contract whilst 22% (n=6) were unfunded

Only one of the services had undertaken a formal cost-benefit analysis, with two completing a rough costing exercise.

Of those not running alternative models of care 25 (67%) intend to do so, with half of these expecting to do so within six months, the remainder planning on doing so within a year.

Conclusions

There are a wide variety of new-models of care in the UK for patients with CKD, operating at a range of maturity with a variety of funding mechanisms.

These services will require appropriate methods of reimbursement and economic analysis if they are to remain sustainable and deliver high quality, cost effective care. Currently there is no consistent funding model with many services receiving no reimbursement. National guidance on commissioning and delivering such services from key stakeholders will help promote sustainability, efficacy and growth.

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The invincible kidney or a disaster waiting to happen? An atypical case of anti-GBM disease with an isolated pulmonary presentation

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Introduction

The majority (80-90%) of patients with anti-GBM disease present with rapidly progressive glomerulonephritis and 40-60% with concomitant pulmonary haemorrhage (1). However, atypical presentations of anti-GBM disease have been described (2, 3, 4). We report such a case of a young male with isolated pulmonary involvement and weakly positive GBM serology who was found to have typical kidney biopsy appearances.

Case Report

A 21-year-old Caucasian man presented to the respiratory clinic with 4-months of daily haemoptysis (mixture of fresh blood and clots). His past medical history comprised solely of intermittent eczema and his family history was unremarkable. He took no regular medications. He reported smoking 10 cigarettes/day with occasional use of cannabis and cocaine. He worked as a self-employed electrician. On examination, he was afebrile and normotensive with saturations of 96% on room air. His chest was clear. His urine dip showed 2+ blood but no protein.

Initial investigations revealed a microcytic anaemia (Hb 95g/L, MCV 79fL, ferritin 104ng/ml), normal platelets and normal coagulation. His CRP was 18. He had normal renal function (creatinine 62umol/L, eGFR>90ml/min) and unobstructed, average-sized kidneys. His initial chest x-ray demonstrated clear lung fields. However, a CT performed subsequently showed bilateral widespread patchy ground-glass appearances in an alveolar distribution and borderline splenomegaly (15cm). He proceeded to have a bronchoscopy that identified light growth of staph aureus but no fungus/mycobacterium. Tests for TB and respiratory viruses also returned negative. Pulmonary function tests did not reveal a raised transfer factor.

An autoimmune panel returned predominantly unremarkable (anti-MPO negative, anti-PR3 negative, normal complements, connective tissue disease screen negative). However, the identification of weakly positive anti-GBM antibodies (14U/ml) almost a month following presentation prompted admission. He was pulsed with intravenous methylprednisolone (500mg) and he then underwent a kidney biopsy which revealed that 1/52 glomeruli exhibited cellular proliferation within the bowman's space, possibly representing an early crescent. There was no evidence of inflammation, necrosis or vascular abnormalities. Staining with IgG and C3 in a typically linear pattern was found on immunofluorescence.

The patient subsequently underwent 4 consecutive plasma exchange sessions and received a dose of 1g rituximab. By this stage his anti-GBM titre had reduced to 2.7U/L. He was thereby discharged on 40mg prednisolone only to represent days later with haemoptysis and a similar anti-GBM titre. Oral cyclophosphamide (2mg/kg) was started and he received a second dose of rituximab 2 weeks later resulting in complete B cell depletion. As he continued to suffer haemoptysis, oral cyclophosphamide was continued until complete resolution of symptoms 7 weeks later. He remains well without further haemoptysis, undetectable anti-GBM antibodies, normal renal function and does not take any medications.

Discussion

Although rare, similar presentations of pulmonary-isolated anti-GBM disease have been described (2, 3, 4). Whilst these presentations with negative or weakly positive anti-GBM serology may appear to suggest a disease subclass with renal sparing, these cases could also represent early detection before potentially devastating kidney damage (2). It is therefore imperative to suspect anti-GBM disease even in the context of seemingly unscathed kidneys.

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Quality of life on Tolvaptan.

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Introduction

In the United Kingdom ADPKD affects approximately 70,000 people1. 70% will progress to end stage renal disease2. Tolvaptan is the only licenced medicine that has been shown to improve the rate of decline of renal function in ADPKD patients. In 2015 NICE licenced Tolvaptan for use in CKD stages two and three who show a rapid decline in kidney function3. Tolvaptan has significant side effects which can affect patients' quality of life. These include thirst, polyuria, nocturia, dry mouth and dizziness. Tolvaptan can also cause liver dysfunction. In the Tempo 3:4 there was a 23% discontinuation rate for patients taking Tolvaptan, 15.4% of this was due to side effects4. Little is known about the quality of life of the ADPKD population taking Tolvaptan.
We aimed to assess the feasibility of using a questionnaire to compare the quality of life of patients taking Tolvaptan with those who had discontinued the treatment.

Methodology

A qualitative approach was taken for this audit. The patients sampled are those who are currently, or have been, prescribed Tolvaptan in our unit. These patients were approached to complete a validated international quality of life questionnaire (EQ-5D-3L)5-6. This questionnaire covered pain, anxiety, ability to complete usual activities and overall self-perceived health rating. We recorded maximum dosage and duration on Tolvaptan. A similar process was completed for those patients no longer taking Tolvaptan and reason for discontinuation documented. We also recorded current GFR and GFR at commencement or discontinuation of treatment and frequency of monitoring liver function.

Results

Eleven patients taking Tolvaptan and five that had discontinued treatment completed the questionnaire. The populations were comparable in terms of gender and age. The majority of patients in both groups achieved the maximum dose. The mean overall health self-rating for the Tolvaptan group was 79/100 and 68/100 for the discontinued group. There was no significant difference between the two groups (P=0.9). Three patients stopped tolvaptan due to intolerable side effects. The mean reduction in eGFR in the Tolvaptan group was 22.5% compared with 35% in the discontinued group. All patients had their liver function tested every three months.

Discussion

It is feasible and easy to use the quality of life questionnaire EQ-5D-3L to assess the impact of the side effect profile of Tolvaptan in the ADPKD population in a clinic setting. In future performing questionnaires in a larger number of patients at intervals may assess for change in quality of life. An alternative questionnaire may be better to capture the subtle differences in the symptoms of Tolvaptan.

Conclusion

We found that there was no difference in the quality of life between those taking Tolvaptan and those who had discontinued Tolvaptan.

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Renal transplant in Carbohydrate-deficient glycoprotein syndrome type 1a.

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Introduction:

Carbohydrate-deficient glycoprotein syndrome (CDG) is a group of rare metabolic disorders which affect glycosylation, with over 80 subtypes.[1,2] The disease typically presents from birth or infancy involving multiple organs with a wide range of signs and phenotypes. This can range from hepatosplenomegaly, hepatic impairment, cardiomyopathy, pericardial effusions and renal impairment as well as bleeding and clotting abnormalities. [1,2] There is limited evidence in the literature of transplantation in this patient population, with only single case reports of heart and liver transplantation (3,4).

Case description:

We present the case of a 14year old boy with CDG type 1a who underwent a successful renal transplant. He was diagnosed with CDG type 1a within the first 6 months of life. His phenotype includes global development delay, renal failure secondary to diffuse mesangial sclerosis, visual impairment and hepatomegaly. In addition to the recognised clotting abnormalities of CDG of an unpredictable risk of thrombosis or bleeding, on an extended clotting screening our patient also had a low protein C and anti-thrombin 3, and a low factor XI.

The proteinuria from his renal disease led to progressive renal impairment cumulating in the need for renal replacement therapy as peritoneal dialysis at 12 years of age and listing for transplantation. However, he had an extensive bleed following the insertion of a peritoneal catheter and was subsequently suspended from the transplant list pending further exploration of his bleeding risk.

Historical surgical procedures (liver biopsy and gastrostomy insertion) had not involved significant bleeding. Local haematological and secondary centre surgical/haematological opinions were sought in conjunction with the family's wishes to evaluate and attempt to quantify the excess risks involved in renal transplantation. In particular the risk of graft thrombosis and death during the procedure from bleeding. The risk was unquantifiable and through shared decision making with the family the patient was listed for transplantation.

To minimise the risk of bleeding fresh frozen plasma (FFP) was given 1 hour before transplantation. We had factor XI on site and if there was unexpected bleeding an urgent level would be taken and if <45iug/dL to give 5iu/kg infusion with an urgent re-check as a level >70iu/dL increases the risk of thrombus. The recommended anti-coagulation plan post theatre was for IV heparin once "risk of bleeding decreased" as opposed to enoxaparin. To minimise the risk of thrombosis perioperatively good hydration was maintained and it was advised to have "expert surgery" to reduce risk of vessel thrombosis. The transplant was uncomplicated with successful primary graft function. The patient had a complicated post-operative recovering including a significant gastrointestinal bleed.

Discussion:

We believe this is the first renal transplantation in a patient with CDG. Shared decision making is essential with families and patients with CDG due to the rare nature and limited understanding of the disease as risks will be unpredictable and unquantifiable. A collaborative approach across centres and specialities was instrumental in allowing a balanced management plan for the risk of bleeding and thrombosis to be expediently managed.

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Vending machines in a renal outpatient setting – a difficult audience to please

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Introduction

Vending machines are frequently used as a convenient way to provide food and drink in public areas. However, it can be difficult to cater for the varying dietary needs of customers, particularly in the hospital setting. Current criteria and guidance, produced by the British Dietetic Association (BDA) is limited to healthier choices (1).

The vending machines in the renal outpatient department of a large teaching hospital stock 44 snack foods and 26 drinks. The company aim to provide healthier options from small companies. The machines are used by kidney patients, their families, and staff. The local population is ethnically diverse which is represented in the patient and staff group.

This audit aimed to investigate the suitability of products in vending machines, located in a renal outpatient department, for the local client base.

Method

Each product was assessed against the BDA criteria, which specifies the maximum serving size and maximum energy, fat, saturated fat, sugar and salt content.

Products were classified as suitable for those following a reduced salt diet if the salt was <1.5g/100g (2). The items were also reviewed for ingredients high in potassium and phosphate.

A questionnaire was developed to gather customers' views on whether the vending machines met their requirements.

Results

Four (9%) snack options and 18 (69%) drinks met the 'better choices' criteria. Sixteen (36%) snacks and 12 (46%) drinks were likely to be suitable for a low potassium, reduced salt and low phosphate diet.

Thirty-two patients, staff and family/friends completed the questionnaire. Thirteen (41%) felt the vending machine did not offer suitable choices. Twenty-eight (88%) thought a labelling system would be useful. Other comments included that items were too expensive and unfamiliar, making it difficult to determine suitability for their dietary and religious restrictions.

Discussion

Few of the foods met the healthy eating criteria, illustrating how difficult it can be to find healthy snacks in vending machines. For those at risk of malnutrition, a "healthy snack" may not be the priority. Providing a variety of high energy and lower calorie items would be more appropriate.

One limitation was the lack of nutritional data for potassium and phosphate; therefore, reliance was on the ingredients list. Despite some ingredients being high in potassium or phosphate, the overall product may have been suitable.

The customer survey indicated the majority would welcome a labelling system, especially as many products were unfamiliar. This may be difficult as the renal diet is complex, varied and needs to be individualised. A potential solution might be to highlight products which are better choices for those limiting potassium, salt and phosphate. Excluding products that include high potassium or phosphate ingredients is justifiable from a patient education perspective, to ensure consistent messages. Working with the vending machine provider to influence product choice will help increase the range of suitable items.

Conclusion

It is difficult for vending machines to cater for a wide variety of dietary requirements and for people to make appropriate choices. A simple labelling system to indicate better choices might be helpful.

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Implementing MAGIC and improving cannulation practice

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Introduction: Arteriovenous (AV) fistulae and grafts are the optimal form of vascular access for most haemodialysis patients. Cannulation is a challenging but necessary procedure to be able to use AV access for haemodialysis. Repetitive use and cannulation damage the AV access, causing stenosis, with eventual thrombosis and failure. Buttonhole and rope ladder cannulation minimise this damage, whilst area puncture increases it. Whilst the British Renal Society (BRS) and Vascular Access Society of Britain and Ireland (VASBI) Needling Recommendations promote avoidance of area puncture, this continues to be the pre-dominant cannulation technique in use within the UK.

Managing Access by Generating Improvements in Cannulation (MAGIC) is a quality improvement project designed to improve cannulation for haemodialysis, minimising the use of area puncture cannulation and promoting the use of rope ladder and / or buttonhole cannulation.

Methods: MAGIC includes four phases: baseline measures, staff education, patient awareness and a region designed phase. It includes materials to assist units in improving cannulation practice, including a measurement strategy, an eLearning package and awareness materials designed for patients. These materials can be implemented in Plan-Do-Study-Act cycles in the four phases, alongside local initiatives. The Kidney Quality Improvement Partnership (KQuIP) assists regions in implementing MAGIC. The first two regions have implemented the staff education phase and are progressing onto the patient awareness phase. Data (as defined by MAGIC's measurement strategy) have been collected from the first two regions and amalgamated, to identify the impact of MAGIC to date.

Results: Data collection spanned 9 months (M1-M9), with 3,150 cannulation events audited from 20 different main and satellite units. Region 1 implemented MAGIC eLearning at Month 5 (M5) and Region 2 at Month 7 (M7). Through MAGIC, the use of rope ladder and buttonhole cannulation has increased (M1=53.0%; M5=64.9%; M7=63.3%; M9=66.4%). Missed cannulation was identified on 200 occasions (6.2%) and was increasing at M5 (M1=5.2%; M5=8.7%, M7=7.0% and M9=10.0%). To date, 177 users have started MAGIC ELearning and 51 users have completed this. Data are also being analysed for rates of AV access use, loss of AV access and use of new AV access.

Conclusion: MAGIC is leading to an improvement in cannulation technique used for haemodialysis, with increased use of rope ladder and / or buttonhole cannulation, with a corresponding reduction in area puncture. There has been an increase in 'missed cannulation'. However, we anticipate that as nursing cannulation expertise in 'new' practices becomes embedded, missed cannulation should reduce. Data will continue to be collected regularly from participating regions, enabling continued monitoring.

MAGIC is currently being implemented in two further regions with interest from other regions. It is anticipated that improved cannulation practice associated with the MAGIC programme will result in better longevity of AV access.

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The longitudinal impact of acceptance of illness on quality of life outcomes for haemodialysis patients.

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Introduction: A growing body of evidence has suggested that how patients relate to haemodialysis is associated with clinical and psychological outcomes. Adjusting to illness is a complex process and one factor identified as important in other chronic conditions is acceptance. Findings from studies across a range of chronic conditions suggest that more positive acceptance of illness facilitates improvements in patients' overall quality of life (QoL). However, there is limited research addressing the role of acceptance of illness and its impact among dialysis patients. This study aimed to test the longitudinal impact of acceptance on haemodialysis patients' QoL.

Method: Haemodialysis patients completed four questionnaires at baseline, 6 months and 12 months. The Kidney disease quality of life questionnaire (KDQoL) measured three components of quality of life; kidney disease-related quality of life, physical quality of life and mental quality of life. They also completed the acceptance of illness scale (AiS), the depression anxiety and stress scale (DASS) and the illness cognitions questionnaire (ICQ). A total of 98 patients completed the baseline questionnaire, 71 completed the 6-month measures and 50 completed the 12-month measures. Sample characteristics were consistent with the national profile in terms of gender and age.

Results: The group means indicated moderate acceptance at baseline (mean 24.100 (SD 9.157)) and these did not significantly differ across timepoints. 6- and 12-month acceptance measures were significantly correlated with baseline scores ($r=0.612$ $p<0.001$ and $r=.689$ $p<0.001$). However, the group means masked individual changes with some patients reporting large increases and others decreases in acceptance. Regression models showed increases in acceptance of illness at 6 months predicted increases in mental quality of life ($f(4,57)= 16.927$, $p<0.001$) and increases in kidney disease-related quality of life ($f(4,66) = 46.400$, $p<0.001$). Changes in acceptance at 6 months were not predictors of change in physical quality of life; instead, changes in clinical measures (urea and PTH) were stronger predictors ($f(6,55)=19.964$, $p<0.001$) (Table 1). These findings were replicated at 12 months; 12-month changes in acceptance of illness were associated with changes in 12-month mental quality of life and kidney disease-related quality of life. For 12-month changes in mental quality of life, depression was retained in the regression models and mediated the effect of changes in acceptance (Sobel = 0.2064, 95% CIs 0.0454 to 0.4987, $p < 0.001$). Depression was also an independent predictor of 12-month changes in kidney disease-related quality of life.

Discussion: The results suggest that although acceptance appeared stable across the sample, individual changes were associated with changes in mental quality of life and kidney disease-related quality of life. However, the results also indicated that acceptance cannot be considered in isolation and depression is also a significant consideration. For haemodialysis patients, who must contend with demanding treatment, increasing their acceptance of illness has the potential to improve their kidney disease-related quality and mental quality of life, either directly or indirectly through reduced depression. These findings support the development of dialysis-focused acceptance-based interventions that aim to improve patients' quality of life and reduce the burden of treatment.

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Clinician reported cognitive impairment and residual renal function in older patients on peritoneal dialysis : a retrospective analysis

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Introduction
Cognitive impairment (CI) is common in the dialysis population and more so in older people. Peritoneal dialysis (PD) has been associated with a slower decline in cognitive function and a lower cumulative risk of dementia when compared with haemodialysis (HD).[1] [2] Haemodynamic instability may be contributory although similar cerebrovascular changes have been reported with both modalities.[3] Residual renal function (RRF), often better preserved and linked to survival in PD patients, is hypothesized to be protective against cognitive decline in PD patients. This has not been formally evaluated in clinical studies. This single centre retrospective study aims to evaluate the relationship between clinician reported CI and RRF in older PD patients.

Methods
PD patients between 2009 and 2019, who were 65 years or older and with a PD vintage of at least 3 months, were evaluated. Those with a HD, transplant vintage or without a baseline PD adequacy test were excluded from the cohort. Demographic and clinical variables were collated from the renal database in addition to baseline PD adequacy results. Patients with suspected or confirmed cognitive deficits as reported by their clinician were deemed to have CI. Baseline characteristics were compared using univariate tests. Cox regression analysis was used to evaluate the relationship between baseline RRF and CI after adjusting for confounders.

Results
83 PD patients [age at PD onset – 73(70 -79) years; vintage – 22(10 – 36) months; 28.9% diabetic] met the eligibility criteria during the study period. 8.4% of them were deemed to have CI. Increasing age [HR -1.19 (1.04 -1.37), p =0.01], PD vintage [(HR -0.52 (0.30 -0.87), p =0.01], total weekly creatinine clearance (CrCL) at baseline [HR – 0.95 (0.91 – 1.00), p = 0.04] and residual CrCL at baseline (in ml/min) [HR – 0.77 (0.59 – 1.00, p = 0.05) were associated with CI in the univariate analysis. Higher residual CrCL continued to be associated with a lower risk of CI, after adjusting for age and PD vintage [HR – 0.37 (0.15 – 0.93), p = 0.03]. Total weekly CrCL was removed from the final model, due to strong correlation with residual CrCL.

Limitations
Ascertainment and selection bias
Small sample
Trend in RRF not evaluated during study period

Conclusions
Higher RRF may be associated with a lower risk of cognitive impairment in older people on PD. If corroborated in prospectively designed studies with objectively assessed cognitive trends, there could be implications for incremental dialysis and other strategies for preserving RRF.

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Experiences of patients who have participated in a chosen arts or creative living activity whilst receiving in-centre haemodialysis: a qualitative study

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Introduction
A major challenge for patients receiving haemodialysis is the considerable impact on daily living as a result of the time investment for dialysis. Patients often experience fatigue, low mood, anxiety, depression and boredom, in addition to medical complications due to limited renal functions [1-3]. There is increasing interest in the potentially considerable health benefits, particularly psychological, of arts and creative living activities for people living with chronic diseases, including patients receiving haemodialysis. However, there is very little evidence, particularly from the patient perspective, of the effect and value of arts and creative living activities [4], and a dearth of evidence in dialysis populations. An NHS Hospital Trust charity has been offering arts and creative living activities since 2018 to patients on haemodialysis, delivered by tutors at the bedside. It is a unique scheme, as patients are offered a wide choice of activities - including drawing, painting, sculpture, creative writing, languages and IT/screen-based skills - rather than only one type of activity. This study seeks to address the evidence gap by investigating,

- Experiences of patients who have participated in the arts and creative living activities
- Perceived positive or negative effects

Methods
A qualitative design in the interpretive tradition [5] was employed for the study because of the key benefits of enabling insights into participants' perceptions and opinions, and better understanding of the reasons for their experiences. The setting was an NHS Hospital Trust with three dialysis units. Individual semi-structured interviews [6] were undertaken with a purposive sample of adult patients who had experienced an arts or creative living activity in the last 15 months, until saturation (anticipated 15-20 interviews), and all tutors (n=5). Diversity was sought in the patient sample in terms of age, gender, ethnicity, dialysis unit, activities experienced, and level of activity participation. Data has been analysed using inductive and deductive principles.

Results
Uptake of creative activities and feedback has cut across diverse patient groups. Early study findings indicate a positive response from patient participants to their chosen arts or creative living activities. Activities were perceived to have therapeutic value not only while being undertaken whilst receiving haemodialysis, but more generally for living as a haemodialysis patient. Patients reported the learning process and undertaking the activities improved their mood; their focus was on the activity and not the boredom and limitations of haemodialysis. Longer-term benefits were reported as increased confidence and motivation to take part in other activities and hobbies outside the dialysis centre.

Discussion
The study results will be used to understand the effects, including psychological, for patients taking part in a chosen arts or creative living activity whilst receiving haemodialysis, and assess aspects of the scheme that may require modification or change. Providing patients with a choice of activities may have an impact not only on uptake, but also on subsequent feedback. Further analysis is required to determine whether the

option of creative activities whilst receiving haemodialysis additionally improves dialysis attendance. The findings will have value for other services considering implementing such schemes.

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Genetic variation in the carboxylesterase 2 gene and susceptibility to side effects with mycophenolate mofetil

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Introduction

Mycophenolate Mofetil (MMF) is an antiproliferative immunosuppressant drug with a number of common side effects that can result in the drug having to be used at lower doses, in different formulations or discontinued altogether. Side effects include gastrointestinal upset, bone marrow disorders and an increased risk of bacterial and viral infections. MMF is primarily metabolised by the enzyme carboxylesterase 2 (CES2). The CES2 gene is found on chromosome 16 and is known to have at least 1,500 single nucleotide polymorphisms (SNPs). Two of these SNPs rs11075646 and rs8192925 are common, world frequency 13.3% and 9.3%, they significantly alter CES2 mRNA expression in vitro but their effect on the metabolism of MMF in vivo has not been tested.
We aimed to assess correlation between the SNPs rs11075646, rs8192925 in the CES2 gene, response to treatment and development of side effects with MMF.

Methods

We recruited 120 renal transplant patients who were or had previously been taking MMF. All the patients had been transplanted for a minimum of 6 months; 60 patients were taking MMF 1g bd or 750 mg bd without side effects; 60 patients intolerant of MMF were recruited. These were patients who had had to stop the drug altogether or who had switched to the enteric coated formulation mycophenolate sodium (Myfortic). Patients were consented for the study during visits to transplant clinics and an additional EDTA blood sample was taken in addition to their routine blood tests. Permission was obtained to collect clinical data from the medical records. DNA was extracted from the blood and genotyping was carried out using TaqMan Genotyping assays for the rs11075646 and rs8192925 SNPs.

Results

120 patients were successfully recruited to the study with 60 patients in each arm. The mean age of patients in the MMF tolerant group was 50.1 years, 45(75%) were male, the mean age in the MMF intolerant group was 56.4, 29(48%) were male. In the MMF intolerant group, 30/60(50%) of patients were on Myfortic and 30/60(50%) had stopped the drug altogether. The side effects in the 60 patients who were MMF intolerant are shown in Table 1. In a number of cases the drug was stopped because of a combination of side effects. Mycophenolic acid trough concentration monitoring was not available. A Pearson Chi Square analysis with Cramer's V test for differences in the ratio of genotypes between the MMF tolerant (n=59) and MMF intolerant groups (n=60) resulted in rs11075646 p=0.82 and rs8192925 p=0.17. Comparison of the MMF tolerant group, those who were on Myfortic (n=30) and those unable to tolerate MMF at all (n=30) showed rs11075646 p=0.53 and rs8192925 p=0.31. A comparison of the MMF tolerant group, those with gastrointestinal side effects (n=45) and those who had non-gastrointestinal side effects (n=15) showed rs11075646 p=0.97 and rs8192925 p=0.36.

Conclusion

Genotype at CES2 polymorphisms rs11075646 or rs8192925 with potential to influence metabolism of MMF are unlikely to predict susceptibility to side effects.

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Communication with primary care following hospital admission with acute kidney injury

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Introduction:
Acute kidney injury (AKI) is common among hospital admissions and it is associated with an increased mortality(1). Following hospital admissions, readmissions are common, and a quarter of unplanned readmission are with pulmonary oedema(2). Communication between medical professionals is crucial to help minimise complications following discharge(3).

Aim:
To assess whether general practitioners are being informed of hospital admissions with AKI.

Method:
This study was carried out in a single UK hospital between April and July 2017. A sample of adult inpatients with AKI identified by electronic alerts had their discharge summaries reviewed for a reference to AKI, changes in medications and recommendations of plans to restart or withhold medications. The sample was taken by reviewing every inpatient alert on the 3rd, 11th, 19th and 27th of the four months. Patients receiving chronic dialysis were excluded using a review of the renal database. Patients who were transferred to other hospitals prior to discharge were excluded from the discharge summary analysis.

Results:
There were 304 alerts, 36 of these were false positives (14.1%) as they were in dialysis patients, following nephrectomies or adjudge not to have AKI(figure). After removing these patients, and those who were not admitted or those transferred to other hospitals there were 162 patients. The mortality was 25.6% and 44% during the admission and at 1 year respectively. 46.7% of the patients with a peak AKI stage of 3 that survived to discharge died within a year but only 33% of them had a discharge summary mentioning AKI.

92% of the patients alive at discharge had a medications discharge summary, and 71% had a clinical summary. In those patients with a clinical summary, 24.3% had a mention of AKI, this was 17.3% of all the patients alive at discharge. 44% of the patients were on an angiotensin-converting enzyme inhibitor or angiotensin receptor blocker before the hospital admission, of these 35.2% had the medication stopped. When stopped, advice regarding the cessation was given in 40% of the cases, with 52% of the summaries referencing AKI.
23.5% of the patients were readmitted within 30 days (10% of the cohort were unknown as they were from another region), 42.1% of the readmitted patients with discharge summaries for their subsequent admission had evidence suggestive of fluid overload or further AKI during their second admission. All of these readmitted patients had stage 2 or 3 AKI with only 50% having AKI mentioned in their original discharge summary and they had a 75% 1 year mortality rate.

Conclusion:
Patients with AKI in this cohort have a significant mortality particularly those with severe AKI, despite this, these AKI episodes are infrequently being communicated to the patient's primary care team. These patients are at high risk of readmission and medical professionals reviewing these patients need to be informed of recent AKI episodes. There is a strong argument that all appropriate patients with AKI stage 3 should be

reviewed by a suitable clinician within a month of discharge and that mentioning AKI on discharge summaries should be mandatory.

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Predicting change in target weight of a haemodialysis patient using ensemble machine learning technique

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Introduction:
Target weight estimation is a clinical skill used by clinicians across the world on hemodialysis (HD) patients. The objective of this study was to develop a machine learning algorithm which could be used as a mobile app alongside the conventional clinical estimation to aid the renal physicians.
Methods:
This was a prospective cohort study which was carried out from June 2019 to December 2019, at a tertiary care hospital in Islamabad, Pakistan. All the consenting patients (by non-probability convenience sampling) were included, who had received HD for at least 3 months and who didn't have any disability to communicate. A total of 102 patients were enrolled. An MBBS qualified physician administered a proforma to the patients at the start of a one-month observational period that recorded predictors like age, sex, income, cause of renal failure, HD duration, HD regimen, quality of life score using WHO QOL BREF, dietary compliance, medicinal compliance and electrolytes etc. Target weight as an outcome was estimated clinically by the in-charge renal consultant at the start and end of this observational period. Statistical analysis included descriptive stats and building of four machine learning algorithmic models namely linear regression, gradient boost, random forest, Xgboost and an ensemble model using random forest and Xgboost models. We used R statistical software version 3.5.2 for the above analysis.
Results:
The study population included 60% (62/102) males and a median age of 55 years. The mean duration on HD was 37 months while only 38% (38/102) patients had a HD regime of three times per week. Dietary compliance was observed by 87% (88/102) patients while 70% (71/102) patients observed medication compliance.
We divided the data into training, Validation and testing sets and used predictors as above for estimating the change in target weight over the coming one month. We built five models from the training-Validation data set which included Linear regression (Figure 2, R2=0.22, RMSE=9.1), Gradient Boost model (R2=0.22, RMSE=1.8), Random forest (R2=0.32, RMSE=1.56), Xgboost (R2=0.39, RMSE=1.55) and an ensemble model (R2=0.41, RMSE=1.49) using Xgboost and random forest. The best performing model by a long distance was ensemble model which was able to explain about 41% variance in the dependent variable (Figure 1). We then developed a mobile app based on this model which takes in the predictors from last month and can give an estimation of target weight change expected in a given patient. There are plans to increase the sample size to further improve the accuracy of this model and to perform a cost-benefit analysis in terms of work-hours saved per week down the line.
Conclusion:
We were able to develop a predictive model using ensemble machine learning algorithm which could estimate a change in target weight in a given HD patient one month in future with a fairly good accuracy. This model was then implemented in the form of a mobile/web app which can be used by clinicians around the world to get a better estimate of target weight changes in their HD patients.

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Understanding how to improve medicine and renal departmental induction for junior doctors

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INTRODUCTION Research suggests departmental induction for junior doctors is highly variable in its amount, content and effectiveness. For newly qualified doctors, induction has been shown to provide better support, improve confidence and competence and ensure patient safety. This evidence led to induction being mandated for Foundation Year 1 doctors from 2012. Junior doctors in their second year of training and beyond continue to rotate through new departments' but their induction is merely recommended. We aimed to assess the quality of induction provided to junior doctors including those rotating to the renal department.
METHODS Semi structured interviews were conducted with ten core medical trainees (third- and fourth-year doctors) in a single hospital in the UK. Interviews included general questions about medical departmental induction and also their experience of a renal induction if they had rotated through the renal department. Thematic analysis was used to identify what induction is being provided, the impact that has and how things could be improved.
RESULTS Participants described departmental induction as highly variable stretching from receiving nothing to extremely thorough inductions. The trainees identified a good induction as that which focussed around the practicalities of the day-to-day job, had a positive impact on their mental health, gave them a sense of being valued as well as ensuring better patient care. The participants gave advice on what they would include such as orientation, a clear guideline for clerking direct admissions and how they would deliver an induction, involving peers, ideally bleep free and occurring away from the ward. Participants also felt being able to provide feedback was vital. Mandating departmental induction for juniors was met with mixed feelings but seen as a positive if it could be implemented as more than a tick box exercise. Those that had rotated through the renal department described heightened anxiety when rotating into renal medicine with the perception of needing more specialist knowledge and not applying the 'normal rules' of medicine to renal patients. They described the thorough orientation, good senior support and the month of weekly teaching sessions run by the specialist nurses and allied healthcare professionals as a significant positive of the renal induction.
DISCUSSION The variability of departmental induction highlighted through this study reflects similar work in first year doctors and supports the need for improvement for all junior doctors. The increased anxiety felt by junior doctors rotating into renal medicine makes the need for a good effective induction even more important. Key areas include ensuring induction is repeated if missed, a welcome to ensure they feel valued in the department, clear orientation, renal specialist teaching and requesting feedback to continue improvement. Ensuring a good induction will help retain doctors in renal medicine.

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Everolimus use in kidney transplant recipients during pregnancy: case report and literature review.

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Introduction:
Everolimus is an mTOR (mammalian target of rapamycin) inhibitor and is sometimes used as maintenance immunosuppression for kidney transplant (KT) recipients. mTOR inhibitors are not licensed for use in pregnancy due to associations with prematurity, low birth weight and pregnancy loss in rats, although human data is lacking (1). There are only 5 reported cases of everolimus use throughout pregnancy in KT recipients (1-3) (Table 1). No fetal malformations have been reported although adverse pregnancy outcomes are common, in keeping with the general KT population (4). The evidence base requires expansion to better guide treatment decision-making. We report a pregnancy in a KT recipient treated with everolimus.

Case:
27-year-old nulliparous female with a background of IgA nephropathy who received a living donor KT in 2011. Immunosuppression initially comprised tacrolimus, prednisolone and mycophenolate, but the latter was discontinued due to leucopenia. An antibody-mediated rejection episode was treated in 2016 and Azathioprine temporarily added to immunosuppression but with no impact on donor-specific antibody (DSA) levels. DSA levels were only successfully suppressed following introduction of everolimus (Certican®). She was referred to a specialist renal-obstetric clinic in the first trimester of an unplanned pregnancy in 2019. Given previous rejection on dual immunosuppression and lack of suitable alternative agents, everolimus was continued after detailed discussion around the risks of potential teratogenesis.

Early pregnancy creatinine fell to 105µmol/l (pre-pregnancy baseline 126µmol/L, eGFR 44ml/min). Tacrolimus and everolimus doses were reviewed monthly, aiming for 12-hour trough levels of 3-7µg/l. Rising blood pressure, transaminitis and deteriorating graft function prompted hospital admission at 34+6 weeks for obstetric cholestasis and superimposed pre-eclampsia. She delivered a female weighing 2765g at 35+6 weeks by vaginal delivery following induction of labour. The baby required 7 days of neonatal care for phototherapy and establishing feeding. Data regarding breastmilk transfer of everolimus is lacking, and therefore bottle feeding was advised. The mother was treated postnatally for respiratory tract infection. Creatinine at 2 months postpartum was 148µmol/l, and GFR 36ml/min.

Discussion:
Caution is required when continuing everolimus in pregnancy for KT recipients. There are no existing reports of fetal malformation with everolimus use, although the evidence base is small. Furthermore, the majority of reported cases used low or unmonitored everolimus trough levels. Adverse pregnancy outcomes including pre-eclampsia, low birth weight, and requirement for neonatal care are common, in keeping with the general KT cohort (4).

In highly selected cases with oversight from renal and obstetric specialists, everolimus may be continued where there is significant risk to graft survival in switching immunosuppression regime and where the patient has been counselled regarding potential risks to the fetus.

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Fludrocortisone corrects tacrolimus associated hyperkalemia in renal transplant patients

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Introduction
Hyperkalemic metabolic acidosis is commonly observed following kidney transplantation. This is often due to calcineurin inhibitors which are known to cause type 4 renal tubular acidosis either due to hyporeninemic hypoaldosteronism or due to direct effect on aldosterone responsive potassium secretion in the distal nephron.

Methods
We report five post-renal transplant patients (5 males, all within 4-8 weeks post-transplant) on tacrolimus with hyperkalemia treated with daily doses of either 50 mcg (n=3) or 100 mcg (n=2) of fludrocortisone. None of the patients were on ACEI or ARB and all patients were on oral sodium bicarbonate at the time of starting fludrocortisone. We retrospectively collected data at three time points before and after administration of fludrocortisone on serum concentrations of sodium, potassium, bicarbonate, creatinine and tacrolimus as well as eGFR and blood pressure. We recorded emergency admissions and length of stay for treatment related to hyperkalemia. Data are presented as mean +/-SD) and analysed with a paired students t-test.

Results
Serum potassium was 6.3 ±0.3 mmol/L and following fludrocortisone decreased to 5.1 ±0.3 mmol/L (p=0.0018). Pre and post-fludrocortisone serum concentrations for venous bicarbonate were 18.4 ±1.8 mmol/L and 20.4± 2.0 mmol/L (p=0.1079); sodium 135 ±1.6 mmol/L and 135± 2.2 mmol/L (p=0.8757); creatinine 184± 12.2 µmol/L and 155± 10.6 µmol/L (p=0.0579); eGFR 39± 3.4 ml/min and 47± 4.2 ml/min (p=0.0349); blood tacrolimus levels 9.8± 2.1 ng/mL and 11.2± 1.0 ng/mL; blood pressure was 133/69± 12/9 mmHg and 129/70± 8/6 mmHg before and after fludrocortisone respectively. We were able to either reduce or stop sodium bicarbonate after starting fludrocortisone due to increase in serum bicarbonate levels. In two patients we measured urinary K excretion and serum chloride levels before starting fludrocortisone and in both of them urinary potassium was low (<20mmol/l) and both demonstrated mild hyperchloremic normal anion gap metabolic acidosis.

Before starting fludrocortisone there were 6 episodes of serum potassium≥ 6.5 mEq/L. Three patients required either renal day case or A&E visits/hospital admissions (n = 6) for management of hyperkalaemia with length of stay of between 1-3 days. Following fludrocortisone administration there was 1 admission (length of stay = 1 day) for hyperkalemia. Reduction in potassium levels to ‘safe levels ’were noted within 24-48h of starting Fludrocortisone.

Discussion
Hyperkalemia was a significant problem in patients described in this report requiring hospital visits for treatment and it occurred with tacrolimus levels in target range. Treatment of hyperkalemic metabolic acidosis with low dose fludrocortisone resulted in normalization of serum potassium levels. There were no adverse effects on blood pressure, serum sodium levels or clinical evidence of fluid retention after commencing fludrocortisone. Instigation of fludrocortisone prevented emergency admissions for treatment

of hyperkalemia and allowed the clinicians to run adequate tacrolimus levels. Fludrocortisone can be a cheap, safe and effective option for the treatment of hyperkalemia in renal transplant patients on tacrolimus.

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Perceptions of Illness Severity, Treatment goals and Life Expectancy: The ePISTLE Study

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Background:
In order to facilitate treatment matching individual beliefs, preferences and values, we need to accurately capture understanding of illness trajectories, expectations of care and perceived priorities of care-receivers and care-givers.

Objectives:
To compare perceptions of prognosis, transplant candidacy, symptom burden and goals of care between seriously-ill haemodialysis patients, their close persons and healthcare providers (HCP).

Methods:
Case-notes at three haemodialysis units were screened. A validated predictive mortality risk score1 was calculated for patients: those with >20% 1-year mortality risk were included into the study. Patients, their close person(s), named nurse and lead doctor were all asked to take part in a structured interview or to complete a mixed-methods questionnaire. Completion of 2+ of these questionnaires formed a patient pack and was anonymised for entry into the study. Ethical approval was granted (18/LO/1386).

Results:
334 patient notes were screened. 60 eligible patients were approached and 42 included into the study (14 declined, 3 questionnaires were not returned in the permitted time period and 1 patient pack was incomplete).

29/42 (69%) patients were male, median age was 76 years (inter-quartile range, IQR 65-83) and median length of time on dialysis was 39 months (IQR 19-56).

36% and 26% patients thought they would have >95% chance of being alive at 1 and 5 years. HCP predicted significantly lower survival (23.6% (□3.93) and 10.9 (□2.60 respectively), (P<0.0001 for both). Close persons were even more expectant of 1-year survival than patients (p<0.05). Only 2 of 15 patients expectant of 1-year survival (13%) preferred 'care focussing on relieving pain and discomfort' compared to 15/27 (56%) of those reporting a lower chance of survival.

Patients were significantly more likely to consider themselves transplant candidates than their nephrologists (p=0.02). Overall, 20/42 (48%) patients believed transplantation was an option for them, despite only 4 being wait-listed at the time of interview. Patients who thought they were on the transplant list were significantly more confident they would be alive at one year (98% vs 61%, p=0.002).

21 patients (50%) reported concerns about their memory and 10 (24%) patients had a formal diagnosis of cognitive impairment. Documented cognitive impairment or memory loss did not alter 1- or 5-year prognostic expectations (p=0.96, p=0.59) nor expectations of transplant candidacy (p=0.21).

Completion of the IPOS-Renal symptom score2 highlighted a significant symptom burden amongst patients which was under-recognised by HCP (18.0 (±1.8) vs 11.1 (±1.0), (p=0.0005)). Close-persons' more accurately recognised patient's symptoms, with no significant difference between patient and close-person scores.

Most patients want to discuss their wishes regarding care towards the end of life (EoL). 10 patients recalled talking about their EoL care-plans with a HCP and 11/32 of those who did not, wanted this discussion to take place.

Conclusions:
There is a disparity between patient/close person estimations of prognosis and those of their nephrologists/nurses. Beliefs regarding prognosis and transplant candidacy affect treatment choices: patients who believe they will live longer preferred more radical care. Our findings suggest the need to improve communication about prognosis to both patients and their families.

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ISN Sister Renal Centers Programme: the journey towards establishing peritoneal dialysis in the Niger Delta, Nigeria

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Objectives
Renal centres from Port Harcourt, Nigeria and the UK formed an alliance through the ISN Sister Renal Centers programme to improve clinical care in nephrology in a low-middle income economy with significant issues in delivering dialysis for both acute and chronic kidney disease.
Methods
Pre-visit video conferencing provided educational and planning opportunities in the delivery of peritoneal dialysis for acute kidney injury (AKI).
Enquiries were made with two major dialysis fluid manufacturers about supply of fluids.
An initial visit to the sister hospital was undertaken by UK nephrologists with special interests in AKI and interventional nephrology.
A multidisciplinary workshop was undertaken with primary and secondary healthcare professionals, designing a project for the early recognition and referral of AKI, agreeing local definitions and indications for point of care testing.
A pop-up dialysis access workshop was undertaken in the dialysis unit over 3 days:
Didactic teaching on dialysis access methods
Small group teaching on the basics of PD and prescriptions
Simple and sustainable training tools for basic surgical procedures, PD catheter insertion and Seldinger technique
Dialysis access ultrasound training with volunteers examining abdominal anatomy and vascular access imaging
Hands on training with simple access phantoms
Results
Participants in the AKI workshop were energised by their work in designing the programme, with uniformly positive feedback.
Locally designed methodology was agreed to inform the next part of the project in AKI point of care testing.
Tunnelled haemodialysis line insertion was achieved by local and visiting nephrologists, unique to the dialysis centre which normally relies on temporary femoral venous access.
Patients did not receive peritoneal dialysis access. Despite forward planning neither manufacturer's PD fluid were available at the appropriate time.
Reacting to the difficulties in establishing commercial fluid delivery discussions were commenced with the local pharmaceutical society in providing locally delivered dialysis solutions using locally available fluids (Hartman's/Ringers lactate and dextrose 50%)
Ongoing support through video links and future visits have been scheduled.
Conclusions
Significant gains have been made on our journey to establishing PD for AKI in the ISN Sister Hospital in Nigeria.
The difficulties in establishing affordable and reliable PD fluid supply have signposted a local solution.
Ongoing video-links for procedure training are in hand prior to follow up visits.
Ongoing links seek to establish a sustainable and affordable PD treatment for AKI and ESRD.
The centres are bidding for level A status to expand the programme across the Niger Delta region of Nigeria.

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Clinical characteristics of the UK Chinese population with kidney failure: a UK Renal Registry analysis

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Background
Data from the UK Renal Registry (UKRR) have shown that 0.5% of those in the UK with kidney failure are of Chinese ethnicity. The UK Chinese population is growing. Ethnic differences in cause of kidney disease and dialysis rates have been described in UK White, South Asian, and Black individuals. However, the clinical demographics of the UK Chinese population with kidney disease have not been investigated.
The China Kidney Disease Network and Hong Kong Renal Registry have reported the main cause of chronic kidney disease in their populations is diabetes, but the causes of kidney disease in other Chinese diaspora have not been well described.
We investigated the clinical characteristics of the UK Chinese population on kidney replacement therapy (KRT) as compared with the UK White KRT population in this UKRR analysis.

Method:
Data on all adult patients >=18 years who started KRT between 1/1/97 and 31/12/16 were extracted from the UKRR. Patients with ethnicity recorded as anything other than “Chinese” or “White”, or with ethnicity data missing were excluded.
Socioeconomic status was measured using country-specific Index of Multiple Deprivation (IMD) quintiles derived from patients’ postcodes (1= most deprived, 5= least deprived). The Chi-square (*) and Mann-Whitney U (**) tests were used to compare baseline characteristics between Chinese and White ethnic groups.

Results:
The dataset comprised of 92,857 incident KRT patients, of which 0.5% (n=501) were of Chinese ethnicity and 76% (n=70,575) were White. Clinical characteristics of the UK Chinese population as compared to the UK White population are presented in Table 1.
UK Chinese patients were younger at start of KRT than white patients (61.4 years vs 65.6 years, p<0.001**). Any difference in the proportion of male patients (60.7% vs 63.0%, p=0.29*) or socioeconomic status (p=0.75*) between the two groups was consistent with chance.
There were marked differences in the causes of kidney disease: UK Chinese patients had more diabetic kidney disease (29% versus 20%, p<0.001*) and glomerulonephritis than white patients (21% vs 13%, p<0.001*) There was modest evidence that more UK Chinese patients started KRT on peritoneal dialysis (PD) compared to the White population (26% vs 23%, p=0.01*)

Conclusion:
We found evidence that the UK Chinese KRT population differs from the UK White KRT population. To our knowledge, this is the first study describing kidney disease in the UK Chinese population, and one of the first to describe disease in the Chinese diaspora.
The causes behind our finding of a greater burden of diabetes and glomerulonephritis in the UK Chinese KRT population compared to the White population requires further investigation.

The increased rates of PD in UK Chinese patients may be associated with lower average Body Mass Index (BMI) in the Chinese population. The quantity of missing BMI data in the UKRR dataset prevented investigation of this association. Studies from Hong Kong have suggested that high transporter status is less common and lower dialysis volumes are required in their population. It would be beneficial to elucidate whether this is also the case in UK Chinese patients.

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A snapshot survey to look at UK dietetic practice with respect to the dietetic management of patients with co-existent diabetes mellitus (DM) and end stage renal disease (ESRD)

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ESRD is a recognised complication of DM; this combination of diseases represents a unique set of challenges for dietetic practice, with a perception that dietary advice may be conflicting, leading to possible confusion for patients and healthcare providers alike. Within the NHS, there are specialist dietitians for both DM and ESRD, with potential inefficiency because patients may be sent to see both subspecialist dietitians. This survey was designed to explore this complex area to see if there is an unmet need.

A questionnaire designed to answer key questions regarding dietetic management of DM and ESRD was distributed to Renal Nutrition Group (RNG) members via an online survey tool, and paper copies were distributed at an RNG meeting. The survey was open between October 2019 and January 2020. The survey covered perceived knowledge of ESRD and DM, the perceived need for, and details of, existing joint specialist ESRD and DM dietetic posts, and how joined-up the care was for people with CKD and DM in their trust. There was an opportunity to provide comments and share examples of excellent care. Results were collated, and basic statistical analyses were performed using an excel spreadsheet.

There were 67 completed questionnaires (38 online, 29 paper copies) from 37 different hospitals within the British Isles, of which 65 were evaluable after initial analysis. Two responses were excluded as they were more than 90% incomplete. For each question there was a small variation in denominator which is reflected in the calculations, and this occurred because not all questions were answered clearly. Five hospitals have joint renal diabetes posts, and these vary between band 6 and 7. Not all gave specifics on WTE but this varied between 0.1WTE and 1WTE. Results are enclosed in Table 1.

Table.

There were a few examples of good practice and some common themes: a need for “renal diabetes” dietitians; lack of confidence within renal dietitians in complex areas of DM e.g. insulin pumps, continuous glucose monitoring, and labile DM; need for more education for renal dietitians in DM diet and medicine; a lack of joined up working in all aspects of ESRD and DM management including a need for renal DM specialist nurses.

The number of surveys and geographical representation adds weight to this study and most respondents indicate they manage patients with coexistent ESRD and DM.
In summary the survey identified the following key findings:
Whilst confidence was moderate in managing this patient group, respondents indicated a need for increased educational sessions for this area of dietetics.
Joint specialist renal DM posts are rare, but many respondents feel strongly there would be patient benefits and efficiencies to be gained with resources for such a post. This highlights the need to explore investment in this area.

Few dietitians can prescribe and alter insulin doses, this could be an area that adds value in the future as the number of supplementary prescribing dietitians increase.
There is room for improvement in joined up care for these patients across the ESRD and DM teams.

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Implications of Hemodialysis Access Surveillance on Reducing Risk of Access Thrombosis: A Meta-analysis of Randomised Studies

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Introduction:
Published studies have shown conflicting results of the utility of access flow monitoring in reducing the risk of dialysis access thrombosis. We conducted a meta-analysis of the published randomized controlled trials of AV access surveillance using access blood flow monitoring. The aim was to assess whether this method can reduce the risk of hemodialysis access thrombosis or not.

Methodology:
We conducted a systematic review in Pubmed, Medline, and EMBASE database to identify randomized studies that assessed the effect of hemodialysis access surveillance on the risk of thrombosis. Data collected were the name of the first author, journal title, year of publication, the country where the study was conducted, number of patients in access surveillance arm and the no-surveillance arm, number of patients who had dialysis access thrombosis in each arm. A fixed-effects model was used for the meta-analysis.

Results:
1127 abstracts were reviewed. 10 randomized studies were included in the meta-analysis. The total number of patients included in the analysis was 904. The estimated overall pooled risk ratio was 0.75 (confidence interval ranges from 0.59 to 0.94) favoring access surveillance. We performed a subgroup analysis among those who had AV fistulas. Among this subgroup, the estimated overall pooled risk ratio was 0.55 (confidence interval ranges from 0.37 to 0.84) favoring access surveillance.

Conclusion:
Hemodialysis access surveillance using access blood flow monitoring is an important and recommended method in reducing the risk of access thrombosis

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U-Drain for automated peritoneal dialysis: 3 year follow up safety and outcomes

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Objectives
U-Drain is a fixed drainage mechanism for disposal of PD effluent for patients on APD, avoiding the need for draining bags. We present long term follow up data of patient and technique survival, peritonitis and the green dividend
Methods
15 patients were enrolled in this Academic Health Sciences sponsored project commencing November 2016. 8 male, 7 female, aged 57 (34-84) years. Causes of kidney failure were diabetes (6), glomerulonephritis (3) and hypertension (3). There was variation in weight 71 (48-101) kg and body mass index (BMI) 26 (20-39) kg/m2. 4 patients were active on the kidney transplant waiting list.
Patients and staff completed an anonymised questionnaire: 14 themes including ease of installation, tolerability, advantages and issues arising.
The Peritoneal Dialysis Dependency Score, a validated measurement of global patient performance was undertaken regularly.
Peritonitis episodes, admissions and modality changes were regularly reviewed by the MDT
Results
MDT review noted no delays to diagnosis of peritonitis or increased incident in comparison to the unit's APD population.
No patient modality change was associated with U Drain and patients actively wished to continue using it.
5 patients remain on U Drain after 3 years, peritonitis free.
Peritonitis was experienced by 5 patients, total 7 episodes
Modality changes: 4 deaths, 3 transplants, 2 transfers to haemodialysis
Questionnaire results indicated a high level of patient and staff satisfaction with installation and function.
Feedback was provided on flushing and maintenance.
Over 100kg clinical waste have been avoided.
Conclusions
This project demonstrates the long term safety and tolerability of U-Drain. No delays or infectious complications were found. Patients appreciated the reduced amount of consumables to dispose of and not having to empty drain bags.
Removing the requirement for drainage bags significantly reduces the volume of clinical waste for disposal and single use, non-recyclable plastic.
The data support offering U-Drain to support home dialysis therapy to patients in the pre-dialysis and established dialysis populations, improving quality of life in a safe and ecologically sustainable manner.

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Access to kidney transplantation in the UK Chinese population: a UK Renal Registry analysis

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Background
Previous UK Renal Registry (UKRR) analyses have shown ethnic disparity in access to kidney transplants in the UK, but access to transplantation for the UK Chinese population has not been investigated
In this UKRR analysis, we compared the likelihood of kidney transplantation between the UK White and UK Chinese renal populations, aiming to investigate whether there was evidence of ethnic disparity in access to kidney transplantation for this specific ethnic group.

Method:
Data on all adult patients >=18 years who started kidney replacement therapy (KRT) between 1/1/97 and 31/12/16 were extracted from the UKRR. Patients with ethnicity recorded as anything other than "Chinese" or "White", or with ethnicity data missing were excluded. Patients aged >=75 years at start of KRT were excluded because of the high prevalence of comorbidity which decreases the likelihood of transplantation and the very small proportion of patients receiving a kidney transplant in the UK in this age group. Socioeconomic status (SES) was measured using country-specific Index of Multiple Deprivation quintiles derived from patient postcodes (1=most deprived, 5=least deprived).
The independent variable of interest was Chinese ethnicity (Chinese vs White). Multivariable logistic regression models were used to investigate the relationship between Chinese ethnicity and being listed on the deceased-donor transplant waiting list i)at start of KRT ii)2 years after start of KRT iii)pre-emptive kidney transplantation, iv)kidney transplantation at 3 years after start of KRT, and v)living-donor kidney transplantation. The models were run unadjusted and then adjusted for the confounders, specified a priori, age, sex, primary kidney disease and SES. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated using robust standard errors to account for clustering by kidney centre.

Results:
The dataset comprised of 92,857 incident KRT patients. 0.5% (n=501) were of Chinese ethnicity, 76% (n=70,575) were White. The findings of the multivariable logistic regression analyses are presented in Table 1. Even after adjustment for potential confounders UK Chinese patients had lower odds of being waitlisted at the start of KRT (OR 0.71, [95% CI 0.54-0.94]) but were more likely to be waitlisted at 2 years (OR 1.28, [95% CI 1.02-1.61]) compared to White patients. UK Chinese individuals were also less likely to receive a pre-emptive kidney transplant (OR 0.47, [95% CI 0.29-0.78]), less likely to be transplanted within 3 years of starting KRT (OR 0.69, [95% CI 0.52-0.92]) or have a living-donor kidney transplant(LDKT) (OR 0.39, [95% CI 0.26-0.59]) compared to White patients.

Conclusion:
This is the first study that has shown that UK Chinese kidney patients are less likely to receive a living or deceased-donor kidney transplant. Future research needs to test whether later presentation or more rapid progression of kidney disease could explain these observations. The higher odds of transplant listing at 2 years suggests fitness for transplantation is not a significant barrier. The reasons why this ethnic group are

less likely to receive a LDKT are not well understood. Understanding whether these disparities reflect modifiable policy, health system or donor/recipient level barriers will help ensure equitable access to transplantation.

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Glucagon-like peptide 1 (GLP-1) receptor agonists in overweight patients with type 2 diabetes with and without CKD

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Introduction
Recent evidence suggests that GLP-1 agonists (Liraglutide and Dulaglutide) improve renal and cardio-vascular outcomes in patients with diabetic kidney disease. In this work, we describe single centre experience of 75 patients with Type 2 diabetes on GLP-1 agonist attending diabetes or diabetes-renal clinics. We assessed glycemic control, weight and kidney function in patients with and without CKD before and after commencing GLP-1 agonist.

Methods
This was a retrospective cohort study. Patient demographics: n=75, 44 female, 31 males. Mean age 63 ± 1.25 years, Ethnicity-18 Asian, 16 Black, 40 white and 1 other. The majority of patients were on Liraglutide (n=62), 5 were on Exenatide (Bydureon), 7 on Exenatide (Byetta), 1 on Lexisenatide. 48 patients (64%) had eGFR >60, 18 patients (24%) were in CKD G3, 3 were in stage G4 (4%), no eGFR data available on 6 subjects. There were 21 patients (28%) with eGFR <60. We analysed weight, HbA1C and eGFR before and after (6m and 12m) starting GLP-1 agonist.

Results
Patients with eGFR >60: Weight before starting GLP-1 agonist: Mean 98.6 kg (92.10-114.9 kg), 6m post initiation of GLP-1 agonist- Mean 96.6 kg (88.5-109.7 kg, P <0.001), 12m post initiation of GLP-1 agonist-96.1 Kg (87.0-109.3 Kg, P <0.001).
Glycemic control: There was significant reductions in HbA1C both at 6m and 12m (Pre HbA1C-67.5mmol/mol (58-85.5), 6m post 66 mmol/mol (53-80, P <0.05), At 12m: HbA1C-61.0 mmol/mol (51.0-75, P <0.05).
Patients with eGFR <60: Weight loss after 6m was not significant (Mean pre wt-100.7 ±4.37 Kg, Mean post Wt 98.7± 4.5 Kg, P=0.72). In this group, weight loss at 12m was significant (Pre wt 100.7 ±4.37Kg, post wt 97.0±5 Kg, P <0.05).
Glycemic control: Pre HbA1C 69 mmol/mol (64.5-87.0), 6m post 69.5 mmol/mol (56.8-76.3, P= 0.46); 12m post -69.5 mmol/mol (51.5-82.8, P=0.3).
Kidney function: There was no difference in kidney function assessed by eGFR 6m and 12m after initiation of GLP-1 agonist.

Discussion
In this cohort, GLP-1 agonist treatment resulted in significant reduction in weight and HbA1C at 6m and 12m in patents with eGFR >60 but in those with baseline eGFR of <60, significant weight reduction was only seen at 12m. Significant reductions in HbA1C seen in patients with eGFR >60 was not seen in patients with eGFR <60 at both time points. This could be due to smaller patient numbers in eGFR <60 group. There was no difference in eGFR before and after commencement of GLP-1 agonist. We could not demonstrate beneficial effect of GLP-1 agonists in patients with CKD apart from weight loss 12- month post initiation.

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Pre-emptive renal transplantation versus transplantation after a period of dialysis in paediatric patients: a systematic review and meta-analysis

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Introduction: Kidney transplantation is the treatment of choice for many patients with end-stage renal disease. However, whether or not dialysis prior to kidney transplantation in children should be avoided at all is still unclear. Research has reported mixed findings on whether pre-emptive kidney transplantation (PKT) is associated with better outcomes when compared to kidney transplantation after a period of dialysis (nPKT). The aim of the study was to systematically review the clinical outcomes of PKT versus nPKT in paediatric patients.

Methods: A bibliographic search was carried out using free text and controlled vocabulary terms to search the following databases: EMBASE, MEDLINE (OvidSP), PubMed Publisher, Cochrane Central Register of Controlled Trials (CENTRAL), Cinahl, Web-of-science and Google Scholar. Studies that compared first or subsequent, living or deceased donor PKT versus nPKT in paediatric patients were included. Any study design was included except for case reports as long as the study reported any of the predefined clinical outcomes, including patient and graft survival, delayed graft function and acute rejection. The screening, selection of articles for inclusion, quality assessment and data extraction were carried out by two independent reviewers. The Downs and Black Checklist was used for assessing the methodological quality. Where possible, data were combined using the random-effects model to produce a summary estimate and 95% confidence interval (CI). The I^2 statistic was calculated to assess heterogeneity. The review was registered with PROSPERO [CRD42014010565].

Results: The search identified a total of 4,743 unique references and 21 studies met the inclusion criteria. A total of 20,800 paediatric patients were included in the analysis, of which 5,044 (24.3%) received PKT and 7,540 (36.3%) had a living donor kidney transplant. The study designs included registry analyses, retrospective cohorts, and case-control and cross-sectional studies with a follow-up range of 1-20 years. The methodological quality varied between studies and the quality scores ranged from 10 to 19 out of a maximum score of 28. The meta-analyses comparing PKT versus nPKT revealed that there was no difference in the risk of patient death (9 studies; Relative Risk (RR) 0.68; 95% CI 0.41-1.13; I^2 =41.5%) and delayed graft function (3 studies; RR 0.57; 95% CI 0.22-1.50; I^2 = 81.5%). However, the risk of graft loss was significantly lower in PKT compared to nPKT (15 studies; RR 0.58; 95% CI 0.50-0.68; I^2 =51.1%). There was a trend towards a reduction in the risk of acute rejection (7 studies; RR 0.77; 95% CI 0.58-1.03; I^2 =77.7%) in PKT patients. Moderate to substantial levels of heterogeneity between studies were observed and subgroup analyses were conducted to explore the reasons for heterogeneity. Limiting analysis to studies that corrected for confounding variables yielded similar results to the overall analysis.

Conclusion: PKT in paediatric patients appears to be superior to non-PKT with regards to graft loss. No differences were found in terms of patient death, delayed graft function and acute rejection.

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Day case per-cutaneous kidney biopsy with interventional radiologist; experience in a District General Hospital.

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Percutaneous kidney biopsy is a gold standard procedure not only for tissue diagnosis of intrinsic renal disease but also to determine the type of treatment and to prognosticate renal disease based on pathological findings. Various guidelines have emphasized the need to minimize harm and increase yield during kidney biopsy. According to the Society of Interventional Radiology Consensus Guidelines, it is classified as high risk bleeding procedure. Most kidney biopsies are done by nephrologists. Post-biopsy complication is high in centres with low volume of kidney biopsy procedure. Kidney biopsy is done by interventional radiologists in our centre. We present our experience over 3 years.
Methods: It is a retrospective review of native kidney biopsies carried out in our centre from January 2017 to November 2019. We reviewed the medical notes, laboratory and histological reports of these patients.
Results: There were 33 kidney biopsies performed of which 2 (6.8%) were in-patients. We were able to get complete information on 29 patients. Mean age was 61±14.8 years and 55.2% were males. Proteinuria was the commonest indication and 16% had acute kidney injury. Mean serum creatinine was 160.4±98.75µmol/l. Mean haemoglobin was 130.5 ±19.08 g/L while platelet count was 293.5±93.28cells/l and INR 0.97±0.13. Median number of glomeruli was 29 (range of 5-104). Only in 2 samples were the glomeruli count less than 10. In 62% of kidney biopsies performed, 18G needle was used. Focal segmental glomerulosclerosis was the most common histological finding in 39.3% followed by diabetic glomerulosclerosis in 17%. None of the patients received desmopressin acetate (DDAVP). We reported no significant complications in our kidney biopsy cohort.
Conclusion: We conclude that kidney biopsy procedure is safe in secondary health care system and consideration should be given to increasing performance of the procedure by radiologists.

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Acute Kidney Injury in a national cohort of children: epidemiology and outcomes using linked electronic health record data

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Background: Acute Kidney Injury (AKI), defined as a sudden decline in renal function, is associated with significant morbidity in children including hospitalisation, intensive care admission and risk of death. Early detection and intervention are key to preventing progression. To date, few data exists regarding the incidence and clinical course of AKI in children. In 2014, NHS England issued a national patient safety alert, requiring hospitals to issue electronic warning scores for AKI using serum creatinine as a clinical indicator. NHS laboratories are required to report this data to the UK Renal Registry (UKRR). The aim of this project is to describe a national cohort of children who received an AKI warning and their clinical course.

Methods: AKI warning alert data was reported to the UKRR between 01/01/2017 and 31/12/2017. Severity of AKI (stages 1-3) was based upon 1.5-2, 2-3 and >3-fold increases from the age-specific upper limit of the reference interval respectively. Linkage to Hospital Episode Statistics (HES) data was undertaken to determine the hospitalisation rate, length of stay (LOS) and outcomes including admission to paediatric intensive care, use of renal replacement therapy and death within 30 days.

Results: Over a period of 12-months, 8472 children had 9720 episodes of AKI identified by 102 laboratories. The median age was 4.4 years (IQR 0.9 – 11.5), 53% were male. Children <2 years constituted over a third of the total cohort (34.5%), with 25% <1 year. Just over half of all AKI episodes (55.6%) were associated with a hospital admission, of which 44.4% (n=2400) were hospital-acquired episodes (alert 3+ days into admission): most (89.7%) had one episode of AKI. The median LOS was 8 days (IQR 3-18 days): there was strong evidence for increasing LOS by increasing peak AKI stage on crude analysis ($p<0.001$) but not by AKI stage at initial alert. LOS was also significantly higher for hospital acquired AKI episodes (median LOS community-acquired 4 days, hospital-acquired 15 days, $p<0.001$).

Of the total cohort, most (80.4%) had an initial AKI alert of stage 1, 12.6% in stage 2 and 7.0% in stage 3. Within 30 days, the proportion of children with peak AKI stages 1, 2 and 3 were 70.6%, 17.9% and 11.6% respectively. There were 320 deaths within 30 days of AKI alert; over half were children aged <2 years (58.4%). Mortality directly correlated with peak AKI stage ($p<0.001$) and decreased as age increased ($p<0.001$). Among infants <1 year, a higher proportion of deaths were seen for all AKI stages.

Conclusion: This study highlights that over half of all AKI alerts in UK children were associated with a hospital admission, with the majority community acquired in nature. Young children contribute significantly to the AKI burden and associated mortality, highlighting the importance of early identification and treatment. As higher peak AKI stage and hospital acquired injury were associated with longer LOS, inpatient-based interventions to prevent progression may minimise the AKI-related morbidity in children and be cost-effective to healthcare providers.

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“Haemodialysis is nothing like it was portrayed”. An exploration of shared-decision making in haemodialysis initiation.

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Background
Older, unwell patients often have multiple comorbidities and decisions about treatment options can be complex1. As part of the ePISTLE (Perceptions of Illness Severity, Treatment goals and Life Expectancy) study, we sought to explore whether patients felt they were involved in shared decision-making when starting on haemodialysis, their subsequent reflections and experiences of treatment.

Methods
Seriously unwell patients at three hospital-based haemodialysis units were invited to take part in the study. ‘Seriously unwell’ was defined as a 1-year mortality risk of >20%2. Patients were invited to take either part in a semi-structured interview or to complete the same questions independently via a questionnaire. Ethical approval was granted (18/LO/1386).

Results
“I didn't particularly want to do it. You think it's going to make you feel better but I've found it really debilitating. Sometimes you have good days but a lot of the time I'm existing rather than living at the moment. “

43 patients were recruited into the study (14F, 29M). The median age of participants was 76 years (interquartile range, IQR 65-83) and they had been on dialysis for a median of 34 months (IQR 20-56). 37 patients took part in a semi-structured interview, 6 patients chose only to complete the questionnaire.

Only 29/43 (70%) felt that they had been actively involved in the decision to start dialysis. Patients who did not feel involved in the decision-making process were significantly more likely to regret starting dialysis and wish they had opted for conservative care (p=0.03).

“The lack of freedom, the quality of life. Not being able to do things I would want to do. Not being able to work. Not being able to travel. I would have done anything I could to avoid dialysis.”

Analysis of the factors considered when starting dialysis has revealed four major themes: lack of choice (n=19), a desire to stay alive (n=11), symptom control (n=7) and family pressures (n=5) (Table 1). Despite a perceived lack of autonomy in dialysis initiation, 12/19 patients citing lack of choice felt actively involved in the decision-making process (63%). In these patients, the perceived beneficence of treatment may have outweighed the lack of control they felt at the outset of therapy.

5 patients in this study would choose no dialysis if they could go back in time. Most patients (n=22, 51%) were happy with hospital haemodialysis (reasons given included reassurance, perceived safety of the hospital environment and social aspects). 16 patients (37%) would prefer a home-based treatment modality (home haemodialysis or peritoneal dialysis). The most common reason cited for this was difficulties with patient transport.

Conclusion

Whilst over nearly half of the patients involved reported having no choice in the decision to start dialysis, nearly two thirds of these patients felt actively involved in the decision-making process. This highlights the importance of the manner in which dialysis initiation is managed. Actively involving and empowering patients in the decision-making process may result in less regret amongst older hospital haemodialysis patients.

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Investigating reasons for ethnic inequity in living donor kidney transplantation in the UK: a mixed-methods analysis of a multicentre questionnaire-based study

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Background

A living-donor kidney transplant is one of the best treatments for kidney failure, yet in the UK there is evidence of ethnic inequity in access. We designed this questionnaire-based mixed-methods study to investigate the patient-reported reasons that family members of Black, Asian and Minority Ethnic group (BAME) individuals were not able to become living kidney donors.

Method:

This questionnaire-based case-control study included 14 UK hospitals. Participants were adults transplanted between 1/4/13-31/3/17. Participants provided data on all relatives aged >18 years who could have been potential living kidney donors. Participants were asked for the reasons why relatives could not donate: individuals were asked to tick all options that applied from a list of reasons (Age; Health; Weight; Location; Financial/Cost; Job; Blood group; No-one to care for them after donation) and a box was provided for free-text entries following the option 'Other-please give details'. Multivariable logistic regression was used to analyse the association between the likelihood of selecting each reason for non-donation and participant ethnicity (binary variable White versus BAME). 56/171 BAME respondents provided free-text responses and all were analysed. Qualitative responses were analysed using thematic analysis.

Results:

1,240 questionnaires were returned from 3,103 patients (40% response). There was strong evidence that after adjustment for potential confounders sex, age and socioeconomic position, BAME individuals were more likely than White respondents to indicate that family members lived too far away to donate (adjusted odds ratio (aOR) 3.14 [95% Confidence Interval (CI) 2.10-4.70]), were prevented from donating by financial concerns (aOR 2.25 [95% CI 1.49-3.39]), were not able to take time off work (aOR 2.05 [95% CI 1.36-3.09]), and were not the right blood group (aOR 1.47 [95% CI 1.12-1.94]). Four qualitative themes were identified from free-text responses from BAME participants: a)Burden of disease within the family b)'Unorthodox' religious beliefs c)Specific geographical concerns (healthcare provision, visa difficulties) and d)Knowledge handling. The theme 'Knowledge Handling' incorporated three subthemes: i)Need for more detailed knowledge, ii)Protected disclosure of health status, and iii)Recipient assumptions about potential donor knowledge.

Conclusion:

We have identified multiple barriers to living kidney donation in the UK BAME population, which should be further investigated and addressed. BAME transplant recipients were more likely to report that potential donors were not the right blood group: work should be undertaken to ascertain if this reflects true ABO-incompatibility or misunderstanding. Potential donors living outside the UK is a major barrier, related to

difficulties with accessing visas and concerns about a specific country's healthcare system's capacity for longer-term post-donation care. The financial barriers reported may disproportionately affect overseas donors who, although entitled to reimbursement for travel, accommodation and visa costs, may incur large "up-front" costs which may be prohibitive. No respondents reported that a major religion's position on living donation was a barrier to donation. However, there were several references to family members holding beliefs described as 'distorted' religious beliefs: this highlights the need to understand the beliefs of potential donors who belong to non-mainstream religions, which may be out of the remit of denominational faith leaders.

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Developing a Renal Teaching Programme for International Medical Elective Students

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Medical electives are a core part of the medical school curriculum and provide an opportunity for medical students to experience another culture and study medicine in another country. Despite this, there is little information available on the development of teaching programmes for elective students.

In view of this, an innovative teaching programme was developed for 21 visiting medical elective students from 12 countries who were placed across a range of clinical specialties in Leeds Teaching Hospitals NHS Trust. Over the course of their four week placement, students were timetabled to attend weekly teaching sessions in the Undergraduate Centre. The first session was designed to allow the students to discuss their different backgrounds and educational experiences and encourage them to set some aims for their placements. The following teaching sessions delivered a renal teaching programme focussed primarily on acute kidney injury (AKI). The teaching sessions included interactive lectures, clinical skills and simulation teaching. Students were asked about any prior teaching they had received on AKI in their home institutions and pre- and post-teaching questionnaires were completed to establish the confidence of students across a range of domains. These included understanding of the risk factors, causes, assessment and management of patients with AKI as well as recognition and management of the complications of this condition.

The medical students had received variable preparation for their elective from their home institutes prior to travelling. The aims of the elective students varied greatly and included experiencing a different healthcare system and culture, meeting new people and developing their English language skills. All students had previously received teaching on AKI; this was delivered at some stage between the second and the final year of their studies at their home university. Similarly, there was considerable variation as to when students had their first patient contact, also ranging from the second to the final year of their medical degree. The majority of students (63%) had received teaching on AKI using a mix of modalities including lectures, tutorials and teaching on clinical placements. The remaining students received lectures only. Pre- and post-teaching questionnaires from the students indicated that their confidence levels improved across all domains following the teaching sessions on AKI compared to confidence levels prior to this. Feedback was positive with all sessions rated ‘good’ or ‘excellent’. Evaluation of the elective placements demonstrated the value placed by students on the teaching sessions in not only improving their knowledge and clinical skills but also in developing their understanding of the healthcare system and gaining confidence. The teaching programme supported them in meeting some of their aims which may not have been possible otherwise.

In conclusion, the renal medicine elective student teaching programme allowed visiting students to meet other students in a protected and relaxed environment. The students were able to determine their aims and maximise the learning opportunities available to them during their elective placement. Finally, the students’ clinical skills and understanding of AKI also improved as a result of the teaching programme.

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Identifying Acute Kidney Injury in children: comparing clinical indicator alerts with electronic health record data

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Background: Acute Kidney Injury (AKI), defined as a sudden decline in renal function, is associated with significant morbidity in children including hospitalisation, admission to intensive care and risk of death. Early detection and intervention are key to preventing disease progression: often serum creatinine and/or urine output serve as indicators for evolving AKI. In 2014, NHS England issued a patient safety alert, requiring hospitals to issue real-time electronic warnings for AKI using a rising serum creatinine as a clinical indicator. NHS laboratories are now required to report all AKI warning data to the UK Renal Registry (UKRR). The aim of this project was to determine whether identification of AKI in children and young people (CYP) using a rising serum creatinine could be validated using linked electronic health record (EHR) data.

Methods: AKI warning alert data received by the UKRR between 01/01/2017 and 31/12/2017 was examined for CYP aged <18 years. AKI severity (stages 1-3) was defined by 1.5-2, 2-3 and >3-fold increases from the age-specific upper limit of the creatinine reference interval respectively. Where possible, linkage to Hospital Episode Statistics (HES) data was performed to determine whether AKI warning alerts could be validated against AKI codes within the EHR. Funnel plots were constructed to explore differences in the proportion of cases with HES-validated AKI by centre and AKI alert stage. Comparisons were also made with adult data.

Results: Over a period of 12-months, 5407 patients received an AKI warning alert and had a related hospitalisation documented in HES. The median age was 5.1 years (IQR 1.6-12.3), 52.5% were male, 78.9% white ethnicity and 27.8% were under 2 years of age at initial alert. Of these, 1008 (18.6%) were diagnosed at paediatric-specific hospitals; 2927 (54.1%) cases were seen at hospitals offering nephrology services (adult and/or paediatric).

Overall, few paediatric patients with an AKI warning result were validated through HES-linkage (20.8%). This finding correlated with AKI severity: a lower proportion of CYP with an AKI stage one alert were validated in HES compared with stage three (mean 15.6% versus 40.1%, $p<0.001$). Considerable differences in the proportion of HES-validated AKI cases were also noted comparing paediatric with adult patients: 3.2%, 12.3% and 24.3% of children with AKI stage 1, 2 and 3 alerts were coded in HES compared with 18.1%, 28.3% and 44.8% in adults respectively ($p<0.001$). No differences were seen in the proportion of validated AKI alerts by age-group or gender.

Conclusion: AKI alerts using a rise in creatinine from baseline are poorly validated in CYP using linked HES data. This is particularly true for CYP with stage 1 AKI alerts, highlighting that cases are not being recognised and documented within the EHR. Use of HES to identify CYP with AKI may under-estimate the incidence of AKI, particularly of lower stages. It is unclear how accurate serum creatinine AKI alerts are, particularly for young children experiencing rapid growth changes. Further work is required to determine the diagnostic utilities of AKI warning alerts using population-level data.

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Role of Plasma exchange in hypertriglyceridemia-induced acute pancreatitis

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Description: Hypertriglyceridemia accounts for up to 10% of all acute pancreatitis episodes1. The role of plasma exchange (PEX) in reducing triglycerides (TG) was first reported in 1978 by Betteride et al2. There is sparse evidence in the role of PEX in hypertriglyceridemia-induced pancreatitis (HTG-AP).

It has been reported that a single session of PEX can reduce TG levels by up to 70%, with clinical and laboratory improvement2. However, Chen et al. found no statistically significant improvement in mortality or morbidity with PEX3. He et al found that high volume filtration can reduce TG more efficiently than LMWH and insulin therapy, although not superior in terms of clinical outcomes and costs4.

There is minimal data regarding choice of replacement fluid but historically fresh frozen plasma (FFP) and Human Albumin solution (HAS) have been used5. Gubensak et al found no difference in mortality in patients who received PEX early (<36 hours after onset of pain) vs. late6.

We present two cases of severe HTG-AP requiring PEX.

Case one: A 34 years old obese Romanian male, with no known co-morbidities, presented with acute epigastric pain. He was diagnosed with radiologically confirmed acute severe pancreatitis secondary to hypertriglyceridemia (normal range amylase) leading to diabetic ketoacidosis. Initial blood tests done were reported as 'lipaemic'. An admission serum triglyceride done was 63.6mmol/L (normal range 0.4–1.9mmol/L) and had risen to 81.1mmol/L within 24 hours (with a total cholesterol level 24.2mmol/L; normal range <5.1mmol/L).

He was initially admitted to the intensive care unit (ITU) and managed supportively with analgesia, fluid resuscitation and diabetic ketoacidosis protocol. He was started on bezafibrate and atorvastatin. His renal function remained stable throughout.

He was given a single session of PEX with FFP (4L exchanges) on Day 3 of his admission. TG fell to 9mmol/L and subsequently to 3.0mmol/L. Cholesterol improved to 2.3mmol/L. He clinically improved after a 10-days hospitalisation.

Case two: A 34 years old Asian man, with multiple co-morbidities, presented with abdominal pain and vomiting. His background includes long-standing hypertriglyceridemia, dyslipidaemia, hypertension, type 2 diabetes mellitus, obesity and two previous episodes of pancreatitis (presumed hypertriglyceridemia induced). His initial TG and cholesterol were 74 mmol/L((normal range 0.4 – 1.9mmol/L) and 14.5 mmol/L (normal range <5.1mmol/L) respectively. He was already on fenofibrate and atorvastatin.

He was diagnosed with HTG-AP, with associated sepsis, paralytic ileus and acute kidney injury Stage 3. He was started on Omacor (Omega-3). He required 2 ITU admissions for continuous venovenous hemofiltration during his 14 days hospital stay. He received 2 sessions of PEX with HAS 4.5% (4L exchanges) on Day 5 and

Day 8. His TG levels improved to 13.8mmol/L after the first session and to 5.8mmol/L after the subsequent PEX. He clinically improved, with recovery of his renal function.

Both patients were followed up in lipid clinic.

Conclusion: These 2 cases demonstrate that PEX was effective in lowering TG and cholesterol in HTG-AP, with favourable clinical outcome, using two different replacement fluid. The number of PEX sessions was guided by their clinical condition and laboratory improvement.

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Incidence of Skin Cancer – A Long Term Outcome of Immunosuppression in Renal Transplant Recipients Associated With The Usage of Azathioprine

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Background: The main cause of mortality in Kidney Transplant Recipient's is malignancy. The cancer incidence is increased by treating with immunosuppressive agents and longer grafts survival of kidney. Multiple studies have indicated that there is an increased incidence of melanoma and non-melanoma skin cancer in immunosuppressed Kidney Transplant Recipient's(KTRs).

Methods: This is a long term retrospective single centre study to evaluate the incidence of skin cancer, comprising of about 941 patients who had transplants between 1998 to 2018 at University Hospital Coventry and Warwickshire NHS Trust (UHCW) with a follow up period of 1 to 20 years. The average dose of immunosuppressant Azathioprine administered to study subjects was calculated with the range of 6 months, 1, 5, 10, 15 and 20 years respectively. The standard maintenance dose of Azathioprine was 50-125mg daily by clinical guidelines of UHCW NHS Trust. As per clinical guidelines by UHCW, KTRs who received standard dose i.e. 25-100mg were included in low dose group and the dose greater than or equal to 100mg were under high dose group. The demographic and clinical characteristics of patients (such as gender, age at transplantation, ethnic group and type of transplant) and biopsy results of the KTR's were obtained from the Clinical Results Reporting System (CRRS) and Proton; and patients with histologically proven skin cancers and pre cancers as well as post-transplant lymphoproliferative disorder (PTLD) and other skin disorders were identified. A Chi- Square test of independence was used to compare the association of skin cancer incidence with high and low dose of Azathioprine in KTRs with characteristics of patients such as gender, ethnic group, type and transplant and age of transplant.

Results: Out of 941 patients, KTRs excluded from the study were 77 (KTRs) with incomplete data or no data, 10 had pre-transplant skin cancer diagnosis [these includes Actinic Keratosis (AK) and Bowen's Disease (BD)] and 425 KTRs who did not receive immunosuppression therapy with Azathioprine at any point and 170 KTRs who received a combination of Azathioprine and Mycophenalate Mofetil at some point during the follow up period. As a result, 259 KTRs who received immunosuppression therapy with Azathioprine alone were included in the study. While a total of 34 patients were diagnosed with skin malignancies of which Basal Cell Carcinoma (BCC) (8), Squamous Cell Carcinoma (SCC) (8), Kaposi Sarcoma (1), patients with both BCC and SCC (7), Post Transplant Lymphoproliferative Disorder (PTLD) (2) and Pre-cancers (8). Among the KTRs with confirmed skin cancer diagnosis, 28 received Azathioprine low dose [25-100mg] and 6 received Azathioprine high dose [≥100mg].

Conclusion: Based on the findings it concludes that Azathioprine was associated with a significant risk in the incidence of skin cancer. The immunosuppressive regimens which were widely used in earlier years carry out risks for carcinogenicity after kidney transplantation. Long-term follow up and patients on Azathioprine after transplantation resulted in significant impact on the incidence of skin cancer.

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Sodium zirconium cyclosilicate (SZC) for treatment of chronic hyperkalaemia in order to maximise inhibition of renin–angiotensin–aldosterone system (RAAS) – what is the impact in the general nephrology clinic?

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Introduction
RAAS inhibitors provide significant benefits including slowing deterioration of kidney function in patients with diabetic or proteinuric kidney disease, improved outcomes for patients with heart failure with reduced ejection fraction and patients with ischaemic heart or cerebral vascular disease. Patients receiving maximal RAAS inhibition achieve the greatest response but some patients are unable to tolerate this because of hyperkalaemia.

The recently published National Institute for Health and Care Excellence (NICE) technology appraisal guidance recommended using SZC for outpatients with persistent hyperkalaemia and chronic kidney disease (CKD) stage 3b to 5 or heart failure with reduced ejection fraction, who are not taking an optimised dosage of RAAS inhibitor because of hyperkalaemia. It is important to determine the proportion of patients who would benefit from SZC to support implementation of local guidelines in clinical practice and understand the potential cost of such treatment.

Methods
One hundred sequential patients in a general nephrology clinic with non-immune and non-dialysis chronic kidney disease had their electronic records reviewed, identifying those with an indication for RAAS inhibition. This included 1) CKD with proteinuria (urine PCR >100), 2) CKD due to diabetes mellitus, 3) heart failure with reduced ejection fraction and 4) CKD in combination with either ischaemic heart or cerebrovascular disease. If these patients were not on maximal RAAS inhibition, then a documented reason was searched for. If no reason was documented, the patient's results were assessed to identify hyperkalaemia, defined as documented serum potassium level >6.0mmol/litre or persistently > 5.5mmol/litre. Where hyperkalaemia had occurred acutely it was only labelled a contra-indication for RAAS inhibition if it occurred without an associated episode of acute kidney injury (AKI). In cases where hyperkalaemia limited dosage of RAAS inhibition it was determined whether these patients had received measures to reduce hyperkalaemia including optimisation of bicarbonate.

Results
Of the 100 consecutive patients audited, 46 were female and 54 were male. The mean patient age was 64 and the mean estimated glomerular filtration rate (eGFR) was 33. 68 patients had an indication for being on RAAS inhibition with only 10 on a maximal dose. Of the remaining 58 patients, 26 (45%) were limited by hyperkalaemia. Furthermore 12 of these patients (46%) had hyperkalaemia associated to an episode of AKI. 20 of the 26 patients had their bicarbonate levels optimised to reduce hyperkalaemia. Therefore 14 patients were identified suitable for SZC.

Discussion
A significant proportion (14%) of patients attending a general nephrology outpatient clinic were not on optimum RAAS inhibition due to hyperkalaemia. It is possible that with appropriate treatment, using sodium

bicarbonate, this number may decrease, but this still leaves a significant number of patients who would attain prognostic benefit by using SZC to maximise RAAS inhibition when limited by hyperkalaemia. This audit has implications for renal centres across the UK to support implementation of guidelines for use of SZC and monitoring arrangements. Introduction of SZC would enable a significant number of patients in general nephrology clinics to achieve maximisation of RAAS inhibition and attain the associated long-term benefits.

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The effect of patients' preferred dialysis modality on the first dialysis modality they receive

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Introduction: It is increasingly recognised that home dialysis therapies, such as peritoneal dialysis (PD) or home haemodialysis have better outcomes1. PD, especially now with the availability of assisted PD, provides a better quality of life and preserves the individual's autonomy2. PD preserves residual renal function and compared to in-centre haemodialysis (HD), reduces the financial burden on the healthcare system2. There is now a drive towards a shared decision making, where the importance of patients' engagement in determining the goals of treatment and decisions regarding their management is recognised3. Despite this, Renal Registry data showed that only 5.4% received PD compared to 37.3% on in-centre HD (hospital and satellite)4.

The aim of our study was to identify what proportion of pre-dialysis patients who had chosen PD at the time of assessment received PD as their first dialysis when compared to patients who were undecided

Methods: We conducted a retrospective observational study of patients with chronic kidney disease (CKD) G4/5 who attended the renal access clinic (to assess suitable access options) in a single UK renal unit from 01/08/2013 to 31/07/2016. Data on baseline demographics, comorbidity, preferred dialysis modality, eGFR and access was analysed on 31/07/2018.

Results: 363 patients were included (234 male and 129 female). Based on the MDRD GFR, 73% had CKD Stage G4 and 26% G5. 44% of patients had diabetes mellitus.

147 patients remain pre-dialysis (out of whom 53 died without renal replacement therapy), 69 had been started on PD first, 97 had been started on HD first, 15 had a kidney transplant before dialysis. 35 others had either opted for conservative care, been discharged to GP, moved home or lost to follow-up.

All patients were found to be suitable for HD access and 68 patients opted for HD. Out of the 324 patients who were deemed suitable for PD, 101 chose PD as their dialysis modality of choice. 194 patients (53% of the cohort) were undecided on what modality they would prefer.

At the time of analysis 51 of the 101 patients who had opted for PD had started PD or HD. 81 of the 194 undecided patients were on dialysis. The remainder were still pre-dialysis, had a transplant or died before requiring dialysis, been discharged, moved address or lost to follow up.

39 patients who had opted for PD had started PD compared to 28 patients of those who were undecided ($p<0.0001$). 12 patients from those who had opted for PD were started on HD compared to 53 of those who were undecided ($p<0.0001$)

There was no significant difference between males and females in choice of dialysis. Patients under 60 were more likely to choose compared to older patients ($p<0.05$)

Discussion: Although a large majority of patients were physically suitable for PD, less than a third chose PD as their first choice for dialysis. Patients who were undecided when approaching ESRD were more likely to start on HD – suggesting the need for better engagement of patients at an earlier stage of their CKD journey.

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Evaluating medication prescribing errors on discharge letters at a UK renal unit before and after implementation of interfaced electronic prescribing and discharge computer systems

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Introduction
Polypharmacy is common in patients with renal disease. This patient cohort is at greater risk of prescribing errors and consequent potential harm from medicines[1]. The provision of poor-quality discharge information about medicines can lead to medication errors, associated adverse events and hospital readmissions[2]. A baseline audit of 83 discharge letters in February 2019 showed 81% of discharge letters contained at least one prescribing error (average of 2.6 errors per letter), with 32% of errors driven by limitations of the PROTON computer system[3] used to generate discharge letters.
The Trust strategic plan to implement electronic prescribing (MedChart) along with the interfaced Sunquest ICE discharge letter system was actuated on the renal wards in October 2019. These systems replaced paper in-patient drug charts and PROTON. A monthly evaluation of prescribing errors was conducted to determine whether the prevalence and severity of prescribing errors on discharge letters were reduced during this transition.

Methods
All discharge letters reviewed by pharmacists from four renal in-patient wards at a UK NHS Trust were collected from July to December 2019, for one-week each month. Prescribing errors identified by pharmacists were recorded and categorised by severity[4] and the categorisation agreed by consensus by two senior renal pharmacists. This was an audit with a pre- and post-implementation study design and ethics approval was not required.

Results
A total of 186 discharge letters were reviewed (July 28, August 32, September 26, October 33, November 27, December 40). Monthly results prior to introduction of the interfaced electronic prescribing and discharge computer systems were comparable to baseline data (Figure 1). After implementation of MedChart and ICE, 46.5% of discharge letters contained at least one prescribing error (average of 0.8 errors per letter) compared to 96.2% of discharge letters (average of 3.0 errors per letter) the previous month. These improvements were sustained in the subsequent two months with 29.6% and 32.5% of discharge letters containing at least one error and an average of 0.4 errors per discharge letter both months.
Post-implementation of MedChart and ICE, there was a reduction in all severity categories of error (Figure 2). Serious errors reduced from an average of 0.5 to 0.1 errors per letter and significant errors from an average of 1.7 to 0.4 errors per letter following implementation. These improvements were sustained in subsequent months.
This study is limited as no discharge letters written by more senior prescribers were encountered during the study period. This study also only included prescribing errors identified on letters reviewed by pharmacists. It is conceivable that discharge letters not screened by pharmacists will include errors that may be not be detected.

Discussion

This study has shown a reduction in prescribing error rates following the introduction of interfaced electronic prescribing and discharge computer systems. Although reduced, serious and significant errors were encountered throughout the study potentially putting patients at risk of negative health outcomes. Our target is to be a zero harm organisation and we aim for this work to form the basis for further quality improvement methodology.

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Vascular Access in a Frail Haemodialysis Population

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Introduction
Current guidelines recommend arteriovenous (AV) access over central venous catheter (CVC) access in haemodialysis (HD) populations. The limitations of this approach are increasingly recognised, and are particularly relevant for frail, co-morbid patients with limited life expectancy. In such patients AV access may incur more invasive procedures, whereas CVC access may incur heightened risks of infection. This study aimed to evaluate the association between HD access modality and access complications, hospitalisation and mortality in a cohort of frail HD patients.

Method
We performed retrospective analysis of prospectively recorded data from the Strathclyde Electronic Renal Patient Record from 01/10/2017 to 21/09/2019. HD patients with a Rockwood clinical frailty scale (CFS) ≥6 were identified with baseline demographic data recorded from the first CFS ≥6 date to census date 21/09/19 or death. We recorded the first vascular access modality at study inception and the modality at the time of census or death. Episodes of TCVC associated sepsis were determined using both clinical diagnosis from patient case records and positive blood cultures.

Results
138 patients were identified with CFS ≥6. Median age was 69 years and 51% were female. Median follow-up was 1.1 years with 48871 observed HD days. 51% patients were deceased at census.

Table 1 illustrates vascular access modality at initial CFS. CVC accounted for the greatest proportion of dialysis access days (52.4%) compared to AVF (38.7%) and AVG (8.9 %).
There was no significant difference in mortality between vascular access modalities over the follow-up period (47.5% CVC; 54.3% AVF; 58.3% AVG, p=0.65).

In total, 5134 HD exposed days (10.5%) were spent as an inpatient, of which 97% were unscheduled. Both AVG (141/1000 HD days) and CVC (109/1000 HD days) were associated with more inpatient bed days than AVF (95/1000 HD days) (p<0.0001). Patients who started with CVC and transitioned to AV access had a rate of 65/1000 HD days. This was lower than those who remained on CVC throughout (p<0.0001).

There were 24 CVC associated sepsis episodes during follow-up, a rate of 0.9/1000 HD days. Rates of CVC associated sepsis were similar between CFS 6 (0.8/1000 HD days) and CFS 7 (1.0/1000 HD days) (p=0.52). The CVC associated staphylococcus aureus bacteraemia (SAB) rate for the overall population was 0.2/1000 HD days. AVG sepsis occurred at a rate of 0.5/1000 HD days and there were no incidences of AVF sepsis in those who continued with AVF throughout the follow-up period.

Conclusion
CVC was the most prevalent access modality in this frail HD population. Rates of CVC associated sepsis and SAB were similar to published bloodstream infection rates and existing local data[1]. Although absolute events were low, increasing frailty from CFS 6 “moderately frail” to CFS 7 “severely frail” did not appear to influence CVC associated sepsis rates. Patients with CVC and AVG had greater inpatient bed days than those

with AVF. Transitioning from CVC to AV access reduced inpatient bed days. However, the choice of vascular access modality did not influence mortality overall.

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Young adults' experiences of dialysis and kidney transplant decision-making: social media recruitment of participants

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Introduction

Social media is increasingly being used for health research recruitment (Whitaker et al., 2017; Arigo et al., 2018) as an alternative to traditional recruitment via the NHS. It can be used to recruit seldom-heard (hard to reach) groups to research studies (Kayrouz et al., 2016). However, this method has its own challenges (Frandsen et al., 2016), such as a biased sample because individuals are self-screened. This paper examines the use of social media to recruit young adults' (18-30 years) living with end-stage kidney disease (ESKD) to understand their experiences of making a dialysis choice. It explores how far social media was a successful way to recruit young adults with kidney disease to a qualitative research study.

Methods
The study was first advertised to young adults living with ESKD via Twitter and Facebook. The study had its own Twitter handle and a member from our patient and public involvement group made a short film to encourage young adults to contact the researcher. Charities, local groups, and influential young adults with kidney disease (well-known on social media) were contacted by email and telephone to explain the study and request dissemination. An examination of each strategy (Twitter and Facebook) method for successful recruitment was undertaken.

Results
39 participants responded to the study invitation, out of which 32 were from Facebook posts, 5 from Twitter posts, and 2 from peers who had already taken part in the study. 18 eligible young adults were recruited and interviewed. 10 participants were above the age range, 3 withdrew due illness and 8 lost following initial contact. Overall it took 11 months to recruit the 18 participants. As recruitment was slow to start (11 participants over 9 months), the researcher applied for Health Research Authority (HRA) approval to recruit via the National Health Service (NHS) in one Trust. As HRA approval has just been given, we have yet to recruit via the NHS so cannot compare with the numbers recruited via social media.

Conclusions
Social media can be used to advertise and recruit young people to a research study. However, it requires time and working with influential peers within the young adult population to maintain continuing interest and response to the study invitation. The recommendation is that researchers should consider a variety of simultaneous recruitment methods and should not just rely on social media.

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Are IgG autoantibodies a key pathogenic trigger in IgAN?

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IgA Nephropathy (IgAN) is the most common cause of primary glomerulonephritis worldwide, being especially prevalent in East Asian populations. The condition is characterised by the deposition of undergalactosylated IgA1 (ug-IgA1) containing immune complexes in the glomeruli [1], leading to mesangial cell proliferation, extracellular matrix synthesis, interstitial fibrosis and ESRD in 30% of patients within 20 years of diagnosis. The biological processes which lead to IgAN are unclear. According to a multi-hit hypothesis for the pathogenesis of IgAN; circulating IgA1 with reduced galactose in the glycans attached to the hinge region (ug-IgA1) bind to autoantibodies and form circulating immune-complexes (IC) which deposit in the glomeruli and cause renal injury. In support of this theory, significantly higher levels of circulating ug-IgA1 are seen in serum from IgAN patients and IgA1 isolated from renal tissue from IgAN patients showed reduced galactosylation. However not all IgAN patients have IgG deposited in their glomeruli. Previously, serum levels of IgG autoantibodies which bind ug-IgA1 were measured using an ELISA based method employing an IgA1 hinge region with the galactose moieties enzymatically removed as the capture antibody [2]. In this study, we used a more physiological relevant capture antibody to measure levels of circulating IgG molecules which bind to ug-IgA1 to investigate the importance of anti ug-IgA1 IgG in the pathogenesis of IgAN.

Methods: Serum from 48 patients with biopsy proven IgAN, and 50 healthy subjects (HS) were analysed for the levels of ug-IgA1, IgA-IgG IC and IgG against ug-IgA1 using in-house ELISA based methods. Ug-IgA1 was measured using biotinylated Helix pomatia (HPA) lectin and IgA-IgG IC were captured using an (Fab')2 antihuman IgA and detected with an antihuman IgG-HRP. The IgG which binds ug-IgA1 was measured using a novel ELISA based method with ug-IgA1 isolated from serum from a patient with marked mesangial IgA deposition, IgG and C3 deposition and an RPGN as the capture antibody and an (Fab')2 antihuman IgG-HRP detection antibody. Biopsy data from the IgAN patients were analysed for glomerular IgG deposition. Statistical analysis was performed using Student's t test and Spearman's correlation.

Results: Serum from IgAN patients contained significantly higher levels of ug-IgA1 compared with HS ($P=0.0018$). However no correlation was observed between this ug-IgA1 and levels of IgG autoantibodies in IgAN. Additionally, the levels of IgG autoantibodies did not correlate with circulating IgA-IgG IC levels nor IgG deposition on kidney biopsy in IgAN and IgG autoantibody levels were no different between IgAN and HS.

Discussion: Evidence suggests that ug-IgA1 containing immune complexes deposited in the glomeruli in IgAN originate from the systemic compartment thus, investigating the levels of ug-IgA1, antibodies which bind this aberrantly galactosylated IgA1 and IgA-IgG IC in serum give an insight into the importance of these molecules in IgAN. The lack of correlation between levels of circulating ug-IgA1, IgG molecules which bind ug-IgA1 and IgA-IgG IC raises doubts about the importance of these antibodies in the pathogenesis of IgAN.

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Introduction of a dedicated Acute Injury Clinic to reduce hospital admissions, mortality and length of stay

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Introduction
The 2010 NCEPOD report 'Adding Insult to Injury'1 highlighted the need for Trusts across the United Kingdom to address under-treatment of Acute Kidney Injury (AKI).
Our STOP-AKI project was triggered following a trust mortality analysis. Following this project, it demonstrated an integrated, whole–system approach is necessary to improve AKI. These interventions delivered a 23.2% reduction in in-hospital mortality, a 25.9% reduction in 30 day AKI mortality and a 2.6 day improvement in length of stay (LOS), all of which were sustained over 33 months follow up2. Membership of AQuA ensured compliance with an AKI bundle for patients admitted with or who developed stage 3 AKI. Our trust has sustained its top ranking with AQuA throughout its membership.

Despite this success our LOS, mortality, and 30 day readmission offered some improvement, however these outcomes subsequently plateaued. Therefore in March 2019 we created a time sensitive AKI outpatient clinic; ensuring review of all patients with AKI stage 3 and non-resolving AKI stage 2. After 7 months we undertook a retrospective qualitative audit review of AQuA and trust data to establish the impact of the new service.

Methods
We compared outcomes of all the patients who had attended AKI clinic (n=60) from March 2019 to September 2019; with a randomised comparison group of 60 patients (n=60) who met AKI clinic review criteria and were discharged from hospital between March 2018 and September 2018. Patients were matched for stage of AKI and demographics. The data obtained was derived from patient electronic records. We retrospectively analysed 30 day readmission, 30 day mortality, and hospital length of stay for both groups of patients.

Results
Our results (see Table 1) demonstrate no 30 day readmissions for patients who attended AKI clinic. For the comparison group the readmission rate was 23% (43% of whom had an acute kidney injury on admission). Average LOS in the AKI clinic group was 12 days versus 15.7 days in the comparison group. 3 patients died in the AKI clinic group but >30 days. 35% of patients in the comparison group died, 29% of who died <30 days (incidentally these were the same patients who were re-admitted with an AKI).

Conclusion
We have achieved a time sensitive dedicated clinical stream for AKI patients within our Nephrology service. Patients within this clinic have been monitored, medications recommenced education and shared care practices implemented and evaluated across primary care.

The increased risk of mortality remains evident over longer term follow up. Furthermore, AKI is associated with a 13-fold increase in the risk of subsequently developing End Stage Renal Disease3. This supports the need for long term follow up of AKI 3 patients in the Nephrology setting.

The AKI clinic has enabled a time sensitive review of discharged patients, and we have been able to prevent readmission, 30 day mortality, and reduce LOS. Although early indications are positive, further ongoing evaluation is required to see the longer term impact of this service.

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Acute and chronic kidney disease preceding dialysis initiation – an audit of UK Renal Registry data

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Introduction

Kidney replacement therapy (KRT) is used to treat kidney failure following acute kidney injury (AKI) or progressive chronic kidney disease (CKD). The UK Renal Registry now holds data for patients known to renal units with CKD stage 4 or 5 and individuals whose blood results indicate a probable AKI (thus triggering an 'AKI-alert'). Alongside capture of KRT initiation, these data provide a more comprehensive picture of advanced kidney disease in the UK than has before been possible.

Reported here is the first audit of these AKI-alert, CKD and KRT data. The following question was asked of UKRR records restricted to centres providing analysable CKD and AKI-alert data from mid-2016:

"Amongst individuals who started KRT in 2017, who had previously been reported to the UKRR in the CKD or AKI-alert data, and what were their clinicodemographic features and outcomes?"

Methods

Six UK renal centres (Coventry, Derby, Gloucester, Leicester, Middlesbrough and Portsmouth) have provided both CKD and AKI-alert data since mid-2016. All individuals reported to have initiated their first-ever KRT in these centres during 2017 (including individuals coded as receiving 'acute' dialysis) were included. Routine UKRR data were used to describe their clinicodemographic features and outcomes, stratified by whether they had been reported to the UKRR in CKD and AKI-alert data in the six months preceding initiation.

Results

In 2017, 1,143 people started kidney replacement therapy across the six units.

- 400 (35.0%) featured in the CKD dataset in the 6-months before initiation, but had no AKI-alert,
- 9 (0.8%) had one or more AKI-alerts, but were not in the CKD dataset,
- 299 (26.2%) were in the CKD dataset and had one or more AKI-alerts,
- 435 (38.1%) were in neither the AKI nor the CKD dataset before initiation.

Peritoneal dialysis and pre-emptive transplantation were commonest amongst individuals who were in the CKD dataset, and scarcest amongst individuals in neither dataset. Individuals in neither dataset had the highest rates of mortality, but also the highest rates of recovery. Diabetes was coded as the primary renal diagnosis least commonly for individuals who had not been reported to the UKRR preceding KRT initiation.

Conclusion

A more comprehensive picture of UK advanced kidney disease is available than ever before, but it remains incomplete. Even with records restricted to centres providing the most complete CKD and AKI-alert data, over one third of individuals who started KRT in 2017 had not previously been reported to the UKRR. More work is needed to better understand the reasons for incomplete capture of pre-KRT nephrology care and

acute kidney injury. Potential explanations for these findings include suppression of AKI-alerts by reporting units/laboratories, missing baseline renal function tests at reporting laboratories, completeness of CKD reporting and use of a six-month window in this analysis (a limitation of the data available). Work is underway using Hospital Episode Statistics to supplement and triangulate the presented data.

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Multimorbidity and adverse clinical outcomes in patients with chronic kidney disease: findings from the UK Biobank Cohort.

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Introduction
Multimorbidity (the presence of two or more long term conditions (LTCs)) is common in patients with Chronic Kidney Disease (CKD). The existing literature on multimorbidity in CKD focuses mostly on stage 5 CKD (which accounts for only 1% of the population with CKD). Here we study patients with stages 3 to 5 CKD in the UK Biobank Cohort and report the rates of mortality and cardiovascular events, exploring the associations with multimorbidity.

Methods
The UK Biobank Cohort is a prospective population-based study of around 500,000 adults aged 37–73 years at baseline (between 2006 and 2010). Information is partly self-reported and is validated by linked primary care and hospital records. Biochemistry data are available at baseline for 93% of patients and we calculated estimated glomerular filtration rates (eGFR) using the CKD-EPI equation. The patients with eGFRs of less than 60ml/min/1.73m2 were divided by number of LTCs (0, 1, 2 and ≥3) in addition to CKD. Time-to-event analyses were performed for mortality and major adverse cardiovascular events (MACE; myocardial infarction, stroke and CV death). Hazard ratios (HRs) were calculated with adjustments for age, sex, ethnicity and body mass index (BMI) for all-cause mortality and age, sex, ethnicity, BMI, smoking status, deprivation status, eGFR and hypercholesterolaemia for MACE.

Results
10,062 of the patients in UK Biobank had an eGFR of less than 60ml/min/1.73m2. During a median follow-up of 8.76 years (Interquartile range (IQR) 96-113 months), there were 1290 deaths and 951 MACEs. The median age was 64 years (IQR 60-67), 53.2% were female, 95.2% of white ethnicity, median eGFR was 54 (IQR 48-57) and the median number of prescribed medications was 4 (IQR 2-7). Rates of all-cause mortality rose with increasing condition count: 0 LTCs 8.0%, 1 LTC 13.1%, 2 LTCs 16.6% and ≥3 LTCs 22.2%. Rates of MACE rose with increasing condition count: 0 LTCs 5.5%, 1 LTC 9.7%, 2 LTCs 13.0% and ≥3 LTCs 16.5%. All-cause mortality risk for those with ≥3 LTCs was more than 2 times higher than those with 0 LTCs: HR 2.68 (95% confidence interval 2.28-3.14, p<0.001). Figure 1 shows the probability of all-cause mortality by number of LTCs. Risk of MACE for those with ≥3 LTCs was more than 2 times higher than those with 0 LTCs: HR 2.29 (1.88-2.79, p<0.001). Cause of death was more likely to be from cardiac disease in patients with more LTCs: 17.9% in patients with 0 LTCs versus 39.6% for patients with ≥3 LTCs (p<0.001).

Conclusions
This study identifies associations between multimorbidity and higher risks of all-cause mortality and cardiovascular events in patients with CKD stages 3 to 5. This advances the field by including a large sample size with predominantly mild to moderate CKD. Improving our understanding of why multimorbidity has such an effect on adverse events will inform the future care of patients with CKD.

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Peri-operative hyperkalaemia in deceased-donor kidney transplant recipients

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Background:
Hyperkalaemia is a common and life-threatening medical emergency present in up to 10% of acute hospital admissions. End-stage Kidney Disease (ESKD) patients undergoing transplantation are at increased risk of hyperkalaemia and although the prevalence of hyperkalaemia in ESKD is well described, few studies have assessed the incidence and treatment of hyperkalaemia in kidney transplant recipients. Here, we describe the results from a retrospective review of peri-operative hyperkalaemia in incident deceased-donor kidney transplant recipients.

Methods:
We conducted a retrospective electronic health record review of 172 consecutive deceased-donor kidney recipients at Addenbrooke's Hospital, Cambridge between November 2018 and November 2019. Patients receiving simultaneous pancreas/kidney transplants, simultaneous liver/kidney or multi-visceral transplants were excluded as were living-donor kidney recipients. Variables abstracted included demographics, the type of organ received, pre-transplant renal replacement modality, treatments received for hyperkalaemia, serum potassium values and admission and discharge dates.
Data were summarised as frequency (%), mean ± standard deviation (SD) or median with interquartile range (IQR) as appropriate. Categorical variables were compared by Chi-squared test and continuous variables by Student's t-test or Mann–Whitney U-test based on their distribution.

Results:
172 patients received a deceased-donor kidney during the study period and the median age of all recipients was 56 (IQR 46-64.5) years. 110 (64%) patients received a DCD (donation after circulatory death) kidney with the remaining 62 (36%) receiving DBD (donation after brainstem death) kidneys. 110 (64%) of recipients received haemodialysis prior to transplant. Mean serum potassium prior to transplant was 4.22±0.61 mmol/L and immediately post-operatively was 4.69±0.61 mmol/L.

85 (49%) recipients required emergency treatment for hyperkalaemia post-operatively. The median serum potassium prior to treatment was 5.98mmol/L (IQR 5.7-6.2) with median time to treatment of 6.8 hours (IQR 2.4-9.6) after kidney reperfusion. Of these patients 64% underwent emergency haemodialysis as the first line treatment for hyperkalaemia, whilst 24 of the 31 patients treated with insulin/dextrose for hyperkalaemia went on to receive haemodialysis for hyperkalaemia. Median length of stay was longer in those receiving treatment for hyperkalaemia (9 days (7-13) vs 7 days (6-10), p=0.005). Additional data is described in the table below.

Conclusion:
Hyperkalaemia amongst kidney transplant recipients is common, particularly in the peri-operative period. Current management strategies contribute to morbidity, with haemodialysis in the first week also independently associated with increased healthcare costs per patient in the first year following transplantation. New oral potassium binders may offer an alternative or adjunct to current management

but there is a lack of data for their use in transplant patients. Clinical trials in the transplant peri-operative setting are warranted.

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Hyperkalaemia in prevalent kidney transplant recipients

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Background:
Hyperkalaemia is a common and life-threatening medical emergency present in up to 10% of acute hospital admissions. End-stage Kidney Disease (ESKD) patients undergoing transplantation are at increased risk of hyperkalaemia, a potentially life-threatening medical emergency. Although the prevalence of hyperkalaemia in ESKD is well described, few studies have assessed the incidence and associations of hyperkalaemia in kidney transplant recipients. We evaluated post-transplant hyperkalaemia in a single centre using a large electronic health record dataset of emergency admissions.

Methods:
Prevalent kidney transplant recipients were identified using ICD-10 codes from a complete Electronic Health Records database of all emergency admissions to Addenbrooke's Hospital, Cambridge between April 2015 and August 2018. We abstracted demographics, comorbidities, concomitant medications, biochemistry results including all blood potassium values, in-hospital prescribing and admission and discharge dates. Data were summarised as frequency (%), mean ± standard deviation (SD) or median with interquartile range (IQR) as appropriate. Categorical variables were compared by Chi-squared test and continuous variables by Student's t-test or Mann–Whitney U-test based on their distribution. Factors associated with developing hyperkalaemia were explored using mixed-effects logistic regression and odds ratios (OR) are reported.

Results:
421 prevalent kidney transplant recipients were admitted a total of 1,065 times via the Emergency Department and a further 475 times direct to the Transplant ward. 324 (77%) were deceased-donor recipients with 83 (20%) living-donor recipients and 14 (3%) simultaneous pancreas kidney (SPK) recipients. Median age of admitted recipients was 56 (IQR 44-65) years and 87% were of white ethnic origin. Mean serum potassium was 4.56±0.72 mmol/L compared to 4.21±0.61 mmol/L amongst the 170,913 non-kidney transplant patients admitted over the same time period (p<0.001). 376 (89%) recipients were prescribed a calcineurin inhibitor.
Hyperkalaemia >5.5mmol/L occurred in 282 (67%) of 421 prevalent kidney transplant recipients with 203 (48%) patients including all SPK recipients experiencing moderate-severe hyperkalaemia (K >=6.0mmol/L). Of these, 110 (39%) received emergency treatment with insulin/dextrose. Potassium concentration immediately (≤ 60 min) pre-treatment was 6.26±0.76 mmol/L. The mean reduction in potassium at 4-hours post treatment was 0.89±0.90 mmol/L. Twenty-five of 110 (23%) patients developed hypoglycaemia (glucose <4mmol/L) within 6 hours of treatment and 37/110 (34%) required retreatment with insulin/dextrose within 24 hours.
Kidney transplant recipients were at significantly increased risk of developing hyperkalaemia (OR 19.8, 95% Confidence Interval (CI) 16.2-24.4, p<0.001) compared with all admitted patients and this risk persisted after adjustment for age, sex and co-morbidity (OR 3.6, 2.9-4.5, p<0.001). Associations with hyperkalaemia amongst transplant recipients included receiving a deceased-donor kidney (OR 1.96, 1.13-3.40, p=0.017) and exposure to beta-blockers (OR 2.26, 1.36-3.59, p=0.001) and calcineurin inhibitors (OR 6.39, 2.81-14.5, p<0.001).

Conclusion:

Kidney transplant recipients are at greatly increased risk of developing hyperkalaemia. Recipients who become hyperkalaemic are more likely to have received a deceased-donor transplant and be prescribed beta-blockers and calcineurin inhibitors than those who do not. Insulin/dextrose for hyperkalaemia is associated with hypoglycaemia in almost 1 in 4 recipients treated and re-treatment is required in one third of recipients.

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Anticoagulation in Congenital Nephrotic Syndrome: 15 year experience from a national cohort

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Introduction: Congenital nephrotic syndrome (CNS) is an ultra-rare disease characterised by heavy proteinuria and severe oedema within 3 months of birth. Severe urinary plasma protein leakage, including loss of antithrombin III, confers a greater risk of venous thromboembolism (VTE). To mitigate this risk, prophylactic warfarin or low molecular weight heparin (enoxaparin) may be used. The evidence base for anticoagulation in CNS is limited. This study aimed to determine the time taken and doses required to achieve effective anticoagulation in patients with CNS. We hypothesised that these patients will require high doses of anticoagulants and that a long duration of treatment may be required to reach therapeutic levels.
Methods: Patients were included if CNS was diagnosed from 1st July 2005 until 1st January 2018. Eight children had a confirmed diagnosis of CNS, representing all cases nationally in that time. Data was collected prospectively by two authors, with independent retrospective verification of a cross-section by a third author. The database was locked on 1st January 2020. The primary study endpoint was effective anticoagulation, defined as three consecutive therapeutic measurements. Therapeutic 'prophylactic' levels of enoxaparin were defined as anti-factor Xa levels of 0.2-0.4mmol/l; therapeutic warfarinisaton was defined as an INR between 2.0 and 3.0. Secondary endpoints were bilateral nephrectomies, transplantation or the development of end-stage renal disease (ESRD). Secondary outcomes included any clinically confirmed VTE, or any clinically significant episode of haemorrhage.
Results: Histologically, two patients had Finnish type CNS, two patients had Pierson's syndrome, three had diffuse mesangial sclerosis and one was classed as Non-Finnish type CNS. All patients initially commenced on enoxaparin, with five patients subsequently treated with warfarin. Using enoxaparin, two patients reached therapeutic anti-factor Xa levels (Time: 6-26 weeks, Dose: 4.0 – 4.79mg/kg/day) and six patients did not reach therapeutic levels (3 patients: ESRD, 3 patients: non-therapeutic levels). Whilst heparinised one patient developed a femoral vein thrombosis (Anti-factor Xa = 0.27iu/ml) and one suffered a bleeding complication (Anti-factor Xa: 1.38 iu/ml). For warfarin, three patients reached therapeutic INRs (Time: 6-19 weeks, Dose: 0.124-0.25mg/kg/day) and two patients did not reach therapeutic levels (2 patients: non-therapeutic levels). One patient was discontinued from warfarin due to two bleeding events (Bleed 1: INR 6, Bleed 2: INR 5.5). At the time of data lock three patients were successfully transplanted, three patients had died and two patients were on peritoneal dialysis.
Conclusions: Our study highlights that achieving therapeutic anticoagulation in CNS is challenging. Reasons may include phenotypic variation and clinical heterogeneity, precluding a defined therapeutic regimen to achieve optimal drug levels. More patients achieved effective anticoagulation whilst on warfarin, with variable therapeutic times and doses. Both agents had similar efficacy and safety profiles. All bleeding complications were associated with non-therapeutic measurements, highlighting the requirement for careful monitoring.

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Chemerin as a novel target for the alleviation of CKD induced muscle weakness

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People with non-dialysis dependent CKD (NDD-CKD) often experience muscle wasting and dysfunction, limiting physical activity and resulting in a downward spiral of atrophy and disuse, reduced quality of life and increased risk of morbidity and mortality. Understanding this process and developing interventions to alleviate muscle loss is of great interest, and in this regard the link between adipokines and muscle loss is under-researched. An adipokine termed Chemerin has been shown to correlate strongly with CKD disease progression and has also been shown to be involved in inflammatory signalling processes. With chronic inflammation recognised as a contributory factor in NDD-CKD muscle loss, we sought to 1. define Chemerin systemically in NDD-CKD and, 2. investigate its potential effects on the skeletal muscle of these patients. Retrospective analyses of Chemerin concentrations were performed by ELISA on stored plasma and urine samples from 71 NDD patients and 32 age and sex matched controls. Correlation analysis was conducted to explore the relationships between Chemerin and markers of disease severity and body composition. To investigate the role of Chemerin on skeletal muscle, human derived muscle cells (HDMCs) were harvested from skeletal muscle biopsies and the cells matured in cell culture. Mature skeletal muscle myotubes were exposed to multiple doses of Chemerin and subsequently harvested for downstream analysis. This included identification of the proposed receptors ChemR23, GPR1 and CCLR-2 as well as quantifying the effects of Chemerin on intracellular signalling related to protein degradation. Both urine and plasma Chemerin concentrations were significantly raised in NDD-CKD patients in comparison controls (162.00 vs. 66.08 ng/ml respectively, $p < 0.0001$). Plasma Chemerin was negatively correlated with eGFR ($r= -0.57$, $p < 0.0001$) and positively correlated with both BMI ($r= 0.26$, $p= 0.009$) and % body fat ($r= 0.28$, $p= 0.008$). Utilising cell culture we were able to identify two of the three proposed receptors of Chemerin in skeletal muscle myotubes, termed ChemR23 and GPR1. Myotubes exposed to an acute dose of Chemerin displayed a dose dependent significant increase in the mRNA expression of the pro-inflammatory markers TNF-α, IL-6 & MCP-1 ($p \leq 0.05$). Our work shows increased plasma and urine Chemerin levels in NDD-CKD, which correlates with disease severity. Further to this, utilising in-vitro methodology we have been able to show that Chemerin stimulates increases in intramuscular inflammation which has been shown previously to drive protein degradation. Our work provides a novel insight into a potential role for Chemerin in CKD induced muscle wasting, and implicates it as a potential future therapeutic target to resolve such muscle losses in this population. Future work will seek to define a specific mechanism for such effects in order to further our understanding of the role of adipokines in CKD induced muscle dysfunction.

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Treatment of Hyperkalaemia in an Emergency with Lokelma, an oral Potassium binder; the design and rationale for the HELP-K randomised placebo-controlled trial

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Background:
Hyperkalaemia is a common and serious medical emergency present in up to 10% of medical admissions. Current standard of care consists of an insulin/dextrose infusion (IDex), but this treatment has important limitations including the need for re-treatment due to its transient hypoklaemic effect, risk of hypoglycaemia, and requirement for hospitalisation.
Sodium zirconium cyclosilicate (SZC, Lokelma) is an oral agent that lowers serum potassium by rapidly binding potassium throughout the gastrointestinal tract. It is licensed for use in both the United States and the European Union for the treatment of hyperkalaemia. To date, no randomised trial data has been published describing a role for SZC in the emergency management of hyperkalaemia.

Methods:
HELP-K is a randomised, double-blind, placebo-controlled, trial of SZC for the emergency treatment of hyperkalaemia in addition to standard of care. 194 patients aged 18 years or older with a serum potassium ≥ 5.8 mmol/L will be enrolled at 15-20 sites in the United Kingdom and randomly allocated to either SZC or placebo in addition to IDex. Patients with End-Stage Kidney Disease, diabetic keto-acidosis or pregnancy will be excluded.
Participants will receive six doses of SZC or placebo over 48 hours in addition to standard care during the acute presentation. During a maintenance phase, participants will receive once daily SZC or placebo, titrated to serum potassium concentration, for a total of six weeks. Following discharge from hospital, patients will be assessed at 21 and 42 days. The primary outcome is time-to-treatment failure. Treatment failure is defined as re-treatment with IDex or use of renal replacement therapy for hyperkalaemia. Secondary outcomes include evaluating the addition of SZC to IDex on adverse events (such as hypoglycaemia) and whether the addition of SZC enhances serum potassium reduction and helps to facilitate earlier discharge from hospital.

Results:
Recruitment is expected to commence in Spring 2020. There are no results to present.

Conclusion:
There is a clear unmet need for improved, evidence based emergency treatments for hyperkalaemia. Data exists to suggest that the rate of potassium lowering with SZC is sufficiently rapid to have utility in this setting. HELP-K will determine if SZC has the potential to reduce exposure to IDex and to improve the safety of hyperkalaemia management.

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Ultrasound and microbubble treatment of human renal proximal tubular epithelial cells in vitro enhances the liberation of miRNA biomarkers.

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Introduction:
Although renal biopsy is the gold standard for diagnosis of kidney disease, it is an invasive procedure with associated risk of bleeding. Hence, it is not feasible to perform serial biopsies to monitor disease progression or treatment response. Non-invasive biomarkers of intrinsic renal pathology are preferable but currently lack sensitivity. Ultrasound insonation in the presence of ultrasonic contrast microbubbles has previously been shown to cause non-specific, localised, cell-membrane leakage enriching circulating blood with molecules derived from target cancer tissue. We hypothesise that this technique may increase sensitivity of serum and urine biomarkers of kidney disease, for example microRNAs (miRNA) and we report pilot in vitro experiments to assess feasibility.
Methods:
Renal proximal tubular epithelial cells (RPTECS)(ATCC-LGC) were cultured on porous membranes (Thincert) and allowed to differentiate into an intact monolayer, quantifiable by trans-epithelial electrical resistance (TEER). Cell membrane permeability was determined using lentiviral-transduced GFP positive RPTECs. Small RNA-Seq was performed on FACS sorted kidney cell populations to determine miRNAs in tubular cells. Ultrasound insonation was optimised in vitro altering power, microbubble and time parameters. Cells were treated with ultrasound (5 seconds duration, 2W/cm2 power and 50% duty cycle), by suspending the porous membranes above an acoustic absorber with 1% SonoVue microbubbles added into the well. Media was sampled 10 minutes after ultrasound treatment, spun at 10,000 X G and total RNA was extracted using the miRNeasy Serum/Plasma kit. RNA was then quantified and reverse transcription and qPCR was performed for selected target miRNAs. Cell health was determined by the MTS assay at 4 hours post treatment. Cells were fixed for electron microscopy in 3% glutaraldehyde immediately after treatment, post-processed and viewed using a Hitachi S-4700. RPTECs were fixed in 4% paraformaldehyde for immunostaining with ZO3 (apical marker) and NaK-ATPase (a basolateral marker) to examine polarity and viewed using a confocal microscope.
Results:
Ultrasound insonation of GFP positive cells causes GFP release into the media. Small RNA sequencing was used to select enriched miRNAs in proximal tubular cells and miR-21, as it has been previously demonstrated to be released following ultrasound insonation. Ultrasound insonation resulted in a significant increase of miRNA in the media when cells were treated with both ultrasound and microbubbles compared with control untreated cells: miR-21, 30e, 192 and 194 increased 11 fold, 6 fold, 4 fold and 3 fold respectively (Figure 1), without a significant reduction in cell viability. SEM demonstrated disruption of cell membranes and the formation of budding structures (exocytosis). Immunofluorescent imaging demonstrated strong cell-cell adhesions in control conditions, which is reduced after treatment of cells.
Conclusion:
Treatment of cells with ultrasound insonation induces the leakage of cellular miRNA despite no overt loss of cell viability. Imaging techniques demonstrate that this may be mediated by increased exocytosis of cell contents or disruption in cell-cell adhesion. These proof-of-principle studies will be extended to determine

whether ultrasound insonation could be used to enhance release of renal miRNA in pre-clinical model of renal disease.

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The Optimising Staff-Patient Communication in Advanced Renal disease (OSCAR) study: Protocol for a new NIHR-funded project to develop a communication intervention

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Introduction

In the UK, 3,500 adults with end-stage-kidney-disease over 65 start dialysis annually; this is the fastest growing group of recipients, and providing dialysis in this group costs >£300 million/year. Yet for older people, dialysis brings uncertain survival benefits and greatest impact on quality of life. Conservative (non-dialytic) care is an alternative to dialysis for these patients, but there is considerable variation in rates of conservative care: estimates are from 5-95% across UK renal units. Patients report marked differences in how clinicians communicate treatment options, which strongly influences patients' decision-making.

Aims

1. To understand communication, information provision, and decision-making support in renal units with varying rates of conservative care
2. To identify and describe interactional features of consultations between older people (age 80+ or 65+ with poor performance status/comorbidities) with advanced chronic kidney disease (eGFR <20) and renal clinicians
3. To develop an evidence-based, acceptable intervention, incorporating clinician training, to enhance how renal clinicians support patients' decision-making
4. To contribute to the evidence-base on how patient-centred decision-making is interactionally implemented

Methods

Mixed-methods, via four work packages, following Medical Research Council complex interventions guidelines, and the person-based approach to enhancing intervention acceptability/feasibility (Yardley et al. 2015). Data collection, analysis and intervention development will be informed by the Theoretical Domains Framework and Behaviour Change Wheel (Michie et al. 2005, 2011).

Work Package 1: Understanding the context

At five renal units with differing rate of conservative care, we will:

- Conduct ethnographic, non-participant observation of renal consultants', registrars' and nurses' consultations with eligible patients (and carers, if present), and qualitative interviews with clinicians, and analyse data thematically.
- Evaluate the content and comprehensibility of information resources provided to patients (e.g. leaflets, education sessions, decision aids).

Work Package 2: Describing communication and its consequences

Across these renal units, we will:

- Video-record 60-80 consultations between 20 clinicians and eligible patients (and carers); use Conversation Analysis to identify trainable elements.

- Collect patient-/carer- and clinician-reported questionnaire data regarding consultation communication and treatment decision-making; test for associations between clinicians' communication behaviours and patient/carer outcomes, and differences between patient/carer and clinician outcomes.
- Conduct qualitative interviews exploring patient/carer experiences of communication and decision-making; analyse thematically.

Work Package 3: Intervention development
- Co-produce the intervention with the Stakeholder Panel (patients, carers, clinicians, educators and commissioners), integrating WP1&2 findings, evidence and theory.
- Refine the intervention via iterative 'think aloud' interviews with clinicians, in line with a person-based approach.

Work Package 4: Pilot, refine
- Pilot the intervention in a single renal unit not involved in WP1&2.
- Use pre-/post- questionnaires and qualitative interviews to determine clinician views/experiences.
- Video-record post-training consultations to determine whether/how training is put into practice
- Further refine intervention and prepare for full evaluation of effectiveness/cost-effectiveness

Discussion

This 4-year study, which began December 2019, will result in an intervention to optimise renal clinician's communication with patients and family carers and support patient-centred treatment decision-making. The intervention will be formalised, evidence-based, fit for purpose, acceptable to stakeholders and (if effective/cost-effective) scalable across UK renal units.

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The Prepare for Kidney Care Randomised Controlled Trial: Recruitment Progress and Challenges

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Background
Differences in how kidney failure is treated within the NHS reflects uncertainty about the best approach to manage symptoms in elderly, frail patients with chronic kidney disease (CKD). Whether to undertake dialysis is a difficult decision for older people with co-morbidities, and starting dialysis is associated with a deterioration in functional status and treatment burden. The best quality observational evidence to date does not tell us whether patients would be better off having dialysis or conservative care. Comparison of dialysis patients with matched conservative care cohorts suggests an equivalent survival in patients aged over 80, or over 70 with multiple health problems, and quality of life has a similar trajectory in both groups until initiation of dialysis.
Many people thought it would not be possible to carry out a RCT of preparing for dialysis vs conservative care in this group of patients, but 'Prepare for Kidney Care' is changing attitudes. Recruitment to RCTs, however, is challenging. Lessons learned from the embedded QuinteT Recruitment Intervention (QRI) work over the first 3 years, has aided a steady increase in recruitment.
Interventions and Outcome Measures
Eligible patients (eGFR <15, aged 80+, or 65-79 with multiple health problems/ poor functional status) are approached. Patients providing informed consent are randomised to either prepare for dialysis as per local care, or to responsive management, delivered through a combination of outpatient/ home visits to provide routine support, and support that responds to the patient's needs (from renal unit staff, palliative care teams and community staff). The primary outcome is quality adjusted life years (QALYs). QRI has been integrated throughout the RCT and qualitative research will investigate patients' experiences of the trial treatments. Eligible patients declining the RCT are invited to participate in an observational cohort, the Registry follow-up (RFU) study. Integration with the UK Renal Registry will allow further comprehensive data capture and assessment of external validity of the RCT.
Progress
The study opened to recruitment July 2017 and as of January 2020 223/512 (44%) patients have been randomised. There are 24 sites open, with further sites opening. Additional funding has been secured from NIHR to extend recruitment to June 2021. Follow up will continue until September 2023. 101 patients have consented to the RFU.
Site screening log review alongside QRI audio-recordings of recruitment consultations and in-depth interviews with site staff have provided insight into recruitment barriers. The biggest challenge to date is that some clinicians are not willing to support the trial because they feel their service is already excellent. Another big challenge has been that not all eligible patients screened are being approached due to a pre-existing treatment plan. Of 223 patients randomised and accepting allocation, however, most, if not all, had already started to consider one of the two treatment pathways in routine care, demonstrating patient acceptability.
Conclusion
This is the first RCT to compare preparation for dialysis versus conservative care in older, multi-morbid patients. Its findings will provide patients, families and professionals with much-needed evidence to enable informed decision-making about treatment options.

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Carer and patient perspectives of among people treated with home haemodialysis.

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Introduction
If more people are to dialyse at home then it is necessary to better understand the experience of patients and their carers so that support mechanisms can be focussed and person centred. We designed a pilot study to investigate this further.

Methods
Home haemodialysis patients and their carers from 6 centres were recruited into the Dialyse@Home study (NIHR portfolio number 38189) and completed instruments to assess their quality of life and experience of care. Patients completed demographic questionnaire, EQ5D quality of life, patient activation, illness intrusiveness, renal satisfaction and vascular access instruments. Carers completed the 40-question Carer Quality of life instrument (AC-QOL) from which low, medium and high carer quality of life for 8 subdomains relating to support, choice, stress, money, personal grown, value, ability to care and satisfaction. Quality of life for carer subdomains were compared to patient responses to better understand the comparability of patient and carer perceptions of topics that these instruments co-explore

Results
39 carer-patient pairs were consented. Patients were 87.2% white, having received renal replacement therapy for an average of 8.25 years. 79.5% reported being in a relationship. Once scaled to the same range (0-1.0), the patient EQ5D quality of life was 0.72, with the adult carer quality of life scored 0.70 (a level considered high).
45.2% of carers reported little concern over money compared to 74.2% of patients documenting that they spent no time worrying about the financial cost to the care-giver. The majority (67.7%) of carers reported their stress as low whereas 60% of patients worried about the carer over-extending themselves a little, some or most of the time. Both patients (72.4%) and carers (54.8%) reported capacity to care as high. 40.7% of carers reported poor personal growth, however patients of these carers reported low intrusion of their health into their own self-improvement. Although carers felt highly valued (85.2%) fewer felt highly satisfied (7.4%); while patients felt the intrusion of their health into their relationship was low. 55.6% of carers reported delivering 21 hours or more of carer time per week, despite 80.7% of patients reported no or only slight problems with self care.

Discussion
We found agreement between patient and carer for capacity to care and carer stress, but paradoxical relationships were noted between satisfaction, personal growth and the amount of time caring and capacity to self-care. It is important to systematically explore the differences between patient and carer perspectives in home haemodialysis so that training and support can be directed to promote well-being in the home dialysis environment.

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Calciphylaxis in dialysis patients: a single centre audit

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Introduction:

Calciphylaxis or calcific uraemic arteriolopathy (CUA) is a rare syndrome; characterised by progressive and painful skin lesions. It has an estimated incidence of 1-4 % among dialysis patients annually. Mortality is estimated to be up to 80%; possibly due to infections of necrotic skin resulting in sepsis. Several modifiable risk factors have been identified for calciphylaxis including vitamin K antagonists, hyperparathyroidism and calcium and vitamin D supplementation. Sodium thiosulphate can be an effective treatment in some patients.

Methods:

We retrospectively examined the diagnosis and management of calciphylaxis in patients with end stage renal failure in a single centre. We used local guidelines as the audit standard, in order to assess management, modification of risk factors and clinical outcomes. We reviewed the medical records of all patients treated for calciphylaxis from 2013 to 2019. A total of 18 (N=18) patients were identified and their demographic, dialysis history, biochemistry, risk factors, duration of treatment and mortality data was retrieved from electronic health records.

Results:

18 patients were treated for calciphylaxis from 2013 to 2019. Mean age at diagnosis was 59.8 +/- 12.7 years. Just over half of the patients were female. 14 (88%) patients were on haemodialysis and 4 (22%) on peritoneal dialysis. Average treatment duration was 12.8 +/- 15.5 months. Four (22%) patients had complete recovery and treatment was discontinued. Nine (50%) patients died. Of patients on peritoneal dialysis, 1 (25%) switched to haemodialysis and 3 (75%) remained on peritoneal dialysis. One patient remaining on peritoneal dialysis recovered. Just over a quarter of patients underwent skin biopsy with the involvement of dermatology team to reach a diagnosis. All patients were treated with sodium thiosulphate, with all but 3 patients remaining on the starting dose. 9 (50%) patients were receiving vitamin K antagonists (Warfarin) at the time of diagnosis. 5 (55%) of these stopped warfarin following diagnosis. 15 (83%) patients had documented hyperparathyroidism, all of whom were treated with either parathyoidectomy or calcimimetic. 13 (72%) patients were on vitamin D therapy, this was stopped in 7 (54%) patients. 14 (78%) patients were on calcium containing phosphate binders. These were stopped in all but one case. Advanced care planning including palliative team involvement was documented in just 2 patients.

Conclusion:

Our audit demonstrated calciphylaxis is a significant clinical problem within our unit. We were able to modify risk factors in all cases and adherence to local guidelines was good. Despite this patients with calciphylaxis had poor clinical outcomes, with a mortality of 50%. Patients who remained on peritoneal dialysis responded as well to treatment as those on haemodialysis. Calciphylaxis is a debilitating syndrome with a poor prognosis from the onset of diagnosis given the high morbidity and mortality associated with

this condition. Reducing exacerbating risk factors and prompt initiation of sodium thiosulphate are fundamental in managing this condition.

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Leukopenia and neutropenia post-renal transplantation: A multi-centred retrospective cohort study

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Background
Leukopenia and neutropenia are common complications after renal transplantation with the use of modern drug regimes. We investigated the incidence, risk factors for and the effects of leukopenia and neutropenia, including the development of serious infections (opportunistic infections requiring immunosuppression reduction or infection requiring hospital admission) and allograft function.

Methods
We performed a retrospective analysis of 193 kidney and kidney/pancreas transplant patients from a single transplant programme between 2015 and 2016. All patients received a tacrolimus, MMF (intention for 2g/day for all during the period of the study) and prednisolone-based regime. All patients received valganciclovir for 6 months except for CMV donor IgG negative/recipient IgG negative cases (23%).

Results
The median follow-up time was 1036 (IQR 738-1392) days. The incidence of leukopenia was 56% and neutropenia 36%, with the first episode occurring with a median time of 90 (IQR 61-137) days and 100 (IQR 70-146) days post-transplantation, respectively. Females were significantly more likely to develop leukopenia (females 65%, males 51%; p=0.048) and neutropenia (females 45%; males 30%; p=0.027). Patients receiving a second or subsequent transplant were more likely to develop leukopenia [74%; median time 21 (IQR 4-101) days] as well as having a shorter time to its first episode (p=0.019; p≤0.001), as compared to those receiving their first kidney transplant [53%; median time 92 (IQR 69-152) days]. All other baseline characteristics did not show association with the development of leukopenia and neutropenia. Receiving valganciclovir prophylaxis for CMV infection, increases the chance of developing leukopenia and neutropenia (p<0.001; p<0.001). Development of neutropenia also increased the likelihood of developing infections (neutropenia 71%, no neutropenia 52%; p=0.009). The development of leukopenia was associated with a poorer graft function at 1-year [eGFR 55 (SD 22) ml/min/1.73m2 versus eGFR 64 (SD 16) ml/min/1.73m2; p<0.001] and 2-years post-transplantation [eGFR 55 (SD 24) ml/min/1.73m2 versus 63 (SD 19) ml/min/1.73m2; p=0.028]. Patients who developed leukopenia or neutropenia had increased rates of allograft failure compared to those who did not [8% and 10%, versus 0% and 2% (p=0.011)].

Conclusion
This study illustrates that there is a high incidence of leukopenia and neutropenia in our post-renal transplant population which associated with poorer outcomes. Risk factors included female sex and previous transplantation with valganciclovir use being a potentially modifiable risk factor. Factors identified in this study can help provide a better understanding of the development of leukopenia and neutropenia in this cohort and potentially help better guide clinicians in the management of such patients.

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Diagnosis and Management of Community Acquired Acute Kidney Injury using Point of Care Testing in Nigeria. Technology Evaluation and Study Design.

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Background and Aims: Community acquired Acute Kidney Injury (AKI) is a major health problem in low- and middle-income countries. Delayed diagnosis due to limited laboratory infrastructure is associated with life threatening complications and high morbidity and mortality. Early detection of AKI using point of care (POC) creatinine (Cr) testing can improve outcomes. Collaboration has been established between a renal unit in UK and a renal unit and regional primary care health centers in Port Harcourt Nigeria to evaluate POC Cr technology and design a pathway for early identification and management of community acquired AKI.

Methods: The evaluation phase investigated the accuracy of POC Cr technology. Patients underwent concurrent measurement of Cr using venous samples analysed by the laboratory (Lab) assay (Jaffe) and a point of care Cr measurement using a capillary sample with the NOVA Stasensor Xpress Cr analyser. Pearson Correlation and Bland-Altman plots were used to assess correlation and agreement between the two methods. The results of the evaluation phase were reviewed at a focused AKI workshop and pathway for the use of POC Cr was agreed.

Results: During the evaluation phase at the University of Port Harcourt Teaching Hospital in Nigeria, 96 paired POC Cr capillary and venous Lab Cr samples were analysed. 66 subjects were females and mean age was 49±14 years. POC Cr values were 127±122 umol/l and Lab Cr values were 100 ±85 umol/L, mean positive bias of 27.2±47.94 umol/L. Overall, correlation between POC Cr and Lab Cr was very good, with Pearson correlation r=0.956) Figure 1A. All 4 out of 96 values that were outside the limits of agreement (set at mean ±2 standard deviations) were for Lab Cr values >200 umol/L. A Bland-Altman Plot is presented for paired samples with Lab Cr values <200 umol/L (Figure 1B).
During the AKI workshop that took place in Port Harcourt Nigeria hosted by the Primary Health Care Board Rivers State 85 primary and secondary physicians participated. It was concluded that possible AKI should be considered if the adjusted for positive bias result of POC Cr was > 1.5 times the upper limit of normal range of the Lab assay. Guidance based on history and clinical observations to identify high risk patients that the POC Cr should be tested and an AKI management algorithm was developed (Figure 2).
The project started in the hospital emergency department and will roll out in 2 primary health care centres that will refer AKI cases to the renal team. Quality improvement methodology will be used and ethical approval has been obtained.

Conclusion: A project using POC Cr for improvement of community acquired AKI detection and management in Nigeria has commenced. Progress will be reviewed and appropriate adjustments in the algorithm will be performed by the multi-organisational quality improvement steering committee. Epidemiological data on AKI will be collected and analysed at the end of the project.

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Intravenous Cyclophosphamide for Treatment of Single-Positive Anti-GBM Disease in a Tertiary Renal Centre

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Background:
Anti-Glomerular Basement Membrane (GBM) disease is a condition caused by antibodies to type IV collagen, presenting with a progressive glomerulonephritis and/or pulmonary haemorrhage. The standard of care is accepted to be daily oral Cyclophosphamide, corticosteroids and plasma exchange. In the treatment of ANCA- associated vasculitis, it is well recognised that intravenous (IV) pulsed Cyclophosphamide is as effective as oral Cyclophosphamide therapy and that treatment-associated toxicity is significantly reduced. We report our single-centre experience using pulsed IV Cyclophosphamide, in conjunction with corticosteroids and plasma exchange, for anti-GBM disease. There is a paucity of data on the use of IV Cyclophosphamide in this condition.
Aim:
The primary aim was to compare our outcomes using pulsed IV Cyclophosphamide with published data reporting outcomes with oral Cyclophosphamide in anti-GBM disease.
Method:
This was a retrospective review of records of patients with single-positive anti-GBM disease treated between January 2006 and December 2018. Patients who were dual-positive with ANCA were excluded. Data were extracted manually from the renal unit database and patient records.
Results:
20 patients with single-positive Anti-GBM disease were treated at our renal centre during the study period. One patient with incomplete records was excluded.
14 of the 19 included individuals were male. The median age was 53 years (range 17–77) and the median presenting creatinine was 426 umol/L (range 64–3000). 14 of 19 had renal-limited disease and 2 had lung-limited disease. 17 patients started treatment with pulsed IV Cyclophosphamide, corticosteroids and plasma exchange. 10 received all 6 doses of IV Cyclophosphamide as planned. 7 had fewer than 6 doses of Cyclophosphamide due to infection, dialysis dependence with anuria and thus little likelihood of recovering renal function or concerns about the patient's ability to cope with strong immunosuppression. 2 patients who presented with dialysis-dependent renal failure and no lung involvement did not start immunosuppressive treatment during initial presentation. However, both of them developed pulmonary haemorrhage, the first at 1 and the second at 2 months, and both then required commencement of therapy.
Of 17 with renal involvement, 10 required dialysis at presentation. One of these later recovered renal function at 3 months. Of the 7 patients not requiring dialysis at presentation, none developed end-stage renal failure at 1 year. This gave an overall 1-year renal survival of 47% in those with renal involvement, but of 100% in those who were not dialysis dependent on initial presentation.
One patient, who was dialysis-dependent at presentation, and could not complete treatment because of sepsis, died at 3 months. Thus our 1-year patient survival was 95%.

Conclusion:
Published outcomes from centres using oral Cyclophosphamide report a 1-year patient survival of 87–100%, and 1-year renal survival to be 90–100% in patients not requiring dialysis at presentation (1–3). Our data

show comparable outcomes in patients treated with IV Cyclophosphamide, suggesting that pulsed IV Cyclophosphamide may be as effective. We recognise, however, that our numbers are small and larger studies would be needed to validate these data.

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“Happiness is having a scratch for every itch” - Pruritus in the dialysis population

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Introduction: Chronic pruritus is a tormenting state that can cause hopelessness and desperation. Pruritus is an under-diagnosed and often not well recognised symptom in the dialysis population that causes reduced quality of life and has been shown to correlate with increased risk of depression and death. The aetiology of pruritus in the dialysis patient is still not well understood and is therefore difficult to manage. A lack of randomised control trials has led to unclear guidance in its management. Perhaps being a morbidity rather than mortality risk, it often does not get sufficient medical attention.

Interested to hear the experience of our dialysis population we set out to quantify how much of a problem pruritus really is, how it is experienced and what they perceive helps. Our aim was to find good practice and in standardised approach to implement it uniformly for dialysis patients presenting with pruritus.

Method: Data was collected using a questionnaire that was designed in liaison with the Dermatology department; it used a grading system to capture their experiences of pruritus. Interviews to complete this questionnaire were held with 52 haemodialysis patients during dialysis sessions between May and August 2019. Patient responses were then collated with their dialysis duration, mode and frequency, and biochemical parameters including electrolytes, PTH, Haemoglobin and Urea levels.

Results: 29 of the 52 surveyed patients had been on dialysis for more than 24 months.
64% of the questioned patients reported having suffered from pruritus in the past and 48% reported to suffer from pruritus currently. Of these currently affected, 43% reported to have this daily and 20% weekly. In addition, 70% of the pruritus group suffered from dry skin in contrast to 32% of the non-pruritus group. Almost a fifth (19.4%) of those affected, rated their symptoms as severe.
There was no difference in PTH, haemoglobin or urea levels between the two groups, however phosphate levels were elevated in 33% of the affected group in comparison to 8% of the unaffected. Furthermore, 27% of the patients complaining of pruritus also reported that strict diet control (including the use of Phosphate binders) seemed to have an impact, another 16% stated heat avoidance helped.

Discussion: The limitations of our study are a relatively small sample size, the subjectivity of a symptom such as pruritus and the multifactorial element of the complaint; however, we can say that pruritus is problem for the majority of our patient cohort, there is no consistent treatment supplied to these patients beyond topical emollients and our traditional markers of dialysis quality are not markedly raised in those affected. In the future we feel that we should rather look at further qualitative measures to guide our treatment successes and test the speculation that simple interventions such as education, dietary guidance and simple emollients might have a bigger impact than complex protocols.

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Acute kidney injury identification: use of electronic AKI alerts versus electronic health records in Hospital Episode Statistics

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Background and Aims: Acute kidney injury (AKI) refers to an abrupt decline in the glomerular filtration rate (GFR) which may be associated with significant morbidity and mortality. Since April 2015, an automated real-time electronic alert system for AKI has been introduced and progressively implemented in England, with alert data being sent to the UK Renal Registry (UKRR) for collection into a master patient index (MPI). Historically, the only way to routinely measure AKI incidence in hospital was to analyse the Hospital Episode Statistics (HES). The introduction of the MPI allows for the first time a comparison between warning-test score defined AKI and clinical coding. This project aims to determine whether episodes of AKI identified in the UKRR MPI correspond to coded diagnoses on the discharge record held in HES.

Method: The UKRR MPI of all AKI electronic alerts (AKI stages 1, 2 and 3) in patients ≥18 years of age, between 01/01/2017 and 31/12/2017 were linked to HES data to identify a hospitalised AKI population. Descriptive analyses were conducted to describe the demographics and to investigate whether those with electronic AKI alert also had an International Classification of Diseases (ICD)-10 code for AKI (N17) in HES.

Results: From 01/01/2017 to 31/12/2017, 301,504 hospitalised adults received an AKI electronic alert. AKI severity was positively associated with the percentage of AKI alerts which were coded in HES. There was also a significant variation in HES coding between hospitals, but generally, variation was most pronounced for AKI stage 1, with a mean of 48.2% [SD 14], versus AKI stage 3, with a mean of 83.3 % [SD 7.3] (figure 1). There was an inverse trend with age in that younger adults AKI staging warning scores were less often coded in HES and this was true for all the three AKI stages (33% of AKI episodes coded in HES for people aged 18-29 versus 64% for people ≥ 85 years old) (Table 1).

Conclusion: In 2017, earlier stages AKI warning scores were poorly coded in HES. There was also high degree of inter-hospital variability, particularly for AKI warning score 1, reflecting potentially poor clinical recognition and documentation in medical records and subsequent clinical coding. AKI warning scores were poorly captured in HES for younger adults in comparison to those of older age; reasons for which need to be identified. Use of HES to identify cases of AKI is likely to underestimate the incidence of AKI, especially for AKI stage 1, though a high proportion of the most severe cases will be captured.

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Bariatric surgery in patients with kidney disease; a service evaluation capturing 5 years of practice in a tertiary specialist hospital

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Background
Obesity is a known risk factor for chronic kidney disease (CKD) (1) and has a prevalence of 20% in the adult CKD population (2). Bariatric surgery can be effective in inducing significant weight loss in the general population (3) and it can specifically bridge renal patients to a life-changing kidney transplant. However, it has higher risk of complications in people with lower renal function (4). Since there are no renal specific dietary guidelines available, the aim of this service evaluation was to determine the progress of all renal patients undergoing bariatric surgery in our tertiary specialist hospital in the past 5 years and the range and scope of renal dietetic intervention post-surgery.

Methods
Data on weight, changes in dialysis modality, dietetic contacts from all renal patients [chronic kidney disease (CKD) stages 3-5, receiving haemodialysis (HD) or peritoneal dialysis (PD)] who underwent bariatric surgery from September 2014-September 2019 were collected and analysed. The service evaluation was registered with the Therapies Quality and Safety team.

Results
In total, 16 renal patients (8 men and 8 women, average age 53 years) underwent bariatric surgery in the last 5 years, with 50% having a sleeve gastrectomy and 50% gastric bypass. The average weight loss 1 year after surgery was 35%. In 90% of patients, serum phosphate levels reduced or stayed within the normal range 10 days post bariatric surgery and in all patients at 6 months. In 86% and 87% of patients respectively, serum potassium levels reduced or stayed within the normal range 10 days post bariatric surgery and at 6 months. Patients receiving renal replacement therapy received more input from renal dietitians than bariatric dietitians, whereas the opposite happened to CKD patients post-surgery. Over this timeframe, 25% of patients who were on HD underwent transplantation, 12.5% progressed from CKD to needing dialysis, 19% remained on HD/PD and in 6.25% of patients, renal function improved.

Conclusion
Bariatric surgery enabled a significant number of patients to qualify for transplantation. Serum potassium and phosphate levels decreased in the majority of patients post-surgery. The CKD population was mainly seen by bariatric dietitians while for dialysis patients, dietetic care was mainly provided by renal dietitians. This service evaluation was limited by its observational, retrospective nature.

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Dietary Supplements – Harmless or Hazardous? An Unexpected Tango of Turmeric and Tacrolimus in Transplant Recipients

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Tacrolimus a calcineurin inhibitor is often used as an immunosuppressant post solid organ transplants (1). Therapy requires careful monitoring due to its narrow therapeutic index. It is largely metabolised by hepatic CYP3A4 enzymes leading to potential for interactions with other medication, herbal supplements and food. Concentrations are reduced by CYP3A4-inducers like rifampicin, phenytoin and herbal remedies (e.g. St John's Wort), risking sub-therapeutic blood concentrations and graft rejection. Conversely CYP3A4-inhibitors such as azole-antifungals, macrolide-antibiotics, calcium channel blockers, herbal remedies (e.g. Schisandra sphenanthera) and grapefruit juice increase concentrations risking toxicity. (2)

Several herbal remedies and supplements are being widely advocated as a part of a healthy life style or as non-medical remedies for ailments. Turmeric, an Asian spice/food colouring and traditional medicine is used for conditions including indigestion, arthritis, biliary disorders, peptic ulcers, ulcerative colitis, cancer, dementia, depression, diabetes and hypercholesterolemia.(3-5).

Here we report a case series of raised tacrolimus/creatinine concentrations associated with increased ingestion of turmeric. This was first noted in Patients 1 and 2 (husband and wife) in a routine renal transplant clinic. Both had sudden serum tacrolimus and creatinine rises around the same time. A subsequent consultation revealed they had started using turmeric in their home cooking weeks leading up to their clinic appointments. Following turmeric avoidance and temporal dose adjustments blood tacrolimus and creatinine concentrations returned to therapeutic range for both patients. A third and fourth patient who had abrupt tacrolimus concentration rises were found to be sprinkling turmeric on food and/or using it to make tea. Following tacrolimus dose reduction and advice to avoid using excessive amounts of turmeric blood tacrolimus concentrations also returned to therapeutic range.

It has been suggested that turmeric moderately inhibits the action of hepatic CYP3A4 enzyme. In an animal model study the AUC values of tacrolimus in rats pre-treated with grapefruit, ginger or turmeric juice were significantly larger than those pre-treated with water. A further study found that pretreatment with turmeric increases the plasma levels of tacrolimus in a murine model. In one published case a tacrolimus concentration of 29 ng/ml was recorded, leading to nephrotoxicity, following ingestion of '15 spoonfuls' of turmeric a day for ten days prior to testing. (5) The curcumin component of turmeric has been reported to alter function and expression of P-gp and CYP3A enzymes, however the clinical relevance of this remains unclear. (6,7)

The risk of drug-drug interactions with tacrolimus is well documented and common knowledge amongst healthcare professionals. However herbal medication and supplements are often overlooked or their use goes unreported by the patient. The risks are often not considered by the patients using them. Given that food supplements such as turmeric could have an effect on tacrolimus concentrations it is vital that patient's medications are reviewed regularly. This should include any over-the-counter, herbal remedies and supplements. Patients should receive regular education to ensure that they are vigilant and that they seek advice from a healthcare professional before taking any supplementary medications. Healthcare professionals also need to have awareness of seemingly harmless fads.

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Risk for TMA recurrence and renal outcomes after eculizumab discontinuation in aHUS: results from the Global aHUS Registry

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Background: Eculizumab (Ecu) modifies the course of disease in patients (pts) with atypical hemolytic uraemic syndrome (aHUS), but there are limited data to describe thrombotic microangiopathy (TMA) recurrence rates and long-term outcomes after Ecu discontinuation (d/c).

Methods: Pts in the Global aHUS Registry (NCT01522183) who received ≥1 month (mo) of Ecu with evidence of hematologic or renal response prior to d/c and with ≥6 mo of follow-up (f/u) were included. Those on chronic dialysis (≥3 mo) at the time of Ecu d/c were excluded. Classification as pediatric (<18 years) or adult was made at time of Ecu d/c.

Results: 151 pts (62% female) were included in the analysis: 34% were pediatric and 66% were adults (median [range] age at enrolment, 6.0 [0.6–17.1] and 35.7 [18.4–81.2], respectively), 11% had a family history of aHUS and 41% had a pathogenic variant or anti-CFH antibody. Median (range) duration of Ecu prior to d/c was 1.0 (0.1–5.1) and f/u was 2.3 (0.1–7.1) years. 24% experienced TMA recurrence after Ecu d/c. More pts required antihypertensives at f/u vs at d/c (71% vs 54%). Pts with a family history of aHUS, pathogenic variants, lower eGFR and extrarenal manifestations appeared to be at a higher risk of TMA recurrence (Table).

Conclusions: Discontinuation of Ecu is not without risk and may lead to TMA recurrence in some patients with aHUS. A careful assessment of risk factors prior to the decision to d/c Ecu is warranted.

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Efficacy and safety of the long-acting C5-inhibitor ravulizumab in adult patients with Atypical Hemolytic Uremic Syndrome (aHUS)

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Background: Ravulizumab was engineered to achieve extended complement C5 inhibition, given every 8 weeks, while retaining the proven efficacy and safety of eculizumab. Here we evaluate the efficacy and safety of ravulizumab in adults with aHUS.

Methods: This was a phase 3, single arm study (NCT02949128). Complement inhibitor-naïve patients (pts) aged ≥18 years who fulfilled diagnostic criteria for aHUS (exclusion of ADAMTS13 <5% activity and Shiga toxin-producing Escherichia Coli) and active thrombotic microangiopathy (TMA) received ravulizumab at 8-week intervals during the maintenance phase. The primary endpoint was complete TMA response during the initial 183-day evaluation period. Secondary endpoints included time to complete TMA response, components of complete TMA response over time, CKD stage, dialysis-free status over time and time to dialysis-free status.

Results: Fifty-six eligible pts were analyzed. Median age at baseline was 40 (range, 20–77) years and 36 (66%) were female. Complete TMA response was achieved in 30 pts (54%). 17/29 (59%) pts stopped dialysis (at a median time of 30 days). Primary endpoint and TMA parameter response over time is shown in the figure. Improvement in CKD stage from baseline was observed in 32/47 (68%) pts at Day 183. The most frequent serious adverse events were hypertension and pneumonia, each reported in 3 (5%) pts; 4 deaths not attributed to treatment occurred. No meningococcal infections were reported.

Conclusions: 8-weekly ravulizumab dosing produced immediate, sustained and complete complement inhibition resulting in rapid hematologic and renal response with no unexpected safety concerns.

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Patients' and healthcare professionals' experiences of an arts-based intervention for patients with end-stage kidney disease whilst receiving haemodialysis: A process evaluation.

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Background
Many patients with end-stage kidney disease (ESKD) require haemodialysis; a treatment that requires attendance at hospital three times a week, for four hours each visit. Empty time associated with haemodialysis is characterised by an experience of 'existential boredom' often impacting negatively on patient's mental health. Arts-based interventions have the potential to improve mental health by providing meaningful engagement during a difficult treatment; however, there is a lack of evidence assessing the acceptability of their implementation during haemodialysis for both patients and healthcare professionals.

Aim
To explore patients' and healthcare professionals' experiences of an arts-based intervention for patients with ESKD whilst receiving haemodialysis.

Methods
Patients and healthcare professionals were recruited from a rural haemodialysis unit within the United Kingdom, where a pilot cluster randomised controlled trial (RCT) of an arts-based intervention had been conducted. Patients were recruited into the process evaluation if they had participated in the pilot cluster RCT and healthcare professionals were recruited if they had observed implementation of the intervention at least once. Semi-structured interviews were conducted with participants and these interviews were transcribed verbatim and analysed inductively using thematic analysis.

Results
A total of 22 interviews were conducted: nine healthcare professionals, nine participants from the experimental group and four participants from the control group were interviewed. Four themes were identified: (1) the perception of art participation, (2)effects of art participation on patients and staff, (3) acceptability of the arts-based intervention and (4) acceptability of research procedures.

Conclusions
Despite initial patient apprehension, the arts-based intervention was highly acceptable to both patients and healthcare professionals. The intervention was effectively tailored to the clinical environment and acceptability appeared to be dependent on flexibility of implementation and one-to-one facilitation. Patients and healthcare professionals both reported benefits as a result of the intervention, these benefits were multifactorial and complex, but resulted in an overall improved dialysis experience. The main criticism of the intervention was that it was not long enough, with both patients and staff recommending implementation over a longer period of time.

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Sarcopenia, chronic kidney disease and the risk of mortality and end stage renal disease: findings from 428,331 individuals in the UK Biobank

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Introduction

Sarcopenia describes a degenerative and generalised skeletal muscle disorder involving the loss of muscle mass and function. In studies of the general population, sarcopenia is associated with adverse outcomes including falls, frailty, and mortality. However it remains an under-recognised yet important clinical problem in an ever-increasing ageing and multimorbid renal population. Whilst sarcopenia has been widely studied in end-stage renal disease (ESRD) patients, there is limited evidence of its prevalence and effects in those not requiring renal replacement therapy (RRT), particularly in large cohort studies and using the latest sarcopenia definitions. Using the UK Biobank, we aimed to identify the prevalence of sarcopenia in individuals with CKD and its association with mortality and risk of ESRD.

Methods

428,331 participants were categorised into a CKD (defined as eGFR <60ml/min/1.73m2 not requiring dialysis) and a non-CKD comparative group (no evidence of CKD). Sarcopenia was diagnosed using the EWGSOP2 criteria: 'probable sarcopenia' (low handgrip strength (HGS) <27 and 16kg, males and females respectively); 'confirmed sarcopenia' (low HGS plus low muscle mass, appendicular lean mass <7.0 and 5.5 kg/m2 by bioelectrical impedance); and 'severe sarcopenia' (low HGS and muscle mass plus slow gait speed). Patients requiring existing RRT were excluded. Patients were followed up until death or until they reached incident ESRD, defined as the need for RRT. All-cause mortality was extracted from national death records. Patients were followed up for a median of 9.0 years and data analysed using Cox modelling.

Results

CKD (non-dialysis) was identified in n=8,768 individuals (mean age 62.7 (±5.9) years, 44% male, eGFR 52.5 (±7.7) ml/min/1.73m2) compared to n=419,563 in the non-CKD comparative group (mean age 56.1 (±8.1) years, 47% male). Probable sarcopenia was identified in 10% of individuals with CKD compared to 5% in those without CKD (P<0.001). Confirmed sarcopenia was observed in 0.3% of those with CKD (vs. 0.2% in the non-CKD group, P<0.001). 0.2% of CKD patients satisfied all three criteria (severe sarcopenia) compared to 0.03% in those without CKD (P<0.001).

In CKD, regardless of criteria, sarcopenia was associated with a significant increased risk of mortality: probable sarcopenia, hazard ratio (HR) 2.1 (95%CI 2.0 to 2.2), P<0.001; confirmed sarcopenia, HR 4.1 (95%CI 2.1 to 8.0), P<0.001; severe sarcopenia, HR 5.1 (95%CI 2.1 to 12.3), P<0.001. 53 patients reached ESRD. Patients with probable sarcopenia were two-fold more likely to reach ESRD (hazard ratio (HR) 2.3 (95%CI 1.7 to 3.1), P<0.001)

Conclusions

In the largest cohort of its kind, probable sarcopenia was present in 10% of individuals with CKD. The risk of sarcopenia was significantly higher in those with CKD than those without. Regardless of criteria, CKD patients with sarcopenia were ~2-5 times more likely to die than those without sarcopenia. Patients with probable sarcopenia were twice more likely to require RRT. Our results show that sarcopenia is an

important predictor of mortality and ESRD in early non-dialysis CKD. Measuring markers of sarcopenia as standard practice may identify those most at risk of future adverse events and in need of appropriate interventions to mitigate its negative effects.

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Symptom burden clusters in people with chronic kidney disease

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Introduction
The symptom burden in people with chronic kidney disease (CKD) is high. Research suggests that, on average, patients suffer from 5-8 symptoms simultaneously dependent on stage [1-3]. Management strategies that address clusters of coinciding symptoms may be more effective in improving quality of life. However, evidence to inform such strategies is limited [4].
The objectives of this analysis were to:
(1) Describe the symptom burden of CKD patients treated in secondary care in the UK, by treatment modality
(2) Identify symptom clusters and to what extent they differ between CKD treatment modalities

Methods
This work is part of a larger study of symptom burden and health-related quality of life in CKD patients, using data from the Transforming Participation in Chronic Kidney Disease project and the UK Renal Registry. Fourteen renal centres across England collected patient-reported symptom data captured by the POS-S (Palliative care Outcome Scale – Symptoms) Renal questionnaire [5], which assesses 17 symptoms on a 5-point scale (0=not at all, 1=slightly, 2=moderately, 3=severely, 4=overwhelmingly). A patient's total symptom score was defined as the sum of their individual symptom scores. The total number of symptoms was the number of symptoms with a score of two or more (i.e. at least moderately affected by the symptom, limiting some activity or concentration). For both objectives, we analysed data stratified by modality (pre-end stage renal disease (pre-ESRD), peritoneal dialysis (PD) haemodialysis (HD) and transplant (Tx)). For objective 2, we used principal component analysis (PCA) to investigate clustering of symptoms.

Results
3256 patients were included; 718 (22%) were pre-ESRD, 129 (4%) were on PD, 1509 (46%) on HD, and 900 (28%) on Tx. HD patients had the highest overall symptom score and the highest number of symptoms (mean (SD) 18.2 (11.6) and 6.5 (3.9), respectively), while Tx patients had the lowest (mean (SD) 11.6 (10.3) and 4.8 (3.5)). Weakness or fatigue was the most commonly reported symptom across all modalities, and was at least moderately affecting over 60% of HD and PD patients, compared to 38% of Tx patients. Other commonly reported symptoms included poor mobility (45% of all patients), difficulty sleeping (38%), and pain (37%).
For HD and Tx patients, similar clusters were seen with one relating to skin and physical discomfort, one cluster of gastrointestinal symptoms and a third cluster of more varied but co-occurring symptoms (Figure 1). For pre-ESRD patients, the skin cluster was not identified but anxiety and depression formed a separate cluster. Only two clusters were identified for PD patients, potentially due to the smaller size of this subgroup, with skin and gastrointestinal symptoms appearing together.

Conclusion
People with CKD in England, in particular those receiving HD, have a high symptom burden, characterised by both a high severity and number of co-occurring symptoms. Symptom clusters differed between pre-ESRD

patients and people on renal replacement therapy. As a next step, we will investigate the association between symptom cluster scores and quality of life. This will inform which clusters warrant future studies to develop and evaluate cluster-level symptom management strategies.

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Recurrent urinary tract infections are associated with significantly worse renal transplant function

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Background: Urinary tract infections (UTIs) are the commonest infection affecting kidney transplant recipients (KTRs). Transplant pyelonephritis has a negative effect on long term graft survival. A proportion of these patients have recurrent infection or persistent infection with relapse on stopping antibiotics. Despite being an important clinical problem the incidence of recurrent and antibiotic treatment failure is not known.
Method: The study was a retrospective cohort study of KTRs admitted to a single transplant centre from 1st January 2012 to 31st October 2019. Information on all admissions coded for UTI in KTRs was collated, and subdivided into individuals with (a) single admission or (b) multiple admissions, whether separate episodes or re-admissions (<1 month) indicating a possible recurrence of the infection of the index admission. Individuals with a re-admission within one month due to a UTI were matched to individuals with a single UTI, according to age, gender and transplant age. Data was collected on demographics, biochemistry, microbiology and transplant outcome. Statistical analysis of normally distributed data was performed using chi squared and t-tests.
Results: Within the studied time period, there was an average 126 hospital admission per year due to UTI or pyelonephritis. Of these, 394 (41.7%) individuals had a solitary episode of UTI necessitating admission. There were a further 551 episodes affecting 169 individuals. Fifty five (9.8%) individuals were re-admitted with a further UTI within one month of index admission suggestive of treatment failure, and of these, 11 (20%) had more than one re-admission .
Those who were re-admitted within one month, with presumed treatment failure, in comparison to those who had a single admission had a trend towards a higher creatinine at baseline (mean 232 versus 194µmol/l, p=0.16). The mean creatinine did not change significantly at re-admission (mean 220 µmol/l, p=0.39). Long term however outcome was significantly worse with only 34/55 having a functioning transplant (control group 52/55, p=0.001). The mean GFR in those KTR with a functioning graft was 48.5mls/min in the cohort with recurrent UTIs versus 53.0mls/min in the control group (p=0.32).
The index admission was also comparable between the groups with organisms identified in 33/55 of the cohort versus 36/55 of the control (p=0.55) and neither did duration of antibiotic treatment between the groups (recurrent UTI cohort 11.3 days versus control 13.6 days, p=0.70).
Discussion:
UTI recurrence, after initial treatment failure, is an important cause of morbidity and long term associated with a significantly worse graft outcome. Ensuring adequate duration of antibiotic treatment and resolution of the underlying risk factors should be integrated within routine care to reduce the risk of UTI recurrence.

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Evaluating the impact of routine colecalciferol on secondary hyperparathyroidism: are renal guidelines missing something?

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Background
Vitamin D deficiency and insufficiency (serum 25(OH)D <30nmol/L and <75nmol/L respectively) is prevalent in haemodialysis patients and is associated with secondary hyperparathyroidism (SHPT). Lack of renal 25-hydroxyvitamin D-1α-hydroxylase (CYP27B1) for the conversion of 25(OH)D to active 1,25(OH)D is well acknowledged in end stage renal disease (ESRD) with the routine use of active vitamin D analogues. However, this overlooks 25(OH)D deficiency. Following the development of a new local clinical guideline, our Trust introduced colecalciferol supplementation to all in-centre haemodialysis patients as part of standard routine care. Colecalciferol supplementation was given to replete serum 25(OH)D to ≥75nmol/L as follows: serum 25OHD <50nmol/L repletion dose of 40,000IU weekly for 3 months, ≥50nmol/L maintenance dose of 20,000IU fortnightly, >150nmol/L stop and recheck in 3 months.

Aim
To assess whether increased serum 25(OH)D reduces parathyroid hormone (PTH) levels, measured by a reduction in mean serum intact PTH.

Method
All in-centre haemodialysis patients at our Trust were included in this study (n=350). Retrospective data looking at PTH levels was collected for 12 months prior to the introduction of colecalciferol (T-12 to T-1). The same data was collected prospectively for 15 months post introduction of colecalciferol (T0 to T15). This allowed 3 months to achieve serum 25(OH)D repletion, followed by 12 months post repletion (T4 to T15). Patients with insufficient data, and those that had a parathyroidectomy prior to, or during the study, were excluded. The number included in the final analysis was 280. Serum calcium and 25(OH)D were also collected. NHS ethical approval was received. Whole cohort, and grouped analysis was carried out using a related samples Wilcoxon signed rank test to compare mean PTH pre (T-12 to T-1) with mean PTH post (T4 to T15) serum 25(OH)D repletion. Data were grouped, according to mean PTH levels pre vitamin D supplementation (T-12 to T-1), as follows: on target (8.4-37.8pmol/L), high (37.9-85pmol/L) and very high (>85pmol/L), Data shown is mean±SD.

Results
Prior to vitamin D supplementation (T-12 to T-1) the whole cohort mean PTH was 40.3±37.5pmol/L; following the introduction of vitamin D supplementation (T4 to T15) this reduced to 36.7±34.8pmol/L (ns). The grouped analysis revealed no difference in the patients that had on target mean PTH levels but a significant reduction in PTH was seen in the high and very high PTH groups: 52.2±13.5pmol/L vs. 46.5±24.3pmol/L $p<0.05$, and 130.2±26.7pmol/L vs. 92.9±59.8pmol/L $p<0.001$ respectively. Colecalciferol supplementation effectively increased serum 25(OH)D from 27.4±25.3nmol/L at T0 to 120.0±27.1nmol/L at T15 ($p<0.0001$). Mean serum calcium increased from 2.29±0.13mmol/L (T-12 to T-1) to 2.35±0.13mmol/L (T4 to T15) ($p<0.0001$) but remained well within target range. No hypercalcaemia was directly associated with colecalciferol supplementation.

Conclusion

The vitamin D supplementation guideline developed for haemodialysis patients at our Trust, is both effective and safe. This study indicates that patients with the highest serum PTH levels are likely to have the most significant PTH reduction following normalisation of serum 25(OH)D. The use of colecalciferol concurrently with active vitamin D analogues is shown to be safe and may prove useful in aiding the management of SHPT.

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A discrete choice experiment to elicit prevalent haemodialysis patient attitudes to longer or more frequent in-centres haemodialysis regimes

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Introduction: Longer and more frequent haemodialysis have been associated with changes in survival, quality of life and vascular access patency, but how these outcomes influence uptake of more intensive dialysis regimes is unknown. Quantification of patient preferences and likely uptake could inform clinical trial design, dialysis capacity and policy.

Methods: A statistically efficient discrete choice experiment (DCE) was completed by three times a week haemodialysis patients on treatment for at least one year, which described a scenario where they had high ultrafiltration and significant symptom burden and were offered 4.5 hr haemodialysis sessions three times a week (longer), four times a week haemodialysis, or to continue on their current regime. To elicit preference the specific survival, quality of life, fluid restriction, hospitalisation and vascular access implications associated with these regimes varied across 12 questions. A mixed logit regression model quantified preference for the regimes and attitudes to the benefits and harms. Demographic, patient experience and fatigue questions were also collected.

Results: 194 patients completed the DCE across five centres in England, with a mean age of 63.8 years, 62.3% male, 79.9% Caucasian who had been on renal replacement therapy for a mean of 4.22 years with 22.2% dialysing via a line. 24.7% and 14.8% of patients had previously been approached about longer hours and 4xW HD respectively. When reading the scenario 78.7% felt it sounded a bit or a lot like them. Improvements in quality of life, survival and fluid restriction were associated with increased odds of regimes being selected while increased vascular access complications reduced them (all $P<0.01$). Patients who were younger valued survival advantages more, while older patients found the augmented regimes less preferable (all $P<0.001$). Patients with experience of access problems were more likely to choose an augmented regime ($P<0.001$) but had similar concerns about increases in access complications, while dialysing via a line did not significantly alter regime preference or attitude to access complications. Patients who lived nearer the dialysis unit, had been offered an augmented regime previously, and who felt the scenario sounded like them were more likely to select an augmented regime ($P<0.05$).

When applying benefits and harms values from observational and trial data for longer and four times a week haemodialysis to the model, when presented with this scenario 17.8% of patients would choose longer treatments, 35.9% would choose four times a week in-centre haemodialysis and 46.2% would stay on their current treatment.

Discussion:This DCE quantifies how benefits, harms and the treatment burden associated with longer and four times a week haemodialysis influences patient choice, aligning with existing literature. With relatively high predicted uptake of these regimes, priorities should include obtaining robust estimates of treatment effects and modelling dialysis capacity implications.

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Sodium zirconium cyclosilicate for the treatment of persisent hyperkalaemia in prevalent haemodialysis patients: Experience from clinical practice

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Background and Aims: Sodium zirconium cyclosilicate (SZC) (Lokelma®) is a new oral potassium binder. In September 2019 the UK National Institute for Health and Care Excellence (NICE) did not recommend SZC for dialysis patients due to a lack of evidence [1]. The recent DIALIZE phase 3b randomised controlled trial concluded that SZC is an effective and well-tolerated treatment for hyperkalemia in haemodialysis (HD) patients [2]. We offer an insight into SZC treatment in HD patients with persistent hyperkalaemia in clinical practice.

Method: Adult prevalent HD patients prescribed SZC for persistent hyperkalaemia were included for analysis. The highest pre-dialysis serum potassium (sK+) values were recorded each month before (M-6 to M-1) and after (M1 to M5) SZC initiation. The primary efficacy measure was a reduction in sK+ with SZC treatment.

Results: Sixteen patients (mean age 53.5 years, 56.3% male) were included for analysis. 43.8% (n=7) were diabetic. At the time of SZC initiation 43.8% (n=7) received HD via arteriovenous fistula, 12.4% (n=2) via arteriovenous graft and 43.8% (n=7) via tunnelled central venous catheter. The mean Urea Reduction Ratio [SD] was 68.5% [10.8] and the mean [SD] pre-HD bicarbonate was 22.8mmol/L [2.7]. The dialysate potassium prescription was 2mmol/L for 93.8% of patients (n=15) and 1mmol/L for 6.2% of patients (n=1). The mean [SD] achievement of prescribed dialysis hours over the previous 4 weeks was 93.5% [12.2]. 68.8% (n=11) had previous treatment with calcium polystyrene sulfonate and 12.5% (n=2) with patiromer. 18.8% (n=3) were currently prescribed a renin-angiotensin-aldosterone system inhibitor. 93.8% (n=15) had received dietetic advice. SZC starting doses ranged from 5g four times a week on non-dialysis days to 10g three times a day.

Mean [SD] sK+ at month-1 (M-1) (immediate pre-treatment period) was 7.38mmol/L [0.31]. Mean [SD] sK+ at month 1 (M1) was 6.37mmol/L [1.21]. The statistical difference between these groups was p=0.0023 (paired two-tailed T-test). Figure 1 includes mean maximum monthly pre-dialysis sK+ from M-6 to M5.

SZC was stopped in two patients (after M1 with sK+ 5.0mmol/L and after M4 with sK+ 4.3mmol/L) as it was no longer clinically indicated. Two patients became non-compliant (clinician-suspected or confirmed by patient) with SZC after M2 (sK+ 6.7mmol/L and sK+ 6.4mmol/L). Subsequent sK+ values would not reflect treatment with SZC in these patients. Figure 2 includes mean maximum monthly sK+ for the 12 patients on SZC from M-3 to M5.

ANOVA and post-hoc Dunnett's tests were undertaken to compare SZC treatment months (M1, 2, 3, 4 and 5) to the immediate pre-treatment period (M-1). ANOVA was close to significance (p=0.058), with post-hoc corrected for multiple comparisons finding the data to be significant for M1 vs. M-1 (p=0.045) and M5 vs. M-1 (p=0.018). The same tests across M1 through M5 revealed no significant difference (p=0.968 ANOVA

and p=0.555 Dunnett's), demonstrating that continued treatment with SZC to M5 did not result in a further decline in sK+.

Conclusion: Sodium zirconium cyclosilicate is effective in reducing pre-dialysis sK+ in patients with moderate and severe hyperkalaemia undergoing haemodialysis in clinical practice.

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Pregnancy in women with relapsing minimal change disease – experience of a Tertiary Renal Obstetric Centre

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Background: In the past, termination of pregnancy was recommended when minimal change disease (MCD) recurred in a pregnant woman. Recent data on outcomes in pregnant women with MCD are lacking.
Methods: From our database of women attending the renal obstetric clinic from 1997-2019, we identified all women with MCD. We report obstetric outcomes: number of successful pregnancies, preeclampsia, preterm delivery and birth weight; and, maternal outcomes: relapse, acute kidney injury and worsening of renal function, hypertension (HTN).
Results: Out of 990 pregnancies in the database, we identified 21 pregnancies in 14 women. All women were in remission with no proteinuria at the time of conception. The majority (67%) of women were on immunosuppression: tacrolimus with or without prednisolone (43%, 9/21); cyclosporine with prednisolone (9%, 2/21); steroids alone (9%, 2/21); recent rituximab in an unplanned pregnancy (1/21).
The majority of babies (75%, n=15) delivered at term. Median gestation was 38 weeks [interquartile range (IQR) 36-40]. Small for gestational age incidence was 5%. There was one miscarriage at 18 weeks. No women developed pre-eclampsia and no congenital abnormalities were seen.
Relapses were seen in two women who stopped their maintenance immunosuppression, one during pregnancy and one postpartum. A third woman with frequently relapsing disease relapsed postpartum. One heavily nephrotic patient diagnosed during pregnancy developed AKI. One non-adherent hypertensive patient had worsening HTN during pregnancy and another had de novo HTN.
Conclusions:
In this series, the largest of the last thirty years, of women with relapsing MCD, despite high rates of immunosuppression, pregnancies were largely uncomplicated. Apart from an increased risk of prematurity, our data suggest pregnancies in MCD in remission are safe and that establishing secure remission is key.

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Initiating dialysis improves symptom burden in patients and slightly improves in spouses: A longitudinal, multi-centre study

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Background

Before initiating of dialysis, patients experience a high degree of symptom burden. However, little is known about initiating dialysis affects their symptoms over the first 90 days. Although patients' spouses are integral in their care, limited research exists which describes spouses' own symptoms or how their symptoms are affected by the patient starting dialysis. The aim of this study was to examine changes in symptom burden in patients and their partners over the transition from pre-dialysis to the first 90 days on dialysis.

Methods

10 renal units in England took part in this observational, longitudinal study and recruited patients preparing to start either peritoneal or haemodialysis and their spouses. Data was collected at three time points: pre-dialysis (baseline, 83 couples), 45 days (follow-up 1, 42 couples) and 90 days after initiating dialysis (follow-up 2, 39 couples). At each time point, participants completed the POS-Symptom (patients: renal version; spouses: generic version). Multilevel modelling will be used to estimate the changes in symptom scores and test the relationship between baseline demographic variables and changes in symptom burden.

Results

Preliminary descriptive statistics suggest there may be a significant reduction in symptoms in patients from pre-dialysis to 90 days (symptom severity: 20.9 ±11.5 vs. 16.1 ±9.9; number of symptoms: 9.3 ±4.2 vs. 3.9 ±5.0). Symptoms in spouses also seem to improve slightly over this transition period (symptom severity: 9.3 ±8.7 vs. 8.4 ± 7.4; number of symptoms: 4.7 ±3.6 vs. 2.3 ±3.3). Figure 1 shows overall symptom severity to decrease (indicating less symptom burden) at 6 weeks which remains stable at 12 weeks. The figure indicates that spouses' symptoms do improve minimally over this time period.

At pre-dialysis patients reported weakness/lack of energy, drowsiness, poor mobility and itching as the most severe. Each of these improved after starting dialysis; however, pain worsened. At pre-dialysis, the spouses reported weakness/lack of energy, difficulty sleeping and pain as the most severe, but these did not change over time. Completed analysis with inferential statistics will be presented.

Conclusions

This research is one of the first to investigate changes in symptoms in patients and their spouses over the transition onto dialysis and up to the first 90 days. These findings provide insight into the initial effects of dialysis in patients and their spouses. Understanding factors associated with changes in symptoms may help to prepare patients, and their spouses, for starting dialysis.

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Non-classical monocytes increase after fistuloplasty of an arteriovenous fistula and may promote restenosis

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Introduction: An arteriovenous fistula (AVF) is the preferred method for providing vascular access for haemodialysis. Stenotic lesions caused by neointimal hyperplasia (NIH) commonly occurs in fistulas resulting in patients requiring a fistuloplasty procedure, yet restenosis in the AVF occurs in nearly half of patients within their first year of their procedure by poorly defined mechanisms. The purpose of this study is to investigate the factors which may lead to restenosis occurring in the AVF following a fistuloplasty procedure.

Methods: Resected AVF tissue from 4 patients were histologically characterised. The expression of 50 proteins were analysed in 30 pairs of plasma samples taken pre- and 1-day post-fistuloplasty via Luminex and ELISAs. These samples were from patients recruited to the PAVE trial but then found to be ineligible and not randomised. Using flow cytometry, lymphocytes and monocyte subsets were analysed in 20 pairs of pre- and post-fistuloplasty cryopreserved peripheral blood mononuclear cells (PBMCs). Monocyte populations were further investigated by carrying out flow cytometry on fresh whole blood with counting beads from 5 patients undergoing a fistuloplasty. This allowed assessment of absolute cell numbers.

Results: Histological findings revealed that most of cells within the neointimal lesion are myofibroblasts (alpha SMA+), with smaller numbers of contractile (SM-MHC+) smooth muscle cells. AVF tissue from different patients had variations in the number of CD68+ and CD34+ cells within their neointimal lesions. Plasma myeloperoxidase significantly decreased 1-2 days after the fistuloplasty procedure, whilst IL-6 and TNF-a significantly increased. The proportion of intermediate (CD14++CD16+) and non-classical (CD14+CD16+) monocytes increased one day post procedure. Time course experiment in 5 patients with fresh whole blood confirmed the increase in the proportion of non-classical monocytes at day 1. They further showed no change at 3 hours and demonstrated that the proportional changes were due to an increase in the number of non-classical monocytes and not a decrease in classical monocytes. There were no changes in CD4+ T cells, CD8+ cells, gamma delta T cells, CD19+, or NK cells.

Discussion: The phenotype of CD16+ non-classical monocytes released post-fistuloplasty requires further study. The presence of CD68+ monocyte-like cells within the neointima suggests that CD16+ cells may infiltrate the neointima and have pathogenic potential. Furthermore, myeloperoxidase, IL-6 and TNF-a may be of importance at the local site of injury during restenosis.

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An audit of phosphate binder and Cinacalcet wastage in a haemodialysis population

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Background:
Phosphate binders and Cinacalcet are commonly used to control biochemistry and complications of CKD-MBD in end stage renal disease. However, due to factors such as pill burden, size and side effects, concordance with these tablets can be a challenge. Some of these medicines are expensive and despite prior counselling with patients by showing actual tablets, discussing how to take and common side effects, it has been noted that drug wastage is common. The base hospital pharmacy was contacted to request an initial smaller supply but was unable to issue due to limitations of the medication packaging stipulating to store medication in original container. This audit was conducted to establish the cost wastage of these tablets.

Method:
All new prescriptions for phosphate binders and Cinacalcet were recorded in 7 of our haemodialysis units, for a 6 month period (May 2019 – Nov 2019). Information was collected if patients continued or whether they discontinued the new medication. The number of tablets prescribed to the patient and the amount taken before they were discontinued was documented so that wastage costs could be calculated. Cost per tablet was calculated using the drug tariff price.

Results:
86 new prescriptions of phosphate binders or Cinacalcet were commenced in the 6 months of the audit period. Of the 86 prescriptions issued, 11 were discontinued by patients. The medications discontinued were Velphoro, Cinacalcet, Fosrenol and Renvela . The number of new prescriptions issued for these medications were 15, 13, 9, 9 respectively . Three (33%) were discontinued by patients for Velphoro, 6 (40%) for Cinacalcet, 3 (23%) , 1 (11%) for Fosrenol and 1 (11%) for Renvela. The two medications most commonly discontinued are both prescribed from the base hospital, and not by General Practitioners. The most commonly cited reasons were side effects and taste. The cost of the estimated wastage was £3253.38.

Conclusion:
This audit concludes that many patients prescribed phosphate binders and Cinacalcet discontinue these medications soon after the first supply is received due to reported side effects. With the smallest volume of prescription available for issue being 28 days, large number of tablets are wasted and this results in a substantial wastage costs. This seems particularly relevant as the Renal Association is no longer advocating calcium phosphate binders as the 1st line treatment so there may be an increase in more expensive non-calcium containing phosphate binders being prescribed. Having access to smaller initial volume of prescribed phosphate binders and Cinacalcet to assess tolerance and palatability , it is proposed, could contribute significantly to cost saving in prescriptions of these items. This needs further investigating to assess whether small supplies could be prescribed via pharmacy.

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An Inexpensive Method for Vascular Access Monitoring & Surveillance at A Satellite Dialysis Unit.

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Introduction:
Inadequate functioning vascular access is the leading cause of hospitalization in renal patients which results not only in significant cost implications in terms of hospital admissions but also serious consequences in morbidity & mortality.
We have at our center, which is a satellite unit commenced a cheap yet effective systematic vascular access monitoring and surveillance program to identify deteriorating AVF performance.

Methods:
Surveillance- All staff at our center were trained to do an access flow (Qa) measurement for the Fresenius 5008s machine and an. Qa algorithm was developed, Qa readings were categorized as Green (>500ml/min BF to be re-examined 3 monthly), Amber (400-500ml/min BF to be re-examined monthly), or Red (<400ml/min or 25% reduction from the previous reading -for duplex Doppler ultrasound scan and referral to the Vascular Access Specialist nurse for further review).
All patients with physical and clinical symptoms of access insufficiency regardless of the Qa readings are also referred. All access following fistulopasty is also subject to the Qa algorithm.
Monitoring of the process – all results of the regular pre, intra and post haemodialysis (HD) assessment of AVF are clearly documented in the patient HD booklet.
We aim to perform access flow measurements for all patients with functional AVFs in our center and conduct referral based on the Qa algorithm.

Results:
For 20 months (April 2018 – December 2019) upon commencement of the Qa measurements, we have a total of 317 Qa readings performed on patients with further ongoing routine examinations to date. Of these, 260 (82%) gave a result of Green, 32 (10%) of Amber and 25 (8%) materialized as Red and consequently automatically referred as per algorithm.
Of these 25 patients that were identified as Red, 17 (68%) had fistuloplasties. 18 (56%) of the 32 patients on Amber presented with physical and clinical symptoms were referred and
had fistuloplasties.
Of these 57 total referrals, 35 (61.4%) patients have undergone fistuloplasties. The remaining 22 (38.6%) patients were monitored monthly.

The vascular access rate at our haemodialysis centre: 82 (91.1%) AVF, 2 (2.2%) AVF and 6 (6.6%) CVAD.

Conclusion
Monitoring & Surveillance can be used in combination to achieve the goal of maintaining AVF patency. This can reduce emergency hospital admissions. When implemented in a timely & systematic way, both work in reducing thrombotic events and allow timely referrals to Vascular Access Specialist service. Qa measurement is inexpensive and monitoring is free of cost.

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Educational tools for haemodialysis patients: Development of a haemodialysis education day

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, M Akter, R Agyekum, P Ceesay, M Sesay, A, Santiago, M Neale, AC Rankin

INTRODUCTION:
Patients receiving haemodialysis are often comorbid and mortality rate is high. Non-compliance and disengagement with dialysis treatment may lead to poor quality of life, increased hospital admissions and reduced survival.
The NICE quality standard for RRT suggests that patients on RRT, their families & carers should have access to individualised education programs at specialised renal centres. Better education may improve wellbeing, physical functioning and potentially improve focus areas such as vascular access and self-care, and sustained patient engagement.
After recognising that our patients on haemodialysis had no formal education program, a project to develop an HD education was initiated in 2014.
METHODS:
In order to gauge interest for an HD education morning, a questionnaire was sent to our HD population to explore factors such as preferred location, preference for dialysis or non-dialysis day and subjects of interest.
A multidisciplinary team was formed including doctors and specialist nurses as well as renal counsellors, dietitians, technologists and physiotherapists. This team developed talks relevant for the educational morning.
To investigate baseline knowledge of patients a modified knowledge questionnaire was used and an evaluation form was developed to determine how useful the educational tool was for our patients.
All patients undergoing haemodialysis at our unit were invited to attend the education day on a first come first served basis.
RESULTS:
Questionnaires to determine patient interest were sent out to each of the 7 HD satellite units. Responses rated ranged between 42% and 58% depending on the unit. The majority of patients mentioned they would like to attend an education day for HD patients (62.5% - 86%); there was an overwhelming preference for the education sessions to be held at the patient's local unit & on their dialysis days (57%-80%).
A pilot haemodialysis education morning was therefore organised. HD patients invited, patients were allocated a place on a first come first served basis. After 32 patients had responded positively no further patients were accepted onto the HD education morning due to venue size.
Of these, only 4 attended the day & 2 completed the knowledge questionnaire but scored highly with 12-13/15 questions answered correctly. Feedback from all 4 patients was very positive, with all presentations scored as either useful or very useful. Most useful sessions as determined by the evaluation form were the kidneys and HD session, shared care, and access, and the information given was thought to be just right according to the patients.
Two further education days have produced improved but still low attendance of 12 patients and 11 patients, respectively, despite a large HD population. 8/11 patients of third session completed the knowledge questionnaire forms scoring between 8-15/15. Feedback forms were not available but verbal feedback was very positive.
CONCLUSIONS

An HD education morning is a popular concept with our HD population but was poorly attended. Patients that did attend the day were very satisfied with the educational morning.

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Administration of oral nutritional supplements and enteral tube feeds on inpatient renal wards

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Introduction:
This audit comes in response to an incident where a patient receiving haemodialysis experienced several episodes of hyperkalaemia. After excluding dietary and medical causes, a potential source of potassium was identified as being the incorrect Oral Nutritional Supplements (ONS).
This audit set to identify how many patients, who were prescribed oral or enteral nutritional products, received the correct product, as administered by nursing staff on two renal wards.
As many as 35% of people with Chronic Kidney Disease are at risk of malnutrition on admission to hospital[1]. ONS are commonly prescribed on medication charts to support oral intake and to minimise exacerbation of malnutrition. Where there is no oral route available or oral intake is less than 60% of nutritional requirements, enteral tube feeds (ETF) are recommended[2]. Observation on two renal wards has shown that these are being given incorrectly which can lead to error.
Medication errors are common and error rates are difficult to quantify[3]. There is very little published data on ONS and ETF prescribing and administration errors in the hospital setting.

Methods:
All patients were observed at bedside being administered their prescribed ONS or ETF. The type, volume and time administered was recorded and compared with that prescribed on the patient medication chart. Where these were not given on time, a further bedside observation was undertaken approximately 30 minutes after. Any products administered after 30 minutes that were observed at bedside, were also included and the time recorded as not given within 30 minutes.

Results:
81 administrations were audited for patients prescribed either ONS or ETF. 82.3% administrations of ONS were observed, with 17.7% administrations not observed. 100% of ETF administrations were observed.
Of the observed administrations of ONS, 60.7% used the correct product and 94.6% were given the correct volume of ONS. Only 17.3% administrations of ONS were given on time, rising to 39.1% after 30 minutes.
Of the observed administrations of ETF, 91.6% used the correct product as it was prescribed on the patient medication chart. Only 63.6% of ETF were administered the correct volume. 33% of ETF administrations were given on time, rising to 50% after 30 minutes.
In total, only 66.1% of ONS and ETF administrations used the correct nutritional product as it was prescribed, with 33.9% being incorrect. 89.5% of all administrations were given the correct volume. The total number of administrations given on time, as prescribed was 19.7%. After 30 minutes, the total number of administrations increased to 40.7%.

Conclusion:
Patients routinely receive the incorrect nutritional product via the oral or enteral route. Most patients do not receive ONS or ETF on time. This suggests nursing staff may find difficulty in differentiating between nutritional products, which can impact a patient's nutritional, electrolyte intake and fluid balance. Training and education on available nutritional products to nursing staff is crucial and should be reviewed regularly.

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Strategies for Reduction of Cardiovascular Risk: Effect of Time and Different Treatments on Lipids in Membranous Nephropathy

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Introduction

Treatment of membranous nephropathy (MN) is traditionally focused on reducing progression of CKD in the long term, and mitigating complications of nephrotic syndrome in the short term. Although patients with MN are at increased risk of cardiovascular events when nephrotic, the course of hyperlipidaemia and effects of treatment upon this are poorly characterised. We conducted a retrospective study to define differences in lipids according to treatments received for MN.

Methods

We identified patients with MN for whom demographic and treatment information was available who had serum cholesterol measurements available at the time of diagnosis, and 3, 6 and 12 months after starting treatment. Differences in serum cholesterol measurements and treatment groups were assessed by two factor ANOVA and Tukey's post-hoc testing using the R statistical computing language.

Results

A total of 234 patients were included in the analysis. 32% of patients were female and the median age at diagnosis was 51 (interquartile range 21 years).

41% of patients were treated with a calcineurin inhibitor (CnI), predominantly Tacrolimus, 23.5% with Cyclophosphamide, 26.4% with supportive treatment (e.g. ACE inhibitor or angiotensin II receptor blocker) and 9% with Rituximab.

Distributions of cholesterol measurements by treatment type and length of follow up are shown in the left panel of the figure. The duration of follow up had a significant effect on total serum cholesterol (P-value 8.6x10-9 by two factor ANOVA), with cholesterol falling with increasing time from starting treatment (assessed by Tukey's post-hoc testing).

Serum cholesterol was also significantly different according to treatment used (P-value = 2.9x10-7 by two factor ANOVA). The difference in means and associated confidence levels for all possible treatment pairs are shown in the right panel of the figure. A negative difference implies the second listed drug is associated with a lower cholesterol measurement. Cyclophosphamide treatment was associated with lower mean cholesterol compared to CnI, rituximab and supportive treatment (P-values 2.1x10-6, 0.018, 5.8x10-6 respectively). All other treatment comparisons (those in the right panel whose confidence intervals span zero) had similar means.

Conclusion

This preliminary, retrospective analysis of a large cohort of patients with primary MN suggests successful treatment of nephrotic syndrome improves cholesterol, thus modifying the burden of cardiovascular risk. In addition, serum cholesterol may be differentially affected by the treatment used, a factor that ought to be considered in the timing and choice of therapy in the era of less toxic agents.

It is likely that the effects of rituximab may be incorrectly estimated in these data due to its relatively low use (9% of patients). Additionally, time to starting immunosuppressive treatment, time to remission, relevant co-morbidities, and use of lipid lowering agents, are likely to affect treatment response of lipids in MN.

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Serum biomarkers, but not Dual Energy X-ray Absorptiometry, predict cortical bone mineral density in children and young adults with CKD

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Introduction

Currently available biomarkers and Dual-energy X-ray Absorptiometry(DXA) are thought to be poor predictors of bone mineral density(BMD). The 2017 KDIGO guidelines on chronic kidney disease mineral bone disorder(CKD-MBD) propose using DXA if it will affect patient management or if the patient is at risk of fractures. This recommendation is based on evidence from older people with CKD, and may not be relevant in young patients.

We set out to determine the clinical utility of DXA and routine clinical biomarkers in the young CKD population, by comparing them with tibial cortical BMD measured by peripheral Quantitative Computed Tomography(pQCT). pQCT clearly defines cortical and trabecular bone compartments, and tibial cortical BMD Z-score predicts future fracture risk in CKD[1].

Methods

We performed a prospective multi-centre cross-sectional study: 77 participants on dialysis and 26 in CKD4-5(n=103 total) were compared with 62 age-matched healthy volunteers. Patients under 30 years of age were studied as bone mineral accretion may continue up to 30 years of age when peak bone mass is achieved. Participants underwent hip and lumbar spine(LS) DXA [for areal BMD (aBMD)] , tibial pQCT(for volumetric BMD) and measurement of routine serum biomarkers. All pQCT and DXA measures were expressed as Z-scores adjusted for age, sex, race and height or growth as appropriate. Tibial cortical BMD Z-scores was used as the gold standard to evaluate the predictive value of other measures.

Results

CKD-MBD related morbidity, such as bone pain that hindered activities of daily living was present in 58% of participants. 10% suffered from at least one previous low-trauma fracture.

Hip Z-scores were significantly lower in dialysis compared to CKD or healthy participants ($p=0.01$ & $p<0.001$). DXA LS Z-scores were higher in CKD compared to the dialysis population, with a corresponding higher tibial trabecular BMD Z-score on pQCT ($p=0.006$ & $p=0.02$). pQCT tibial cortical BMD and cortical mineral content Z-scores were significantly lower in dialysis compared to CKD patients ($p=0.01$ & $p=0.05$ respectively)(Figures 1a and b).

Hip Z-scores and LS aBMD Z-scores did not correlate with any biomarkers or tibial cortical BMD, nor with each other($R2= 0.028$, $p=0.07$).

Serum calcium showed a positive correlation with tibial trabecular BMD and cortical BMD Z-scores ($r=0.32$, $p=0.001$ and $r=0.33$, $p=0.001$ respectively). Tibial cortical BMD Z-scores were negatively associated with parathyroid hormone (PTH)($r=-0.44$, $p<0.001$) and alkaline phosphatase (ALP)($r=-0.22$, $p=0.03$).
On multivariable linear regression analysis the significant and independent predictors of tibial cortical BMD Z-scores were PTH (β-0.39, $p<0.001$), ALP (β-0.35, $p<0.001$) and serum calcium (β 0.20, $p=0.015$), which together predicted 52% of variability in tibial cortical pQCT. DXA imaging did not improve this model.

Conclusions
Routinely used biomarkers, calcium, ALP and PTH, when used together are moderate predictors of cortical BMD. No associations were seen with hip or lumbar spine DXA, suggesting that DXA is not a clinically useful tool in this population and should not be performed routinely in children and young adults with CKD4-5 and on dialysis. The predictive value of biomarkers and imaging in determining key patient-level outcomes such as fractures requires further study.

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Long-term outcomes after treatment with low-dose IV cyclophosphamide in black patients with lupus nephritis.

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Introduction:
Lupus nephritis has ethnic variations in disease activity, prognosis, and response to treatment. Low-dose Euro-Lupus cyclophosphamide has been demonstrated to be an effective treatment for lupus nephritis. As the ELNT trial[1] consisted of a predominantly Caucasian population, data on its use in black patients are limited to the placebo arm of the ACCESS (Abatacept) study (n=25)[2]. We reviewed outcomes of black patients with lupus nephritis treated with the Euro-Lupus regimen at our centre.

Methods:
Patients who had received cyclophosphamide were identified by a search on the renal database. The charts of patients who had received low dose IV cyclophosphamide for lupus nephritis between 2004-2018 were reviewed. Data was analysed with reference to response criteria from the ALMS[3] and ELNT trial.

Results:
24 patients were identified, demographics and baseline data is shown in the table.

All patient received maintenance with MMF or azathioprine after Euro-Lupus unless they had reached ESKD. 6 patients also received rituximab. At 6 months, 8/24 patients had a treatment response by ALMS criteria of these, 4/24 had a complete response. The ELNT definition of treatment failure at 6 months was met in 12/24 patients.

During the follow period 4/24 patients died and 6/24 reached ESKD. The incidence of major adverse kidney outcomes (MAKE: dialysis, death, sustained doubling of creatinine) is shown in figure 1A. Incident proteinuria was similar in patients with good and poor long-term outcome but was significantly lower at 6 months in patients with a good long-term outcome (Figure 1B).

Discussion:
Practice at our unit has been to use Euro-Lupus in patients intolerant of MMF, or with severe or treatment resistant disease. This group is likely to consist of patients with higher disease aggression and chronicity than those described in the trials. This is supported by comparison of the mean creatinine (202µmol/L) to that in the ELNT (91µmol/L) and ACCESS (114µmol/L) cohorts. The overall response rate observed in our cohort (33%) was inferior to that reported in black patients in the ACCESS trial (56%) although the complete response rates were similar (17% vs 16%). In keeping with the low response rate, 50% of patients had reached a MAKE endpoint within 3 years. An early reduction in proteinuria was associated with improved prognosis. These data suggest that in black patients with aggressive or treatment refractory disease, outcomes after treatment with low dose cyclophosphamide are poor. There is a need to define more effective treatment strategies for this group.

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Patient activation and kidney disease specific knowledge in an advanced kidney care clinic

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Introduction:
Patient activation and disease knowledge are two of the key domains required to navigate the complex decision making and self-management necessary in CKD5. Whilst both patient activation and disease knowledge have been identified as important factors in advancing health outcomes there are limited data on their role in the low clearance setting.

Methods:
Patients attending a tertiary centre advanced kidney care clinic with a cohort of approximately 500 patients were invited to complete a questionnaire combining a validated patient activation measure[1] and kidney specific disease knowledge score[2]. Patients willing, but unable to complete the questionnaires were assisted by a family or staff member. All patients attending the clinic had a 1 hour first appointment focusing on education, were given an educational booklet, and were also offered a more comprehensive education afternoon. Clinic letters were addressed directly to patients and included relevant blood results including reference to the remaining kidney function.

Results:

101 completed surveys were analysed. Demographic data is shown in table 1.The distribution of results by patient activation level (range 1-4 with level 4 denoting high activation) and kidney knowledge score (max score 24) are shown in Figure 1A-B. Patient activation measure score was inversely correlated with age ((r= -0.27, p=0.006) and positively correlated with the kidney knowledge score (r-=0.24, p=0.018). There was no correlation between activation and social deprivation (measured by indices of multiple deprivation) Kidney knowledge score did not increase with number of clinic visits (Fig 1C). Kidney knowledge was higher In patients who had attended a kidney education session. (15.29±0.51 vs 12.72±0.68 mean±SEM p=0.013) (Fig 1D), patient activation measure was similar irrespective of attendance at the education session.

Analysis of specific questions in the kidney disease knowledge score revealed that only 66% of patients knew that kidneys made urine, 63% of patients knew that the kidneys were important for controlling potassium and 27% of patients could identify eGFR as a test used to measure kidney function. In contrast, 90% of patients were able to identify a modality of renal replacement therapy e.g. haemodialysis.

Discussion:

Kidney disease specific knowledge was variable, and whilst it was augmented by attendance at an education day, a large number of patients were not able to correctly identify some basic aspects of kidney function. This highlights the need to modify educational content to ensure It is appropriately targeted.

Approximately half the cohort had a low level of activation (1 or 2) suggesting limited self-management capacity. As activation is potentially modifiable[3], any interventions should ideally precede education. Patient activation level tended to decrease with age, suggesting that older patients may tend to a more

passive role in both self-management and decision making, a contributor to this may be framing of their illness as “old age”[4].

This work identifies a sub-set of patients who may benefit from enhanced activation, education and decision support in the low clearance setting. This will be the focus of a future intervention and outcomes from these patients will be reviewed.

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Evaluating Pain in Autosomal Dominant Polycystic Kidney Disease

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Background and Aims:
Chronic pain is prevalent in Autosomal Dominant Polycystic Kidney Disease (ADPKD) and is associated with a substantial quality of life burden. Literature describing ADPKD-related chronic pain (ACP) is limited, and generic pain management strategies are suboptimal with patients often reporting inadequate relief. Furthermore, the absence of a validated and widely accepted pain assessment tool (PAT) in ADPKD has posed a significant barrier to better pain management and research. We established an ADPKD PAT (APAT) and confirmed its feasibility and validity through administration to ADPKD patients participating in a randomised high water intake trial (NCT02933268).

Method:
A collaboration of key stakeholders (patients, ADPKD experts, trialists and pain specialists) constructed an ADPKD pain conceptual framework consisting of eight prioritised pain assessment domains. We constructed an APAT from components of previously validated pain assessment tools covering each of the prioritised pain domains. The finalised APAT was administered to participants in a feasibility trial which randomised adult ADPKD patients with an eGFR ≥20mls/min/1.73m2 to prescribed high water intake (HW) or ad libitum water intake (AW group) over eight weeks. Participants were asked to complete the APAT at least twice (baseline and week 8), although more frequent submissions were permitted.

Results:
93% (39/42) of trial participants with CKD stages 1-4 completed a total of 129 questionnaires. Each participant completed a median of 3 (range 1-10) questionnaires. In terms of baseline characteristics; mean age of respondents was 47±13 years, 90% (35) were White British ethnicity, and 59% (23) were female. Median disease duration was 14.2 (IQR 7.0-25.9) years, 69% had enlarged kidneys, 64% had hypertension and hepatic cysts were present in 59%.

Pain (52%) and associated analgesic use (29%) were prevalent. Participants with pain were more likely to report interference with mobility (25% vs 0%), self-care (20% vs 0%) and usual activities (31% vs 1%) compared to those with no pain ($p<0.001$). Pain was also associated with a higher risk of anxiety and depression (RR 2.97, CI 1.70-5.20, $p<0.001$). Pain severity was predicted by traditional risk factors of disease progression including increasing age (OR 1.07, $p=0.009$), eGFR <60mls/min/1.73m2 (OR 5.45, $p=0.021$), and hypertension (OR 12.11, $p=0.007$), but not kidney size, consistent with findings of previous studies. Neuropathic descriptors were not commonly used, while continuous and intermittent descriptors were more frequently selected by patients to describe their pain quality (figure).
The APAT achieved good internal consistency (Cronbach's alpha coefficient =0.91) and test-retest reliability was demonstrated with domain intra-class correlation coefficients ranging from 0.62-0.90.

Conclusion:

A bespoke APAT including components of previously validated pain assessment tools was reliable in evaluating pain in patients with ADPKD, and was acceptable to participants. Pain was prevalent among participants and associated with a substantial emotional and physical burden. The APAT represents a viable instrument for standardised evaluation of ADPKD pain in observational and interventional research.

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Inherited salt losing tubulopathies are associated with altered immunity and clinical immunodeficiency due to impaired IL-17 responses

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Introduction
Salt (sodium chloride, NaCl) intake as part of a western diet exceeds the amount with which we evolved. Increased extracellular sodium has been shown to have pro-inflammatory effects on multiple immune cells. This includes IL-17 expressing CD4+ T cells (Th17 cells), which provide protection from mucosal bacterial and fungal infections. Whilst high salt diets have been shown to worsen autoimmune disease in experimental models, the consequences of in vivo salt depletion on immunity are unknown. We therefore investigated immunity in patients with inherited salt losing tubulopathies (SLT).

Methods
Genotyped SLT patients (Bartter syndrome [BS], Gitelman Syndrome [GS], and EAST Syndrome) were recruited from tertiary tubular disorder clinics at 2 centres. A history of clinical features of altered immunity was taken, and compared to healthy and disease controls. Patients underwent ^{23}Na-MRI imaging of the lower limb and immunological investigations. We subsequently assessed the effect of altering extracellular ionic concentrations on IL-17 responses.

Results
47 SLT patients (BS = 23, GS = 22, EAST = 2) were included. Patients were hypokalaemic and hypomagnesaemic with reduced interstitial sodium stores as assessed by ^{23}Na-MRI (Figure 1a and b). SLT patients had clinical features of dysregulated immunity with significantly increased mucosal bacterial and fungal infections, allergic and atopic disease (Table). Aligned with their clinical phenotype, CD4+ subset analysis revealed increased ratio of circulating Th2:Th17 cells, and in vitro Th17 polarisation was reduced in SLT compared to healthy age matched controls (Figure1c). Alterations in STAT1 and STAT3 phosphorylation, the commonest causes of inherited defects in IL-17 responses, were not present in SLT. Calcium flux during T cell activation, which is commonly altered in ion channelopathies leading to immunodeficiency, was also unaffected. We then demonstrated in control cells that additional extracellular sodium (+40mM), potassium (+2mM), or magnesium (+1mM) during T cell activation reduces Th2:Th17 ratio, and augments Th17 polarisation under optimal 7-day culture conditions. Thus, the extracellular ionic environment typical in SLT impairs Th17 polarisation. Finally, in vitro SLT Th17 polarisation could be rescued with the addition of NaCl 40mM to culture conditions. We assessed the intracellular pathway that mediates sodium driven Th17 polarisation, which is dependent on up-regulated serum/glucocorticoid-induced kinase 1 (SGK1) and nuclear factor of activated T cells 5 (NFAT5). Both SGK1 and NFAT5 expression were normal in SLT.

Conclusion
We describe a novel immunodeficiency in SLT patients who have increased bacterial and fungal infections, and reduced Th17 responses. We propose this is due to an altered in vivo ionic environment in SLT, and this study provides new insights into the influence of multiple extracellular ions on T cell polarisation. Whether additional salt supplementation could rescue the immunophenotype in vivo in SLT is unknown.

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The impact of phosphate additives on haemodialysis patients' diets

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Background
Reducing the intake of dietary phosphate plays a key role in the management of Chronic Kidney Disease Mineral Bone disease (CKD-MBD). Dietetic advice has typically focussed on dietary reduction of foods high in organic phosphate. In recent years food manufacturers have increasingly added phosphate additives to processed food to help preserve product quality and safety[1]. It has been reported that 90-100% of phosphate from this source is absorbed compared to 20-60% from organic sources[2].The aim of this study was to investigate the occurrence of these in the diets of haemodialysis patients.

Method
Twenty haemodialysis patients who had previously been advised on a low phosphate diet were selected. Participants were asked to complete a 5-day food diary recording all food and drink consumed. To help identify the presence of food additives, participants were asked to record the product brand and retain the packaging of products consumed. Food diaries were analysed to identify total organic phosphate intake and the presence of food products containing phosphate additives.

Results
Thirteen patients agreed to take part in the study and ten completed food diaries. Foods containing phosphate additives were identified in the diets of all participants with a median daily intake of 0.9 phosphate additive containing foods per day (interquartile range 0.5-1.7) with processed meats and cakes being the most common source. All patients consumed <1100mg per day of organic phosphate suggesting they were otherwise consuming the recommended levels for a patient with CKD[3]. All participants were prescribed phosphate binding medication and despite the presence of additional phosphate from food additives, 70% had a serum phosphate level below the recommended target of 1.7mmol/l[4].

Conclusion
Phosphate additives exist in a wide range of processed food products[1] and were found to occur frequently in participants' diets. This would suggest that inorganic phosphate may regularly contribute to total daily phosphate intake, although the actual quantity of phosphate contributed is impossible to ascertain from current food labelling practices. Although most patients in the study had an acceptable serum phosphate level, all had been prescribed phosphate binding medication to help control this. Avoidance of phosphate additive containing foods could therefore reduce total dietary phosphate intake and potentially enable a reduction in this medication, resulting in benefits to the patient and financial savings for the NHS. However, full avoidance may be challenging and will be influenced by time available for food preparation, cooking ability, ability to check food labels and financial means. CKD patients may also be following potassium, salt and fluid restrictions, and care needs to be taken not to compromise nutritional intake. Avoidance of phosphate additives should therefore only be undertaken with the support of a specialist renal dietitian, in order to ensure advice is tailored to an individual's unique circumstances

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Patient Knowledge, Control and Experiences of Intradialytic Fluid Management: A Comparison of In-centre and Home Haemodialysis Patients

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Introduction

There is increasing worldwide interest in home haemodialysis, alongside growing evidence that this modality can improve patient outcomes[1]. Patient engagement is an important factor in determining the success of home haemodialysis, as patients will encompass several responsibilities largely independently, including tackling issues such as becoming fluid overloaded[2]. Nevertheless, in-centre patients can also be engaged in their treatment and may even enrol in shared-care programmes[3].

Fluid management is a fundamental part of haemodialysis and is strongly linked to outcomes. Poor long-term fluid management is associated with myocardial stunning[4], left ventricular hypertrophy[5], an accelerated loss of residual renal functioning and an increased risk of fistula failure[6]. Despite this, there is limited research examining patient perceptions of intradialytic fluid management. At UKKW 2019 we reported on a multicentre, cross-sectional, questionnaire study with in-centre haemodialysis patients regarding their knowledge, perception of control and experiences of intradialytic fluid management. The present research extends this by comparing in-centre and home haemodialysis patients' intradialytic fluid management perceptions.

Methodology

An adapted version of a previously validated questionnaire was developed for home haemodialysis patients. Differences between groups was assessed by chi-squared tests, Fisher's exact tests, Mann-Whitney U tests and t-tests.

Results

98 home haemodialysis patients across 6 NHS Trusts completed the questionnaire. Home patients were significantly more likely to be white (white vs. BAME) and have higher education (up to high school vs. post-high school). Patients' upper limit regarding how much fluid they would remove in a session were similar, although home haemodialysis patients were less willing to remain slightly fluid overloaded in order to finish treatment early.

Home patients felt significantly more in control of their fluid management, and reported significantly better subjective knowledge of the long-term effects of regularly not removing enough fluid. However, there were no group differences within subjective knowledge of the long-term effects of regularly removing too much fluid. Home patients demonstrated significantly better objective knowledge of common symptoms relating to fluid management, with the median number of correct answers being 4/9 (44%) for in-centre patients and 6/9 (67%) for home patients.

Discussion

Patients who have haemodialysis at home appeared to feel more in control of their fluid management, consistent with previous research[7], and have better objective knowledge of whether common symptoms could be a result of removing too much or too little fluid. Whilst this may be expected due to their typically

greater involvement in their own care, it is worth noting that home patients were more highly educated and this characteristic has previously been associated with better patient knowledge of kidney disease[8]. Nevertheless, subjective and objective fluid management knowledge was relatively poor in all patients suggesting a need for greater patient education.

Home haemodialysis patients are keener to achieve target ultrafiltration volumes reflecting greater treatment adherence and also feel more in control of, and have better knowledge of, intradialytic fluid management. One explanation for this could be patient selection and training for home haemodialysis programmes.

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Establishing a Renal Assessment Unit to enhance access to specialist renal services pilot results.

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With acute services under increasing pressure, enhancing direct access to specialist renal services is thought to reduce contact with acute emergency services. This would facilitate rapid decision making for renal patients and would impact on hospital admissions and length of stay. We piloted a model of a renal assessment unit to provide operational data related to the feasibility and the impact of such unit on other acute services in a University Hospital.

A four bed area on a medical ward was converted to a renal assessment unit on a two week trial between the 13th and the 24th January 2020. The unit operated Monday to Friday 8am until 6pm and was staffed by a renal registrar and supervising consultants, Band 7 renal specialist nurse as advisor, Band 6 sister and Band 5 registered nurse. The unit rapidly assessed new referrals from acute service and GP's, and provided ambulatory care for patients know to renal services. A mobile phone was provided for the nursing team and one for the registrar to facilitate direct referrals. Posters where put in key areas to ensure all staff were aware of the pilot. A central booking system was set up, to allow direct booking of patients to ensure safe numbers, with provision made for emergency, on the day, attenders.

The total number of patients seen was 78, 5 were admitted to renal and 73 were discharged back to clinic. RAU prevented 7 ED visits and 29 MAU admission in the 10 days trial. 15-day cases went to RAU which would have gone into a bed on 407.

The two week trial period demonstrated the efficiency of the RAU model through preventing admissions and providing rapid assessments and decisions renal patients. Moreover, patients and staff experience was very positive. This pilot demonstrates the importance and need for innovative models of access to specialist services to ease the ever increasing pressures on acute services and improve patients' experiences and outcomes.

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High intensity interval training in renal transplant recipients: perceptions, experiences, and readiness to participate

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Introduction: It is well known that physical activity is highly beneficial in reducing the risk of cardiovascular disease (CVD) in the general population and in many individual disease states. However, research in renal transplant recipients (RTRs) is limited and only 27% are sufficiently active for health in the UK (defined by meeting the national physical activity guidelines of 150 min/week of moderate intensity exercise). Recent literature has alluded to exercise being 'anti-inflammatory' which may have a direct benefit to combat the excess inflammation in RTRs brought about by many factors including daily immunosuppressive medication. A recent abundance of literature around high intensity interval training (HIIT) has revealed a novel and time efficient method to reduce CVD risk. This area is under-researched in RTRs but large-scale efficacy trials are expensive and labour intensive. Therefore, more information about RTRs' perspectives and experiences of HIIT is needed before definitive trials are completed. The aim of this research was to explore RTRs' perceptions and experiences of, and readiness to participate in, HIIT.

Method: All RTRs were eligible if their renal transplant was completed >12 weeks prior to recruitment and their consultant considered no major contraindications to exercise. 13 RTRs (8 males; age 53 [±13] years; eGFR 53 [±21] mL/min/1.73m²) completed semi-structured one-to-one interviews at University Hospitals of Leicester NHS Trust. Interviews were audio recorded, transcribed verbatim and subject to framework analysis in order to identify and report emerging themes.

Results: Overall, participants described a basic knowledge of HIIT and were open to participation. Acknowledgement of superior benefits to cardiovascular, mental, and general health as well as the lower time commitment were expressed as motivators for participation. Curiosity was a key identified theme: "I'd be very interested in doing it to see how I can react and cope with it. I'm interested to see how I react to it after transplant and at my age as well." (Male, 65). There were heightened concerns conveyed around damaging the kidney and 'knowing your limits' which participants associated with a lack of exercise guidance and support: "So I think I'd probably worry about that more than someone that hasn't got anything wrong with them. Like to them, their heart rate going up, that's just normal, whereas with me I think I would probably worry about it more." (Female, 32). Personalisation, doctor's approval and supervision were suggested as important factors in the participant's decision to take part in HIIT.

Discussion: This study provides some evidence that HIIT could be, in principle, largely accepted by RTRs. However, several issues were identified in the present study that require careful consideration for the success of any future efficacy trial. These include: the importance of doctor's approval, supervision, and personalisation, timing of the intervention post-transplant and education surrounding HIIT. A lack of general and specific exercise guidance and support was described by many participants, which seemed to impact their readiness to participate in HIIT, particularly in those who were less confident with exercise in general.

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Comparison of biosimilar rituximab (Truxima®) to the originator (Mabthera®) in patients with lupus nephritis

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Background and aims:
Rituximab, an anti CD20 monoclonal antibody (mAb) is increasingly used for the treatment of lupus nephritis (LN). A biosimilar version of rituximab, 'Truxima' has been available since 2017. Biosimilar medications offer the advantage of lower financial cost to the originator drug whilst maintaining quality and efficacy. Currently, Truxima costs less than half the price (44%) of the reference drug, Mabthera. We aimed to examine the efficacy of Truxima when compared to Mabthera in the treatment of patients LN.

Method:
All patients with biopsy proven LN treated with rituximab from 1stJanuary 2016 to 1st September 2019 were identified using a local histopathology database and a pharmacy dispensary database. They were stratified into "Truxima" or "Mabthera" groups depending on which form of rituximab was administered. Patients who had previously received rituximab or cyclophosphamide, those who received rituximab concurrently with plasma exchange or cyclophosphamide and those with <3months follow-up were excluded.
Primary outcomes assessed included time to B-cell depletion (defined as an absolute B-cell count (ABC) of <10) and time to B-cell repletion (ABC ≥ 10). Secondary outcomes assessed included time to complete and partial remission (defined as urine protein creatinine ratio (uPCR) <50mg/mmol plus estimated glomerular filtration rate (eGFR) ≥ 60ml/min/1.73m2 or not >20% below baseline, and uPCR >50% improvement from baseline and <300mg/mmol if >300mg/mmol at baseline, plus eGFR not >20% below baseline respectively); infection rates (defined as infections requiring admission or administration of antibiotics) and infusion reactions.

Results:
21 and 15 patient received Truxima and Mabthera respectively as part of our standard steroid minimising protocol 'Rituxilup' for biopsy proven lupus nephritis. 32 (89%) were female. There were no differences between the two groups in terms of follow-up time; baseline demographics (age, gender); serum creatinine (sCr); serology at time of treatment; extra-renal involvement or lupus nephritis class (27 were Class III or Class IV +/- Class V, according to ISN/RPS classification system).
There was no difference in days to B-cell depletion (p=0.78) or B-cell repletion (p=0.33). The median number of days to depletion overall was 27 (IQR 18-49) and days to repletion was 160 (IQR 111-237).
16 (76%) patients and 9 (60%) patients In the Truxima and Mabthera groups respectively achieved complete or partial remission (p=0.45), with a median time overall of 125 days (IQR 79-239).
Rate of infections requiring admission (Truxima: 4, Mabthera: 2, p=1) or rates of major infusion reaction (Truxima: 2, Mabthera: 1, p=0.76) were comparable.

Conclusion:
Reassuringly, the biosimilar anti CD20 mAb Truxima appears equivalent in terms of efficacy and safety when compared to the originator, Mabthera, in our group of patients. Its use may improve cost-effectiveness of treatment of lupus nephritis and in this cohort meant a saving of approximately £22,000.

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A hyperkalaemia educational animation for people with kidney disease: An acceptability study

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Background and Aims: Hyperkalaemia is a potentially life-threatening emergency and a common complication in patients with renal impairment [1]. Patients are inundated with information from renal healthcare professionals (HCP) regarding a wide range of issues including blood pressure control, fluid balance, diabetes, anaemia, dietary restrictions, dialysis, transplantation and the control of biochemical parameters like potassium, bicarbonate, calcium and phosphate. The magnitude and multiplicity of medication often prescribed in renal disease can also be confusing for patients. Effective communication and education is therefore essential to optimise patient care.

Many high-quality local and national patient information resources are available to renal patients; predominantly information leaflets. Multimedia education resources are proposed to enhance health literacy [2].

We have created a hyperkalaemia patient educational animation and have explored the views of renal patients to refine the animation before making it available to our wider patient population.

Method: The first version of the animation (V1) was shown to a focus group of representatives from the Paul Popham renal support charity. Opinions were gathered which informed the development of a data collection tool, which would be used during one-to-one interviews with haemodialysis (HD) patients.

Audio-recorded one-to-one semi-structured interviews were conducted with HD patients in Carmarthen Dialysis Unit, South West Wales, following stratified random sampling. Interviews were transcribed verbatim and thematically analysed.

Results: The animation (V1) (Figure 1) was shown to 12 HD patients. One-to-one interviews followed. 50% of interviewees were men (n=6), mean (SD) age 65.3 (16.5) years old. Four main themes (with further sub-themes) were identified following patient interviews: the requirement for patient education, the utility of the animation, ways of learning and the animation's impact on the patient. A selection of themes and patient responses are presented in Table 1.

Discussion: Multimedia interventions have been shown to positively impact on learning [2]. Our focus group and one-to-one interviews identified a need for hyperkalaemia education for renal patients. The animation was well received by all patients, including its design, simplicity and narration. Versions 2 and 3 (Figure 2) of the animation were created following patient feedback.

The animation will soon be available in English and Welsh language to renal patients in South West Wales, before being rolled-out across Wales. The animation will be available on HD TV screens and outpatient waiting room areas. It will be accessible through our renal patient website and via Quick Response (QR) codes in clinic rooms, dialysis units and on renal prescription bags. A paper-based 'comic book' version of the animation will also be created.

Further work will include exploring the impact of the animation on serum potassium levels in our patient population and creating new animations, including ‘understanding dialysis’, ‘blood pressure and fluid balance’ and ‘CKD-mineral and bone disorder’.

Conclusion: Our hyperkalaemia educational animation was well received by patients in this acceptability study. Valuable feedback was obtained and will continue to be requested. We believe that this, and subsequent animations will improve patient understanding of kidney disease and positively impact on patient health and wellbeing.

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Pregnancy following kidney transplantation: Experience of a tertiary renal obstetric service between 1996 and 2020

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Introduction

Compared with dialysis, fertility and pregnancy outcomes are more favourable following transplantation. However, pregnancies post kidney transplant remain challenging due to the risk of adverse maternal and obstetric outcomes

Methods

All patients with transplants who attended the joint renal obstetric clinic during pregnancy were identified from an in-house obstetric renal database. Demographic and clinical data was collected from the electronic clinical record

Results

We identified 52 pregnancies in 39 women with previous transplants. The average age at time of delivery was 33±3 years. 57% were white, 17% black and 21% Asian. The aetiology of End Stage Kidney Disease was glomerulonephritis (46%), reflux (17%), unknown (17%), diabetes (10%) and other (10%).

3 patients (5%) miscarried and are not included in further analysis.

The mean time from transplantation to pregnancy was 84 ± 56 months. The mean follow up following delivery is 6 ±5.2 years. The mean eGFR pre-pregnancy was 50.8 ±16.5. The mean eGFR at 6 months, 1 year, 3 years and 5 years was 49.4 ± 16.8, 47.4 ± 16.9, 48.0 ± 18 and 52.9 ± 16.95. 1 patient lost their graft during pregnancy and started haemodialysis (pre-pregnancy eGFR 25, PCR 150). No one lost their graft in the 1st year following pregnancy. 5 patients (12%) have subsequently lost their graft at a mean time of 4±2.8 years. 1 patient was presumptively treated for rejection during their pregnancy. 2 patients were treated for rejection within 1 month post-partum. 6 others (14%) had a rejection episode a mean time of 38. 6 ±42.4 months post-partum. There were no maternal deaths. 19 patients have had their Donor Specific Antibodies(DSA) checked post pregnancy. 3 had a DSA, 1 was present pre pregnancy and 2 were de novo. Mean gestational age was 35.7±2.7, with 43% born at term (>37 weeks) and 43% born pre-term. 5 (10.2%) of those born preterm were born very preterm (<34 weeks). 18 patients (37%) were diagnosed with preeclampsia. There was one intrauterine death. 66% delivered by caesarean section, 33% had a vaginal delivery. The mean birth weight was 2400±588 grams. 24% were small for gestational age.

Discussion

Pregnancy outcomes in patients with transplants are better compared with those on dialysis. However, complications still occur. We report a 5% miscarriage rate. It is likely that many more women who miscarried did not come to the obstetric renal clinic and were not captured in our database. The rate of preeclampsia (36%) is representative of the current literature & much higher than for women with mild CKD and not transplanted. Diagnosing preeclampsia in patients with pre-existing hypertension and proteinuria, as for many of our transplant patients, remains challenging.

In our experience, reflected here, there are low rates of rejection and graft loss but high rates of obstetric complications. We believe these patients are ideally managed in a joint renal obstetric clinic.

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Pilot and feasibility study examining the effects of a comprehensive volume reduction protocol on hydration status and blood pressure in hemodialysis patients.

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Introduction: Chronic volume overload is a persistent problem in hemodialysis (HD) patients. The purpose of this study was to investigate the impacts of comprehensive volume reduction protocol on HD patient's hydration status and blood pressure (BP).

Methods: Twenty-three HD patients (age=55.7 ± 13.3y) completed a 6-month comprehensive volume control protocol consisting of: 1) reducing post-dialysis weight; 2) reducing BP medication prescriptions; and 3) weekly intradialytic counseling to reduce dietary sodium intake and interdialytic weight gain (IDWG). The primary outcome was volume overload (VO) measured by bioelectrical impedance spectroscopy. Secondary outcomes included: IDWG, post-dialysis weight, estimated dry weight (EDW), dietary sodium intake, BP and BP medication prescriptions.

Results: From baseline (0M) to 6 months (6M), significant improvements were noted in: VO (0M 3.9 ± 3.9L vs 6M 2.6 ± 3.4 L, p=0.003), post-dialysis weight (0M 89.4 ± 23.1 kg vs 6M 87.6± 22.2 kg; p = 0.012), and EDW (0M 89.0 ± 23.2 vs 6M 86.7 ± 22.5 kg., p=0.009). There was also a trend for a reduction in monthly averaged IDWG (p = 0.053), and sodium intake (0M 2.9 ± 1.6 vs 6M 2.3 ± 1.1 g/day, p=0.125). Neither systolic BP (0M 162 ± 27 vs. 6M 157 ± 23 mmHg, p=0.405) nor diastolic BP (0M 82 ± 21 vs 6M 82 ± 19 mmHg, p= 0.960) changed, though there was a significant reduction in the total number of BP medications prescribed (0M 3.0 ± 1.0 vs 6M 1.5 ± 1.0 BP meds; p=0.004).

Discussion: Our volume reduction protocol significantly improved HD patient's hydration status. While BP did not change, the reduction in prescribed BP medication number suggests improved BP control. Despite these overall positive findings, the magnitude of change in most variables was modest. Cultural changes in HD clinics may be necessary to realize more clinically significant results.

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Molecular genetic identification of PODXL nonsense mutation in a family with familial renal disease

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Background
Podoclayxin, a transmembrane protein and a component of the filtration barrier in podocytes is encoded by PODXL. Pathogenic variants in PODXLhave recently been described in families with autosomal dominant focal segmental glomerulosclerosis. Here we report a family, originally from Sudan, with variable phenotypes, including end stage renal disease and haematuria and proteinuria with preserved renal function in an autosomal dominant pattern.

Methods
Clinical, pathological and family history data were combined with whole genome sequencing data in the proband and segregation analysis in other family members.

Results
The proband had presented at the age of 20 years with haematuria but with preserved renal function. During her first pregnancy significant proteinuria developed prompting a renal biopsy post partum which showed thin basement membrane disease. A second pregnancy was also complicated by significant proteinuria. A family history revealed 4 out of 7 siblings had haematuria and the proband's mother who had developed end stage renal disease at 50 years of age. A maternal uncle also was reported to have end stage renal disease. Genetic testing was performed in the proband and mutations in COL4A3, COL4A4 and COL4A5 were excluded. Whole genome sequencing identified a heterozygous nonsense mutation in PODXL which segregated from her mother. Wider family screening is now taking place.

Conclusion
In a large family with familial haematuria and end stage renal disease we have identified a pathogenic variant in PODXL as the likely cause. This widens the phenotypic spectrum of disease associated with PODXLmutations, which was recently reported to be associated with FSGS.

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How effective are renal dietitians? An evaluation of practice!

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INTRODUCTION:
The Department of Health and Social care (2010) makes it clear that NHS Services must focus on and aim to achieve better outcomes. Additionally, in the current NHS financial climate, it is crucial that dietitians are able to show that dietetic interventions are effective. It was decided that outcomes to evaluate the effectiveness of our interventions for the management of hyperkalaemia and hyperphosphatemia in a sample of chronic haemodialysis (HD) patients would be collected. We used the British Dietetic Association Renal Nutrition Group Outcomes Tool (RDOT) (British Dietetic Association 2016).

METHODS:
Three dietitians collected the outcomes between April-October 2018. Patients from the three HD units were included if they met the criteria (Figure 1). During the six months, for every patient seen face-to-face for hyperkalaemia or hyperphosphatemia, their relevant information was added to the RDOT (Figure 2). In November 2018, the patients' final blood results were added to the RDOT, including any further necessary information as per the RDOT (Figure 3). During the project, the dietitians met to discuss any issues arising and to ensure consistent practice and data collection as per the project guidelines.

Patients were classified as having 'achieved' or 'not-achieved' their planned treatment goal if their final blood potassium (4-6mmol/L) or phosphate (1.1-1.7mmol/L) in November was either within or outside the target range, respectively. All data collected was then analysed to help determine effectiveness of dietetic interventions. Analysis involved determining percentage of achievers and non-achievers, number of corresponding barriers, and the most common and effective interventions.

RESULTS:
88 patients were included in the project i.e. 40 and 48 for patients' blood potassium and phosphate outcomes, respectively.

73% of patients seen for hyperkalaemia achieved a blood potassium within target range. 21% of these patients had more than one barrier. 27% of patients seen did not achieve their target blood potassium. 45% of these patients had more than one barrier. Education was the most common intervention. Of those patients receiving education, 74% achieved their aim, whilst 26% did not. Using behavioural change techniques was the most successful intervention, with 89% of these patients achieving their outcome, whilst 11% did not.

46% of patients seen for hyperphosphatemia achieved a blood phosphate within target range. 32% of these patients had more than one barrier. 54% of patients seen did not achieve their target blood phosphate. 31% of these patients had more than one barrier. Education was the most common intervention. Of those patients receiving education, 54% achieved their aim, whilst 46% did not. Identifying barriers and adapting advice for hyperphosphatemia patients was the most successful intervention, with 100% achieving their outcomes.

DISCUSSION:

The results show that a greater percentage of patients with hyperkalaemia achieved their target blood results after dietetic intervention, compared with those seen for hyperphosphatemia. Based on the results, it is prudent that dietitians identify patients' barriers to change and adapt their advice accordingly to address hyperphosphatemia. Additionally, dietitians should consider adapting their interventions for hyperkalaemia patients to include behaviour change techniques, rather than just educating patients.

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Muscle symptom burden: differences between non-dialysis CKD patients and non-CKD adults

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Background

Patients with chronic kidney disease (CKD) may experience more severe muscle related-symptoms than non-CKD adults. These symptoms present themselves in the form of muscle weakness or tiredness and muscle pain. Other symptoms associated with musculature could include cramps or restless legs. The impact of these symptoms on activities of daily living (ADLs) is well known in a non-CKD population however, how individuals with CKD experience these symptoms is not well defined. This comparative study investigated the severity and impact of these symptoms amongst CKD patients and non-CKD adults.

Methods

347 non-dialysis CKD patients (males: 53% age: 63.8 (±17.4) years, eGFR: 33.1 (±20.1) ml/min/1.73 m2) and 306 non-CKD adults (males: 28%, age: 46.7 (±16.4) years) were asked to fill out a bespoke questionnaire. The questionnaire used a Likert scale (0-10), where 0 indicated 'no symptoms' while 10 indicated 'severe symptoms'. Six items assessed muscle-related symptoms (weakness, tiredness, ache and pain, cramps, reduction in size, and restless legs), and four items assessed the impact of these symptom on ADLs (socialising, working, daily activities, and performing sport and exercise). Total scores were calculated based on the sum of all ten scales (total /100), and sub-scales for muscle-related symptoms (total /60) and ADLs (total /40). Higher scores indicated either more severe symptoms or greater impact on ADLs. General linear modelling was used to explore differences between groups.

Results

Non-CKD adults had a 50% lower total mean score than CKD patients (31.7±25.6 vs 15.9±18.2, p<.001) as shown on Figure 1. Furthermore non-CKD adults showed a 46% lower severity score (21.3±15.2 vs 11.5±11.7, p<.001) and a 57% lower impact on ADLs score (10.5±12.9 vs 4.5±9.0, p<.001) than patients with CKD. Muscle ache and pain (4.4±3.7 vs 2.7±2.9, p<.001), muscle tiredness (4.3±3.6 vs 2.5±2.7, p<.001) and cramps (4.2±3.5 vs 2.4±2.8, p<.001) were the three most severe symptoms in both groups. Regression analysis indicated that gender was the only significant (B= 6.852, p=.013) predictor for total mean score in the CKD group.

Conclusion

The results indicate that CKD patients experience the same muscle-related symptoms as non-CKD adults, these are: aches, tiredness and cramps. However, CKD patients, especially women, perceive these symptoms more severely. This suggest that CKD patients may need different coping strategies or interventions that aim to reduce these symptoms in order to improve quality of life.

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Reducing acute kidney injury patient readmission through appropriate patient information at the point of discharge

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Conflict of interest declaration.
The project was supported by a Wessex Health Education England Individual Fellowship.

Problem:
Acute kidney injury (AKI) a sudden episode of kidney failure or kidney damage that occurs in 48 hours or within the last 7 days. A common complication of many other acute illnesses and AKI is a frequent problem for around 20% of hospital inpatients. A large acute hospital found that they had a slightly higher than expected readmission rate for patients with AKI. Quality improvement (QI) methodology and 'plan do study act' (PDSA) cycles were used to identify why this was occurring, embed and measure change to improve patient care.

Methods/Intervention:
AKI readmissions were classified as patients who had an AKI during their first admission, and then on their readmission, AKI did not need to be the primary cause for admission. Case reviews were completed in the initial project design. This found common causes of readmission were poor medication safety netting, including a lack of information regarding AKI.

The project involved a baseline survey of patients discharged after experiencing AKI, to understand their knowledge levels of the problem. The results highlighted that more than 80%(N=59) of patients who responded (200 patients surveyed/72 patients responded) were not given meaningful information about their AKI during their hospital stay or after discharge. A patient information leaflet was already available for all staff to give to patients- as well as being available on the trusts patient website.

Lead by the AKI Lead advanced nurse practitioner, multidisciplinary team across the hospital were consulted to determine who was best placed to provide patients information prior to discharge. Based on staff feedback, identifying the overwhelming amount of information provided to patients on discharge, there was consensus that there should be no set criteria about when information should be provided to the patient, but that it would be towards of the end of the patients stay. Statistical process control (SPC) charts plotted AKI discharges and readmission with AKI within 90 days on a week by week basis. The discharges were observed for a 9 month period- from the start of the project until May 2019. PDSA cycles were used to monitor readmissions rates and examine the implementation of patient information across the different wards.

Results:
123 Discharges of patients with AKI across the acute medical directorate were recorded for the period of June –December 2018, during this period UHS reported an AKI episode rate of 4407 (data from renal registry report). Following the completion of the project the readmission rate was reduced for June 2019-December 2019 to 107 patients- a 13% reduction in readmissions.

Conclusion

The key findings of this QI project is that AKI readmissions reduced through appropriate and timely patient information. Assisting in reducing reoccurring AKIs prevents long-term kidney damage. Within the busy Acute Trust, the QI project has reduced unexpected avoidable admissions, through patient education and appropriate information provision, improving bed occupancy and availability.

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Tolvaptan for Autosomal Dominant Polycystic Kidney Disease: Factors Affecting the Patient Experience

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For the past few years, Tolvaptan has been available as a disease-modifying therapy for Autosomal Dominant Polycystic Kidney Disease, and many centres have begun to set up Tolvaptan programmes to manage eligible patients. However, despite such administrative developments, it remains the case that a significant proportion of those starting the drug do not feel able to remain on it long-term, which limits its potential effectiveness at a population level. Here we describe our current cohort and outline the reasons for ceasing to continue the drug.

Prior to appointing a part-time coordinator for our Tolvaptan service, 11 patients (6 male, 5 female) deemed eligible to receive it by national criteria had been commenced on Tolvaptan following counselling in clinic about the benefits and risks, side effects and the need for their involvement in management by complying with monitoring requirements. Since the arrival of the designated coordinator, a further 48 eligible patients (25M, 23F) have been approached about Tolvaptan when attending clinic.

Of this group of 59, 31 elected to commence the drug, while 19 declined treatment because of perceived likely disturbance of lifestyle (working environment limitations, inability to consume enough water and/or concerns about nocturia), and 9 are still in the decision phase.

Of the 31 who started Tolvaptan, 19 (61%) are taking it currently, while 5 (16%) have had a temporary stoppage, because of:

- Mental health issues - 2
- Problems with drug delivery - 1
- Difficulty with work commitments - 1
- Immobility following multiple leg fractures - 1.

An additional six patients (19%) have had to stop treatment permanently, for the following reasons:

- Abnormal LFTs - 1
- Comorbid episode - 3 (one each of: flare of ulcerative colitis, cardiovascular issues, metastatic cancer diagnosis)
- Issues with delivery of the drug by pharmacy, as per Otsuka restrictions -1
- Side effects (bloating and nausea) - 1

One of the original 11 has moved abroad (Tolvaptan status unknown).

Coordination of the prescriber-to-patient loop has been important. There have been no issues with communication from patients and/or primary care of LFT results, necessary for a smooth prescribing routine. Delivery of the drug has in eight cases been interrupted because of pharmacy administrative issues, but in all but the one case above, patients have ultimately continued on Tolvaptan.

Of the 19 currently on treatment, 6 have now been on it for more than 18 months, and therefore moved to three-monthly monitoring.

Thus we have found Tolvpatan generally well tolerated, but with very variable effects on lifestyle. We have found the patient experience very useful in improving how we counsel newly-identified potentially eligible patients.

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Sirt5 deletion protects from ischaemic AKI and enhances nephrotoxic CKD

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Introduction. Acute and chronic kidney diseases (AKI and CKD) are a global health concern associated with high morbidity and mortality. In the UK, AKI accounts for up to 18% of emergency hospital admissions and the prevalence of CKD (stage 3-5) is estimated to be up to 7% of the general population >16 years of age. To date, there are no curative treatments for kidney diseases, stressing the unmet medical need to find new therapies. Accumulating evidence has identified mitochondrial dysfunction as a central pathologic feature of both AKI and CKD. The mitochondrial NAD+-dependent lysine de-malonylase/-succinylase sirtuin 5 (SIRT5) has emerged as a key regulator of mitochondrial metabolism, but its role in kidney diseases remains unknown.

Methods. Male C57Bl/6J (WT) and Sirt5-/- mice underwent either unilateral renal IRI surgery (40min) (model of AKI), or received a single i.p. injection of single dose of folic acid (240µg/g BW) or vehicle control (model of CKD). IRI kidney were harvested after 24h and FAN kidneys after 14d. Tubular injury was determined semi-quantitatively (injury score) and by screening for Ngal and Kim1 using qPCR. Renal function was assessed by measuring serum creatinine and urea levels. Mitochondria were isolated from WT and Sirt5-/- kidneys and complex II activity was determined. A SIRT5 knockdown (by RNAi) was performed in human proximal tubular epithelial cells (hPTECs): cells were exposed to combined oxygen/nutrient-deprivation (OND), an in vitro model of renal ischaemia. Mitochondrial function and mitophagy rates were explored by FACS, Seahorse respirometry, and super-resolution microscopy.

Results. Loss of SIRT5 protected mice from IRI as indicated by significantly reduced tubular injury, enhanced renal function (reduced serum creatinine/urea levels) and reduced Ngal and Kim1 expression. In contrast, ablation of SIRT5 enhanced folic acid nephropathy (FAN), reflected in increased tubulointerstitial damage, immune infiltration, and Ngal and Kim1 expression. Measurement of complex II activity, a known driver of IRI, showed reduced activities in mitochondria from Sirt5-/- kidneys. SIRT5 RNAi-treated hPTECs showed reduced mitochondrial membrane potential (ΔΨM) and decreased mitochondrial ATP production, indicating that SIRT5 depletion impaired mitochondrial function. SIRT5 RNAi also enhanced mitophagy in hPTECs (control conditions and OND), a mechanism which is protective acutely, but exacerbates injury when activated chronically.

Conclusion. Taken together, the data showed that SIRT5 ablation protected from ischaemic AKI and enhanced nephrotoxic CKD, and suggest that in IRI, “functioning” mitochondria are a central driver of injury, while in FAN, mitochondrial function is required to alleviate injury.

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Diabetes care in people on maintenance haemodialysis – Patient perceived care Vs. Documentation of care

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Introduction

In 2016, guidelines were published by the Joint British Diabetes Societies endorsed by the Renal Association, which defined good quality care for a person with diabetes on in-centre haemodialysis (ICHD). Based on these guidelines, to improve the standard of care of diabetes for this population, this quality improvement project (QIP), sought to explore the differences between the patients' perception of the care they receive versus actual care provided.

Method

A patient questionnaire for data collection was developed in conjunction with the national "Diabetes in Haemodialysis" working group. Results from the pilot audit were compared in order to validate the tool before continuing with further data collection. Objective data, for standards such as annual diabetic review, dietary advice, retinopathy screening, and weekly foot inspections, were obtained by examining diabetic, renal and eye screening IT systems and dialysis nursing notes. Discrepancies were defined as being present, when the patient's answer was different to the documented evidence.

Results

The discrepancy rates between perceived care and delivered care measured at three haemodialysis units, are shown in Table 1. These rates varied considerably depending on the type of unit (satellite vs hospital) and whether they were managed by NHS or commercial providers. The units have varying demographics and those with diabetes and without English as a first language, account for 45.1% of the Hospital-based NHS unit, 13.3% of the Satellite NHS unit and 38.3% at Satellite non-NHS unit.

Discussion

The differences in perceived and documented care are attributable to many factors. Patients were often unable to recall when their last retinopathy screening or diabetic review was or if a particular clinical encounter on the HD unit was related to diabetic management. Given the ethnically diverse population, language barriers potentially contribute to misunderstandings during consultations when care is being provided. There is a substantial gap between clinical care delivered and the patient's perception of care actually received. The reasons for this are varied and dependent on patient and unit level factors. Clear verbal and/or written communication between healthcare professionals and the patient, may improve patient level of understanding and perception of care.

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Using Patient Reported Outcome measures (PROMs) to promote quality of care in the management of patients with established kidney disease requiring treatment with haemodialysis in the UK (PROM-HD): a qualitative study.

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Introduction:
Patients undergoing renal replacement therapy by haemodialysis (HD) report reduced quality of life (QOL) and often prioritise improvements in overall QoL over long term survival (1). Regular and systematic collection and use of symptom and QoL data through patient reported outcome measures (PROMs) has been shown to be highly beneficial in terms of improvements in QoL, overall survival and cost-effectiveness in other clinical settings (2, 3). However collection of PROM data to manage the symptoms of patients undergoing HD does not routinely occur in the UK. This study aimed to explore the views, perceptions and experiences of patients receiving HD (including Home HD) and members of the multi-disciplinary team (MDT) caring for this group on the implementation and use of PROM data, particularly when collected and fed back electronically (ePROMs).
Methods:
Using qualitative methodology, semi structured interviews were undertaken with 22 patients and 17 members of the HD MDT, which included both professional (nurses/doctors) and non-professional staff (Health care assistants/unit administrators). Before interviews, participants were given sample validated PROMs (IPOS-Renal, KDQOL-SFTM1.3, KDQOLTM-36 1.0) and details of core outcomes identified by the Standardised Outcomes in Nephrology (SONG-HD) initiative to inform discussion. Interviews were steered by a topic guide. Transcripts were analysed deductively using the Consolidated Framework for Implementation Research (CFIR) (4) and inductively using thematic analysis. The CFIR provides a pragmatic structure to report feasibility and acceptability of PROM use in HD settings; it comprises five major domains: intervention characteristics, outer setting, inner setting, characteristics of the individuals involved, and the process of implementation and their associated constructs.
Results:
The study identified key practical considerations around: i) frequency (how often PROMs should be completed); ii) timing (around dialysis); iii) setting (completion at home or in unit); iv) preferred mode of administration (electronic or paper versions) and v) interpretation and feedback of the responses. Both patients and the MDT were keen to use PROMs to support the delivery of person-centred care through shared decision making and management in all dialysis settings. The potential advantages of PROM use were generally recognised, primarily in research settings; the complexity of the intervention was highlighted through comments on patient safety and the need for effective electronic systems. Potential barriers to effective implementation included: i) lack of evidence base for use in routine kidney care; ii) perceived time barriers from both staff groups, anxious about work flow interruptions, and patients, who were anxious

about being overburdened by questionnaires; iii) risk of over-medicalising the patient experience; and (iv) health literacy issues for both patients and less experienced staff.

Discussion:

To assess whether PROMs can promote quality of care in HD settings, a coherent and comprehensive implementation strategy needs to be devised, taking into account the best available measures and methodological considerations. The findings from this study can assist implementation planning to address the priorities and concerns of both patients undergoing HD and members of the MDT, including timely understanding of factors which could aid or hinder changes to practice.

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A secondary data analysis of the impact of rejection on the long-term outcomes of human leukocyte antigen antibody incompatible renal transplantations

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Graft rejection, especially antibody-mediated rejection is one of the major risks associated with human leukocyte antigen antibody incompatible renal transplantations. To curtail the risks and achieve positive long-term outcomes, transplant centres across the world have employed various desensitization protocols as well as induction and maintenance therapy regimens. Thus, the purpose of this study was to analyse the outcomes of rejection in patients who had HLA incompatible renal transplantation in order to aid in the understanding and accomplishment of better transplantation outcomes.

Anonymized clinical data of 130 patients who had HLA incompatible renal transplantations from 2003 -2018 were assessed retrospectively. The graft survival outcome was compared based on the occurrence of rejection. The graft survival outcome was further analysed based on; a) the type of rejection i.e. antibody-mediated rejection, cellular rejection and mixed rejection b) timing of rejection i.e. rejection occurring within the first two weeks of transplantation, after the first two weeks of transplantation and both within and after the first two weeks of transplantation c) the frequency of rejection. Kaplan Meir's death censored survival analysis was used to estimate survival outcomes.

A total of 43 patients experienced rejection. At 10 years the graft survival of patients who had evidence of rejection (52.7%) was significantly lower than those who did not have rejection (82.3%); $p = 0.015$. Antibody-mediated rejection (AMR) was found to be the most frequent type of rejection occurring in 33 out of the 43 patients that had rejection. AMR was also the only rejection type that caused a significant decline in graft survival by 10 years $p < 0.001$. Rejection that occurred after the first two weeks of transplantation or both within and after the first two weeks of transplantation caused a significant reduction in graft survival of patients $p < 0.05$. Experiencing more than 1 rejection episode was associated with a significant decrease in graft survival $p < 0.01$.

The findings of this study showed that rejection, particularly antibody-mediated rejection, continues to remain a major barrier to long term successful outcomes in HLA incompatible renal transplantations.

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How do we improve the diabetic care of our in-centre haemodialysis population?

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Introduction: Due to the scheduling of haemodialysis (HD) and the burden of disease, people with diabetes on haemodialysis (HD) often find difficulty in accessing the specialist care required for their management. As a result, they often receive suboptimal care. The Diabetes in Haemodialysis (DiH) national working group has proposed standards to identify areas of suboptimal care and encourage interventions, to improve the care of diabetes for this population.

Method: Eleven national standards of care were audited in a Hospital-based NHS unit, a Satellite NHS unit and a Satellite non-NHS unit. These included: a named healthcare professional being responsible for diabetic care; annual reviews of diabetic control, retinopathy and diet; HbA1c within target ranges; capillary blood glucose (CBG) monitoring and; weekly foot inspections.
The following interventions were implemented in the first cycle after initial data collection:

- Presentation of results to Renal Dietitians & review of referral pathways
- Introduction of a Virtual Diabetes-Renal MDT to discuss all patients and manage complex cases
- Education for dialysis nurses designed and delivered by DiH group.
- Referral to primary/secondary care services for diabetic review

Results: Across the three Leicestershire dialysis units, there are a total of 362 people on HD, 148 of which have diabetes (40.9%). Baseline data showed differences in compliance to standards across all three units, attributable to differences in organisational structure (different referral pathways, staffing contracts and proximity to secondary care services) and differences in patient population (socioeconomic status and ethnic diversity). Standards such as annual review by diabetes specialist, dietetic advice and retinopathy screening showed low total compliance of 34.0%, 32.7%, and 75.8% respectively.

The re-audit showed that these standards improved (49.3%, 47.3% and 79.7% respectively); however there was reduction in nursing care standards. Pre-& post-HD CBG monitoring reduced from 98% to 88.3%, and weekly foot inspections from 50% to 42.2%.

Discussion: This quality improvement programme identified areas where standards are underachieved across different units, and the barriers to achieving them. Multi-disciplinary team (MDT) evaluation suggests that patient engagement and education played a large role in achieving good care. Engagement from MDT services including eye screening and dietetic service is also crucial for providing patient-centred care. Staffing pressures and time constraints contributed to low compliance to weekly foot inspections and inconsistent pre- & post-HD CBG monitoring.

In order to improve the standards further and provide care at the “point of dialysis,” the following interventions were identified for implementation and re-evaluation:

- Presentation of results and education for Dialysis Nurses
- Sharing “Diabetes Foot Care Tool” and standardising documentation across all units
- Identifying those at risk of hypoglycaemia with a “Hypoglycaemia Risk Tool”
- Discussion with eye screening services to provide opportunistic screening at HD units

Sharing areas of good practice (100% pre- & post HD CBG monitoring at the Satellite Non-NHS unit; 100% weekly foot inspections at Satellite NHS unit), may help to improve standards of care more widely across units.

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Assessing the feasibility of "low-tech" exercise and the impact on physical functioning in haemodialysis patients: a pilot study

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Haemodialysis (HD) patients have reduced physical functioning and activity levels and this compromise their quality of life and survival1. It is recommended that dialysis patients increase their level of physical activities2. Exercise interventions have shown potential in improving physical performance3 and quality of life4. Intradialytic exercises have also shown to improve dialysis clearance5, vascular health6, heart rate variability7, inflammation8 and body composition9. The majority of these previous studies have used cycle ergometers which are expensive and not always accessible. We conducted a pilot study to test whether an exercise protocol combining resistance training and a simple and flexible aerobic exercise (walking) will be practical and would bring beneficial outcome on physical function and other outcome measure such as body composition, dialysis clearance, inflammation and anaemia among HD patient.
The study included adults aged 18yrs or older, on haemodialysis for at least 3 months at St. George's hospital or satellite unit(s), have commenced/about to start anaemia management therapy, ability to communicate sufficiently in English and provide informed written consent. It excluded Individuals contraindicated to undertake exercise and those who changed mode of dialysis or received transplantation during intervention period. The consent participants were randomly allocated to either intervention or control groups. The intervention program involved walking for atleast 30 minutes, five times per week plus strength training whilst in dialysis for eight weeks. Outcome measured were: Physical Function (assessed with the 30s Sit-to-Stand test), grip strength dynamometer, quality of life (assessed with SF-36v2 questionnaires), Biochemistries (clinic routine blood tests on C-RP, albumin, creatinine, urea), nutritional status (SGA, waist circumference) and body composition (I.E lean tissue and fat tissue mass using Fresenius BMC machine), dietary intake (3 days food diaries). The feasibility of the study was assessed using questionnaires.
Participants' nutritional status was satisfactory but their energy and protein intakes were sub-optimal (table 1). Muscle functioning (measured by hand grip strength and sit to stand test) was poor and quality of life (measured by SF-36v2 questionnaire) was lower than that of the general population and a comparable cohort of dialysis patients. The exercise intervention could not bring desirable changes in body composition, inflammation or haemoglobin status of participants. However, the increase in weight lifted in each session from 3/4th week to the final 7th/8th week showed up to 98% improvements (i.e double the amount lifted in the early stage of the intervention) figure 2. The exercise intervention was acceptable by patients and clinic personnel (figure 1) but proven to be challenge to implement because, despite utilizing inexpensive equipment, in order for the programme to succeed, it requires investment from a full time physiotherapist or physiotherapy assistant to motivate and supervise patients.
We recommend that all dialysis units consider including exercise professionals within the standard care services to promote role of exercise in improving physical and mental health. We propose for this protocol (low-tech and flexible exercise) to be tested in a larger group and for extended period of time, whilst addressing shortcoming of this pilot study.

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A silent storm: report of a case of progressive renal failure secondary to IgG4-related kidney disease

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IgG4-related disease is an immune-mediated fibroinflammatory condition that can affect multiple organs. With multi-system symptoms, it can disguise itself as several diseases. Recent years have seen an increase in awareness of this condition. However, there is some way to go to improve early recognition and treatment of this entity.

We report the case of a 74 year old male ex-quarry worker with declining renal function, difficult to treat hypertension and proteinuria. He reported fatigue, joint pains, and a transient rash on his legs 1 month before presentation. He was euvolaemic on examination. Multiple hyperpigmented papules were present on his back. There was a trace of blood in his urine. Initial tests revealed mild proteinuria, hypocomplementaemia, a high ANA titre, an elevated Rheumatoid factor and a high plasma viscosity. A recent ultrasound showed normal looking kidneys. His eGFR had been slowly declining from normal since the beginning of 2015 and then took a nosedive from the beginning of 2019. It was 24ml/min/1.73m2 in clinic. A renal biopsy was performed 3 days later.

His past medical history revealed a diagnosis of silicosis which spawned from a protracted work-up for progressive dyspnoea in early 2015. A biopsy commented on a degree of silicosis. However, this did not account for all the features. Special stains for mycobacteria and fungi were performed, but did not identify any such organisms. In July 2016, he presented with retroorbital pain, diplopia, and what seemed like 4th and 6th nerve palsies on examination, eventually culminating in a diagnosis of Tolosa-Hunt Syndrome. An MRI of his head and orbit was normal.

MPO, PR3, and anti-GBM antibodies were absent. Antibodies to dsDNA were absent. Alpha-galactosidase levels were normal. His kidney biopsy showed a plasma cell rich tubulo-interstitial nephritis and accompanying storiform interstitial fibrosis. This was highly suggestive of an IgG4-related tubulo-interstitial nephritis. There was no significant staining on immunofluorescence. Although there was a modest elevation of his serum IgG, IgG4 subclass levels were normal. Prednisolone was started.

We are unsure how much, if any, of his past medical history can be linked to his renal pathology and if it can all be unified with a diagnosis of IgG4-related disease. The histological appearances are highly suspicious for IgG4-related renal disease. On recent follow-up, he demonstrated a favourable response to steroids with an eGFR of 34ml/min/1.73m2. However, it must be borne in mind that his renal function had declined significantly by the time he was assessed, and that a modest improvement may be all that can be hoped for.

IgG4-related disease can present with subtle symptoms and affect multiple organs, making it difficult to diagnose. There was no history or evidence of autoimmune pancreatitis, sclerosing cholangitis, or salivary gland involvement in our patient, which are common associations of IgG4-related disease. It is imperative that clinicians consider this differential in patients such as the one described here. Early treatment with steroids results in a characteristic improvement, and unless this window of opportunity is taken advantage of, outcomes can be poor.

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Developing an International Centre for Renal Training – an example from the North West

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Introduction

International renal societies such as the International Society of Nephrology (ISN) and the European Renal Association (ERA) support a wide international network and provide an efficient platform for timely scientific exchange and dissemination between healthcare professionals around the world. Work in Global Nephrology reveals the disparity between the developing and developed worlds in the research, diagnosis, treatment and prevention of kidney disease. The ISN supports several programmes, initiatives and partnerships that help to reduce the incidence and impact of kidney disease worldwide. Here, we describe the multifaceted approach taken by our department to develop an International Centre for Renal Training.

Centre Background

Our department provides a comprehensive regional service, serving a catchment population of approximately 1.6 million. The Directorate comprises a central dialysis hub and six satellite dialysis units, with approximately 500 patients undergoing in-centre haemodialysis and 100 receiving home therapy (both peritoneal and home haemo- dialysis). The Directorate supports acute dialysis, plasma exchange, interventional radiology and vascular access, and undertakes approximately 200 renal biopsies per year. It also provides living and deceased donor transplant workup and is responsible for the follow up of an excess of 750 renal transplant recipients.

Evolving as an International Centre for Renal Training

In 2012 the Renal department became involved in Global Nephrology, with the aim of building links, collaborating and creating networks with other Renal units, particularly from low income GDP countries. With the support of ISN and ERA we have identified four main aspects that are the base for developing an International Centre for Renal Training, and comprise of:

A- The ISN Fellowship Programme; where physicians from low resource countries spend time in the host centre with the ultimate goal of improving the standards of care in their home countries upon their return. Since 2013; 12 fellows from seven countries (Egypt, Sudan, Israel, Croatia, Bosnia, Kazakhstan and Nigeria) have visited for 3-6 months each.

B- The Sister Renal Centre Programme; supported by the ISN, in 2014 our department twined with Tuzla, Bosnia and by 2019 had successfully progressed to achieve top Level A collaboration status, with many achievements for both centres and mutual exchange of experiences.

C- The ISN Renal CME and Educational Ambassadors Programme; where Nephrologists from our department have visited centres in developing countries for specific hands-on training and support developing new skills or services needed in those centres.

D- Innovation in Teaching; since 2012 the Renal Directorate has developed three key international Renal courses which are based on practical and applied teaching; with UK and International representation for both faculty and delegates. Attendees have hailed from more than 48 countries across five continents, with courses covering renal biopsy technique, applied Nephrology and peritoneal dialysis access insertion.

Conclusion

Since 2012 our Renal department has worked to support as well as build links and collaborate with several other worldwide Renal centres. We have identified four key areas around which to develop an International Centre for Renal Training, and hope to explore further methods and expand services in the future.

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In vitro models of AKI reveal cell injury specific cytokine responses

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Background: Acute Kidney Injury (AKI) is a common life threatening condition(1). The nature and severity of the renal injury determine the progression from AKI to CKD.
The Proximal tubule epithelial cell (PTEC) is one of the main targets of AKI and the precise outcome of the injury therefore may depend on the PTEC response(2-3).
The role of TGF-β in renal fibrosis is well known but there is increasing evidence for a role of novel cytokines such as IL-18 and IL-15. However there is no significant data about their expression in PTEC in early AKI. We established three different in vitro model of AKI (septic, Ischaemia-reperfusion injury(IRI) and aminoglycoside toxicity) with the aim of observing the immediate cellular response and subsequently test the hypothesis that IL-15 and IL-18 are involved in determining the outcomes of AKI.

Methods: Primary human PTEC expressing GGT were cultured on collagen IV and cellular fibronectin. Aspects of IRI were reproduced by treatment with NaN3 for 60 min followed by incubation in 17 mMol D-Glucose. For aminoglycoside toxicity cells were incubated with 1 mMol gentamicin. Lipopolysacharides (LPS) treatment was used as the septic model. Cells were treated for 18 and 48 hours followed by RNA extraction and their media collected. IL-18, IL-15 and TGF-β expression were measured by Real-time QPCR. We analysed secreted NGAL and NAG as markers of degree of injury.

Result: Significantly higher NAG activity was detected in NaN3, LPS and gentamicin models of AKI compared to control (p=0.0014, 0.0125 and 0.0028), with no difference between the models. All NGAL results were below the level of detection. Results from the LPS treatment at 18hr tended to be variable with no obvious pattern despite consistent NAG results. There was no significant change in TGF-β expression in any of the models.
In the collagen samples, at 18 hr, both gentamicin and NaN3 reduced the expression of IL-18. At 48 hours IL-18 in gerntamicin treated cells had returned to basal levels but remained suppressed with NaN3 treatment. The expression of IL-18 was significantly increased with LPS. When cells were grown on fibronectin IL-18 expression at 18 hr was similar to that seen in cells on collagen (above), however at 48 hours there was a tendency for a rapid increase with NaN3 and conversely no changes with gentamicin. The IL-18 response to LPS was similar under both conditions.
Regarding IL-15, in the collagen samples, NaN3 induced no change at 18 hr but significant elevation at 48 hr. Whereas gentamicin caused suppression of IL-15 at 18 hr through to 48hr. In cells grown on fibronectin both gentamicin and NaN3 suppressed IL-15 expression at 18 and 48 hours. LPS induced a transient increase in IL-15.

Conclusion: Our pilot data indicates that the cytokine responses of renal epithelial cells to AKI of equal severity varies significantly depending on the nature of the injury. The relative expression of key opposing mediators such as IL-15 and IL-18 may influence the nature of the renal recovery.

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Chronic kidney disease (CKD) leading to acute kidney injury and dialysis initiation – analysis of UK Renal Registry data

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Background and aims: The UK Renal Registry (UKRR) now captures data for individuals who experience acute kidney injury (AKI) or have a diagnosis of progressive CKD managed by renal centres, in addition to information for people on renal replacement therapy (RRT). The aim of this study is to describe the clinical and demographic features of individuals reported to the UKRR as having CKD managed by renal physicians, comparing those who did, and did not transition to RRT. AKI alert data were used to categorise individuals who did and did-not receive an AKI alert.

Methods: We restricted analyses to 8 renal centres across the country who reported on their patients with CKD at the 31st December 2016, with follow-up data available for 24 months, capturing AKI alert data (when available as not all labs reported throughout the follow-up) and RRT incidence. Descriptive analyses are provided for demographics at baseline (age, sex, eGFR at 31st December 2016, ethnicity), modality of RRT-start, and mortality.

Results: At 31st December 2016, there were 12,638 people with a diagnosis of CKD reported to the UKRR, with a median age of 77 (IQR: 68-84), 45 % female, 5.8 % Asian and 1.2% Black ethnicity. Among these individuals, 10,071 (79.7%) had an e-GFR <30 ml/min/1.73m2 based on the last creatinine value in the 12 months before 31st December 2016, 2,080 (16.5%) had an e-GFR between 30 and 59 ml/min/1.73m2 and 296 (2.34%) did not have a serum creatinine value which allowed for calculation of e-GFR. Between 1st January 2017 and 31st December 2018, 3,723 (30%) individuals with CKD have also been reported as having an AKI episode (AKI warning test results sent from laboratories to the UK Renal Registry Master Patient Index dataset). Among these, 2,484 (67%) had one AKI alert and 1,239 (33%) had more than one. 640 (5%) individuals within the CKD cohort started RRT during the follow-up period (24-months) (figure 1). Among those, 66 individuals (10%) died at 2 years. Among those with CKD who did not start RRT and did not have AKI episodes during the 24-months follow-up period (65%), 1498 individuals (18%) died (Table 1). Analysis by stage of first AKI alert, after 31st December 2016, shows that the incidence of AKI stage 1 (67.42%) and AKI stage 3 (30.10%) is much higher than AKI stage 2 (2.48 %).

Conclusion: Amongst people with CKD managed by renal centres, more individuals die than start dialysis over a 24-month period. This is consistent with previous general population studies of people with CKD stages 3-5. Further work using individual clinical and demographic information is needed to better understand the outcomes of individuals with advanced CKD. AKI often precedes RRT start adding to the evidence that RRT initiation is not entirely predictable.

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Implementing the Gold Standards Framework into an outpatient dialysis unit

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Introduction
The Gold standards framework (GSF) is a national initiative to promote preparation for a 'good death'. It involves ensuring a collaborative plan is made with patients / relatives and health care professionals across primary and secondary care considering patient's wishes in their last days of life including DNACPR decisions.
Overall survival on RRT is currently 43% at 5 years and the general dialysis population is becoming frailer with 65% of RRT patients dying in Hospital
Method
The GSF was being used for hospital inpatients using the question 'Would you be surprised if your patient were to die within the next 12 months?'
We initially introduced the framework to the in centre haemodialysis unit in 2016 with MDT meetings commencing in March 2017 involving the Haemodialysis unit manager, practice education facilitator, Palliative care and Nephrology consultants and specialist nurses.
Advanced care planning packs (ACP) were developed trust wide and introduced in April 2018.
All dialysis patients are coded according to the framework as either Blue (stable) Green (unstable with potentially months to live) Amber (deterioration with potentially weeks to live) or Red (dying in the last days of life) and the decision recorded on the electronic patient record.
The monthly clinical meeting discusses all patients coded as Amber to ensure advanced care planning and DNACPR status has been considered and discussed with the patient.
Results
Between March 2017 and November 2019 126 patients have been discussed in the MDT.
Of 126 patients discussed 48 received an ACP, 6 declined and 72 did not receive a pack. 58 patients had a DNACPR put in place 28 of which were a direct result of discussions following receipt of the ACP pack. 15 declined and 53 had no DNACPR in place.
Half of the patients discussed have subsequently died and of these 43 (62%) had a DNACPR in place, 10 (15%) refused DNACPR and 16 (23%) had no DNACPR. Of the deceased patients with a DNACPR 28 (40%) were provided with an ACP pack.
A pilot questionnaire has been given to 10 patients and families for feedback regarding the ACP packs. 6 responded all of whom found the pack useful, appropriate and easy to understand. 65% made a decision regarding end of life preferences as a result of receiving the pack.
Specific symptom control guidelines for CKD patients at EOL have also been developed
Discussion
Going forward we plan to ensure all patients coded as Amber are offered an ACP pack and discussion with more of an emphasis on and audit of preferred place of death
We have recently expanded the initiative to include CKD, Home therapy and Satellite unit team members. Clinicians are encouraged to include GSF coding in all correspondence with community and primary care teams
We have linked with the local hospice community engagement worker and are involved in an end of life project identifying patients from the south East Asian population in the last 12 months of life.

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Diverticular colonic perforation in patient on Mycophenolate Mofetil and Prednisolone: a case report and literature review

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We describe the occurrence of a diverticular colonic perforation in a patient with glomerulonephritis 4 weeks after initiating MMF and high dose oral Prednisolone. It is a recognised complication of immunosuppression, carries a higher morbidity and mortality, and is not always so apparent clinically – prednisolone often masking the presenting symptoms.

Clinical Literature Review:

Colonic diverticulosis (the presence of multiple inflamed diverticulae in the bowel, especially the sigmoid colon) is usually asymptomatic, but may cause symptoms ranging from mild discomfort to severe peritonitis. It is present in up to 38% of the general population.

Gastro-intestinal toxicity is a recognised complication of MMF, affecting both the upper and lower intestine, often occurring in the first 6 -12 months of treatment. Symptoms include nausea, vomiting, ulceration, gastritis, diarrhoea and abdominal pain, often in a dose dependent fashion. Dose reduction, or discontinuation usually resolves the symptoms. Oesophageal ulceration, reactive gastropathy and GVHD-like features have been reported in intestinal biopsies, as well as colitis, especially in solid organ transplant recipients.

Endoscopic examination in the subgroup of colitis sufferers can demonstrate erythema (33%), erosions and ulcerations (19%), but also what looks like normal appearances in 47%. There is usually rectal sparing. Histological analysis however often reveals pathological changes including a distinct MMF related colitis, inflammatory bowel disease appearance, ischaemia and GVHD like features. Histological evidence of colitis was seen in 83% of MMF patients undergoing colonoscopy for diarrhoea. Patients with renal transplants my be at particular risk, compared to other solid organ transplant recipients, possibly related to higher doses used, or increase in the free fraction of MPA in the context of transient renal impairment.

There is some evidence that MMF alters the composition of the gut microbiota, selecting for bacteria expressing the enzyme B-glucuronidase (GUS) and leading to up regulation of GUS activity in the gut of mice and symptomatic humans. In the mouse, the administration of vancomycin eliminated GUS expressing bacteria and prevented MMF induced weight loss and colonic inflammation.

Corticiosteroids are also recognised to cause both spontaneous diverticular perforation (impairing the ability to contain the perforation in the early stages) and mask the symptoms, leading to diagnostic challenge.

Conclusions:

It is important to consider the role of immunosuppressive medication in all patients presenting with unexplained abdominal symptoms.

There may be a role for prophylactic sigmoid resection in patients with a history of previous diverticulitis in whom immunosuppressive drugs are being considered, for example patients with CKD on the transplant waiting list, but the timing of this surgery remains unclear.

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Neutrophils are required for anti-myeloperoxidase antibody vasculitis but inhibition of myeloperoxidase does not affect disease

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Introduction: Anti-neutrophil cytoplasmic antibody (ANCA) vasculitis is a systemic autoimmune disease that causes glomerulonephritis. It is characterised by the presence of autoantibodies that bind to myeloperoxidase (MPO), or proteinase 3 (PR3) which are present in the granules of neutrophils and monocytes. A requirement for neutrophils has not been directly shown in a murine model. A previous publication suggested this was the case, but the depleting antibody used targeted both monocytes and neutrophils. Inhibition of enzymatic MPO may be of benefit in ANCA vasculitis because MPO is an important effector mechanism for neutrophils. Furthermore, a recent publication has suggested benefit for MPO inhibition in the nephrotoxic nephritis model. Therefore, we aimed to firstly explore if neutrophils were required for vasculitis induced by anti-MPO antibodies, and to explore the role of MPO inhibition in this model.

Methods: Disease was induced with anti-MPO IgG raised in MPO-deficient mice, injected into C57BL/6J mice, inducing focal necrotizing crescentic glomerulonephritis. Animals were culled at day 7. To investigate the role of neutrophils during anti-MPO antibody vasculitis, chimeric mice were created using bone marrow with a myeloid-specific deletion of the Mcl-1 anti-apoptotic protein. These Lyz2Cre/CreMcl1flox/flox mice are referred to as Mcl1ΔMyelo mice. This specific deletion leads to a dramatic reduction of circulating and tissue neutrophil counts without affecting circulating monocyte numbers. To explore the effects of MPO inhibition in vivo we treated the C57BL/6J wild type mice with either control vehicle or MPO inhibitor (AZD5904, AstraZeneca) with a total dose of 90 mg/kg/day from day -1 to day 7 after disease induction. At day 7, kidneys were collected for histology and flow cytometry, and urine and serum for biochemistry analysis.

Results and discussion: Mcl1ΔMyel mice were protected from disease. There was a decrease in circulating neutrophils at day 7 but not monocytes. Macrophage infiltration to the glomeruli was decreased in Mcl1ΔMyel mice. Mcl1ΔMyel mice also showed significantly less crescent formation, alongside a significantly lower albumin/creatinine ratio in terminal urines when compared to littermate controls. C57BL/6j wild type mice treated with AZD5904 showed a complete inhibition of peroxidase activity in circulating neutrophils. However, this inhibition did not have an effect on the glomerular crescent score, CD68 cells in the glomeruli, serum creatinine, proteinuria and fibrosis.

Summary: We have demonstrated a requirement for neutrophils in anti-MPO vasculitis. The results of the experiments using AZD5904 suggest that inhibition of MPO on its own is not enough to have a positive impact on disease. Inhibition of multiple neutrophil effector mechanisms may be required for therapeutic benefit.

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Malakoplakia: A Rare cause of renal dysfunction, mimicking a renal tumour

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Introduction:
Malakoplakia is a very rare granulomatous disease of infectious aetiology. The name malakoplakia is derived from the Greek words “Malako” (soft) and “Plako” (plaque). It can involve multiple organs, most commonly the genitourinary tract. It is caused by abnormal macrophage and monocyte function. It usually presents in immune-compromised people. Below is a rare case of malakoplakia of the kidney in an immune-competent person.

Case:
A 49 years old lady presented feeling generally unwell with occasional vomiting, night sweats and subjective weight loss over two months. She did not have any other medical conditions and was not taking any medications. She was a smoker (15 cigarettes/day). Her examination was unremarkable. Urine dipstick showed 2+ protein. Bloods showed deranged renal function with a Creatinine level of 347umol/ L (no baseline reading available), Potassium of 7.2mmol/L, Haemoglobin 97g/L and WBC 15 x 109/L, ESR 135mm/h and CRP 228mg/L. Immunology and myeloma screens were negative.
Hyperkalemia was medically managed and subsequently improved.
Ultrasound urinary tract showed a large and ill-defined mass lesion in the upper pole of the left kidney measuring at least 76 mm x 44 mm.
This was further investigated by a CT chest abdomen pelvis which showed left kidney almost entirely replaced by a tumour mass breaching the Gerota's fascia and invading the psoas posteriorly and the abdominal wall laterally. At the inferior aspect of Gerota's fascia nodules were seen, suspicious of malignant infiltration. Marked para-aortic lymphadenopathy was also noted.
The right kidney was hydronephrotic with hydroureter as far as the pelvic inlet.
A right-sided nephrostomy was done followed by ureteric stenting to treat hyroneohrosis.
Patient was initially suspected of having a renal malignancy. For diagnosis confirmation a subsequent left kidney biopsy was performed. This showed an entirely different picture: the renal lesion was infact found to be malakoplakia.
Based on the above, patient was started on antibiotics: Ciprofloxacin followed by Piperacillin-Tazobactum. With antibiotics, patient has improved clinically accompanied by improvement in infection markers and stabilisation of renal function.

Discussion:
Above is a rare case of a patient with a disease which has a relatively simple treatment but can mimic a much more sinister diagnosis. When involving the kidneys and urinary tract, misdiagnosis can lead to nephrectomy and other radical procedures. Hence it is imperative that this disease is recognised and treated appropriately.
Essential learning points from the above case are: firstly, not all renal masses are malignancies and tissue diagnosis is important; secondly, although more common in the immune-compromised, malakoplakia can also present in immune-competent patients. Thus it should be considered as a differential diagnosis when dealing with a renal mass.

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Effectiveness of Sodium Zirconium Cyclosilicate (SZC) in Haemodialysis Patients with Severe Hyperkalaemia in the DIALIZE Study

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Background and Aims: Patients with severe hyperkalaemia require urgent intervention to avoid serious adverse outcomes and mortality. The phase 3b DIALIZE study (NCT03303521) showed that sodium zirconium cyclosilicate (SZC) reduces predialysis serum potassium (sK+) after the long interdialytic interval and is well tolerated in haemodialysis patients with hyperkalaemia. This post-hoc analysis of the DIALIZE data assessed the efficacy of SZC in patients with severe hyperkalaemia (defined as sK+ ≥6.0 mmol/L) at baseline.

Methods: The DIALIZE study randomised 196 patients 1:1 to placebo (n=99) or SZC (n=97). The study consisted of an 8-week treatment period, comprising a 4-week SZC dose titration phase followed by a 4-week evaluation phase. The starting dose of SZC was 5 g orally once daily on non-dialysis days (4 days/week) for the 4-week dose titration phase (titrated in 5 g increments to a maximum of 15 g on non-dialysis days) to achieve predialysis sK+ 4.0–5.0 mmol/L. Patients maintained a stable dose of SZC for the 4-week evaluation phase (SZC 5, 10 or 15 g). Here, treatment response was defined as achievement of predialysis sK+ of 4.0–5.5 mmol/L during ≥3 of 4 haemodialysis treatments after the long interdialytic interval during the 4-week evaluation phase and not requiring potassium-lowering rescue therapy. Rates of response were compared between those patients with and without baseline severe hyperkalaemia (sK+ ≥6 mmol/L and <6 mmol/L, respectively). The sK+ measurement on Visit 1 (Day –7) was used as the baseline value.

Results: At baseline, 88 patients had sK+ ≥6 mmol/L (SZC n=46, placebo n=42) and 106 patients had sK+ <6 mmol/L (SZC n=49, placebo n=57); data were missing for two SZC patients. The overall proportion of treatment responders (irrespective of treatment and dose) in patients with baseline sK+ ≥6 mmol/L and <6 mmol/L was 44.3% and 43.4%, respectively. The proportion of treatment responders was greater with SZC compared with placebo in patients with baseline sK+ ≥6 mmol/L and sK+ <6 mmol/L (Figure). For patients receiving SZC, the proportion of treatment responders was consistent in those with baseline sK+ ≥6 mmol/L (67.4%) compared with those with baseline sK+ <6 mmol/L (71.4%; Figure).

Conclusion: Our results suggest that SZC is effective in haemodialysis patients with severe hyperkalaemia.

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Using Quality Improvement to Improve the Effectiveness of Dietetics in a Low Clearance Clinic

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Background:
Diet plays a key role in the management of chronic kidney disease (CKD). Individualised dietary advice from a specialist renal dietitian working as part of the multi-disciplinary team improves patient outcomes (NICE 2013, NICE 2014, BRS 2002). Renal Dietitians review patients in busy consultant led low clearance clinics. However, in our centre, only 57% of the patients flagged to see the renal dietitian are seen. Non-attendees have an enormous impact on services and there is a significant workload in managing these patients before and after clinic.

Methods:
Quality Improvement tools were used to understand the process and identify specific areas which may lead to an improvement in service delivery and reduce dietetic non-attendance rates. Data was collected over a 6 month period and the percentage of patients seen by the Renal Dietitian was plotted on a run chart over time. The clinic process was evaluated in depth which included mapping a patient journey through clinic. Reasons patients missed their appointment were identified through patient and staff feedback. A driver diagram was used to identify possible change ideas and the wider MDT was asked to vote for possible change ideas using the 3 dot system.

Results:
The 2 main reasons patients did not see the renal dietitian were:-
1. They did not know they were flagged to see a dietitian
2. They were not told by the doctor that they were to see a dietitian.

The first test of change was for our Dietetic Support Worker to phone patients the week before their appointment. This was started in Week 24 and has resulted in an immediate improvement in attendance rates to 100% (Figure 1).
The second change idea, which is yet to be implemented, is to reserve clinic slots for new and complex patients only and set up a telephone clinic for reviews (with most recent blood results available for the telephone consultation).

Conclusions:
1. Using QI methodology to re-design services is essential as it provides a systematic approach to quickly identify areas of improvement which are effective and sustainable.
2. The benefits of this improvement project include reducing dietetic DNA rates in low clearance clinics and providing a more efficient and effective dietetic service. It helps ensure patients are seen at the right time, in the right place, by the right person.
3. Including the wider MDT in this work has highlighted to them the need for timely, appropriate referrals. One of the consequences is that it may increase demand for our service as more patients and staff understand the process and the value of dietetic intervention in CKD.

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“Traffic Light” Water Jug Lids: A Novel Method To Reduce Dehydration in Hospitalised Patients

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Introduction
Older adults are susceptible to dehydration due to acute and chronic health problems, which impair thirst, reduce the ability to drink sufficiently and/or increase urinary, skin and respiratory fluid loss (1). During hospitalisation negative fluid balance often accompanies infection and is independently associated with poorer outcomes (2-5), longer length of stay and greater costs (6-8). In England, NICE has estimated that the annual impact from acute kidney injury is up to £620 million (7) and that 12,000 cases could be avoided by more pro-active fluid management amongst vulnerable groups such as older adults.

Although it is a clinical priority to recognise and address risks of insufficient oral fluid intake, there is no standardised nurse-led assessment or formal bedside response protocol commonly applied. As such, novel interventions to highlight and mitigate clinical dehydration are warranted.

Methods
As recently first described (9), a “traffic-light” system of water jug lids was piloted on an acute gerontology admissions unit (28 patients) and subsequently a general orthopaedic ward (34 patients) to improve recognition and management of reduced fluid intake.

Patients deemed medically suitable were issued with a red-topped 750ml water jug at 08:00. At 12:00, every patient’s jug was assessed; if empty it was refilled and replaced with an orange-topped lid. The process was repeated at 14:30 and if empty, replaced with a green version. If the jug had not been refilled during the day and hence the lid was still red at 14:30, support workers informed nursing staff and encouragement was given to achieve the minimum daily water intake of 1500ml.

Nursing care records were reviewed before and after the intervention and patient, staff and relative questionnaires were completed to assess the impact of the project.

Results
Mean fluid intake on the gerontology admissions unit increased by over 400ml and was maintained at this elevated level on two episodes of subsequent retesting. A similar increase was noted on the orthopaedic ward with mean intake going up by over 300ml. Allied to this change in hydration, improvements in mean Bristol Stool Scale suggesting constipation had also been positively influenced. Costs were negligible (86p including VAT per jug lid), resulting in the two wards being fully supplied for under £160. Questionnaires highlighted how well the system was received by patients, relatives and staff alike and in view of the positive results and feedback, the project is now on its second trust-wide roll out (10).

Conclusion
A simple, paper-light and likely cost-effective quality improvement project demonstrated a marked and reproducible increase in mean fluid intake and constipation amongst vulnerable older adults. Following careful roll-out, this concept has potential to positively influence dehydration on a much wider scale.

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Using a biofeedback system to control Ultrafiltration rates – Does this impact treatment and patient outcomes?

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Background: Fluid control is an essential clinical goal of maintenance haemodialysis. Failure, may lead to short- and longer-term impact on patient well-being [1]. Often competing, though sometimes associated with fluid control, is intra-dialytic hypotension occurring in up to 20% of sessions, with other patients experiencing symptoms without full hypotensive episode [2]. Clinicians may reduce ultrafiltration (UF) due to clinical symptoms (e.g. hypotension, cramps, nausea, clammy, unwell, sensory impairment, vomiting, loss of consciousness or fitting), possibly failing to achieve the target fluid loss. This service evaluation monitored fluid removal and patient well-being using a biofeedback system (B. Braun Dialog iQ® with BioLogic Fusion®) compared to standard dialysis. This biofeedback system aims to prevent hypotension by monitoring systolic blood pressure and relative blood volume to control ultrafiltration rates.

Methods: Candidates were identified based on presence of any symptom of hypotension or failure to achieve 90% of target fluid loss in previous weeks. Fluid loss achieved, minimum UF rate, patient well-being (Likert scale) and symptoms were recorded for n=48 treatments/patient. Patients were aware of machine change.

Results. Eight patients were treated 3 times a week with high-flux dialyzers. No change in pre-dialysis patient well-being was observed. Net-UF was not statistically different in the two groups. Minimum UF was activated for 16% of standard and 8% of automated treatments. A total of 383 treatments were available. Systolic blood pressure after each hour of treatment was not statistically different between the two treatments approaches. Dry weight was achieved following 50.3% of the standard sessions and 75.5% using the biofeedback system ($p<0.001$).
Post-treatment well-being scores were higher using the biofeedback system with scores improving for 30% of monitored treatments compared with 23% standard. Patients felt the same or better following 85% biofeedback treatments versus 65% of standard ($p=0.004$). For 31% of standard and 15% of biofeedback treatments a lower well-being score was reported. Overall, 3 patients (37.5%) following standard treatment and 6 patients (75%) following biofeedback treatments felt better after treatment.
Frequency of cramps was significantly lower in biofeedback treatments (9.9% vs. 14.66% of standard treatment). Most patients (n=7/8, 88%) experienced cramps during standard treatment compared with half of the patients (n=4/8, 50%) during biofeedback treatments.
Discussion: As observed here, biofeedback may benefit patients, increasing ability to achieve post-dialysis dry body weight, while improving well-being scores. However, further larger scale investigations preferably considering severity of symptoms are required.

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Cutaneous microcirculatory dysfunction in peritoneal dialysis patients

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Introduction

Microvascular impairment is an early step in cardiovascular disease (CVD), the major cause of morbidity and mortality in patients with CKD. Changes in skin microvascular reactivity have been shown to reflect more widespread changes in the systemic and coronary microcirculation. Microvascular function is attenuated by advancing age and conditions that commonly coexist with CKD such as diabetes and hypertension. We investigated whether skin microvascular reactivity is impaired in peritoneal dialysis (PD) patients compared with healthy controls and whether this impairment is independent of comorbidity.

Methods

Forearm skin vasculature was examined in 28 patients on PD. 28 healthy controls and 28 controls matched to the PD patients for age, gender, diabetes and previous CV events were selected from a cohort of patients previously studied in our laboratory. Microvascular function was assessed using laser Doppler flowmetry in combination with post-occlusive reactive hyperaemia (a test of generalised microvascular function) and iontophoretic application of acetylcholine (ACh) and sodium nitroprusside (SNP) to investigate endothelium dependant and non-endothelium dependant vasodilation respectively.

Results

Peak post-occlusive flow (measured in arbitrary units AU) was significantly lower in the PD patients than in both the healthy controls and the co-morbidity matched group; 90.45 AU [60.9-128.35] in healthy controls, 74 AU [58.8-134.4] in matched controls and 56.95AU [45.1-89.8] in PD patients (median [IQR] p=0.03 healthy controls versus patients, p=0.04 matched controls versus patients). SNP-mediated vasodilatation was significantly lower in the PD group compared with healthy controls (p= 0.016), the response to ACh was also lower but did not reach statistical significance. ACh and SNP-mediated vasodilatation trended towards being lower in PD patients than matched controls but did not reach statistical significance.

Discussion

The PD patients were characterised by a generalised dysfunction of the skin microcirculation compared with healthy controls and controls matched for factors known to affect the microcirculation. This appears to be the result of defects in multiple vasodilatory pathways.

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Increased complement C5a expression in IgA immune complexes from children with inflammatory renal disease

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Background: Glomerular immunoglobulin deposition is a common finding in inflammatory renal diseases, including immunoglobulin A (IgA) related nephritis and lupus nephritis (LN)[1] [2]. Previous biological studies within the literature have demonstrated that IgA and immunoglobulin G (IgG) alone are unable to induce a direct pathogenic response in renal mesangial cells[2] [3] leading to the hypothesis that complement components bound to the immune complex may be the source of this damage. This study aimed to explore the extent of active complement component binding to IgA immune complexes isolated from patients with inflammatory renal disease.
Methods: This study used the ThermoScientific CaptureSelect system with Pierce spin columns to isolate IgA immune complexes from 200µL plasma from a small pilot cohort of patients with immunoglobulin A vasculitis nephritis (IgAVN), LN and age- and sex-matched healthy controls (n=6/group). The immune complexes were then analysed for their expression of complement components C3a and C5a using western blotting after normalisation to IgA concentration. Data are expressed as median [range] and are analysed using Kruskal-Wallis with Dunn's multiple comparisons test.
Results: There were no significant differences between age or gender between groups (Table 1). There was no significant difference in the total protein concentration obtained from 200µL of plasma between any of the groups (data not shown). When normalised to the concentration of IgA with the immune complexes there was no difference in the expression of complement C3a within the immune complexes between the groups (Figure 1A). There was, however, a significantly increased expression of complement C5a in the immune complexes isolated from patients with LN (0.004 [0.003-0.009]; p=0.006) compared to healthy controls (0.002 [0.0008-0.003]) (Figure 1B). When normalised to the concentration of IgG within the immune complexes there were no significant differences between any of the groups for either complement C3a or complement C5a (Figures 1C-D).
Discussion: These pilot data suggest a potential increased expression of complement C5a in IgA immune complexes isolated from children with LN compared to healthy controls. Building on these data with further laboratory studies may provide evidence of the potential usefulness of targeting the complement system in these renal inflammatory diseases.

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Auditing the nutritional care process on an acute renal ward

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Introduction
Malnutrition is a common complication of chronic kidney disease (CKD) and end stage kidney disease (ESKD), due to fatigue, food distaste, and nutrition impact symptoms such as nausea dysgeusia early satiety and poor appetite. Dietitians have a key role in managing malnutrition, access to relevant medical, social and nutritional information is necessary, alongside co-operation from the multidisciplinary team in implementing nutritional care plans. We noted that some referrals were incomplete, and nutritional care plans were not being fully implemented, therefore we aimed to audit compliance with the nutrition care process on an acute renal ward.
Methodology
Patients who were admitted to the renal ward and referred for dietetic advice or currently under the care of the dietitian were included. A data collection tool was devised, incorporating demographics, referral type, reason for referral, appropriateness of referral, number of days from referral to patient being seen, and aspects of the dietetic care process. recent weight, were food charts available and complete, were snacks ordered received within 2-3 days and were supplements given as prescribed. Data was collected using the audit tool, this was used alongside assessment of the most recent food chart available at the time of initial dietetic assessment to collect data for the audit. Data was analysed to determine reason for referral, and the effect of this upon the quality of the nutrition care process followed nutritional documentation by nursing staff.
Results
84 patients met initial inclusion criteria. Four patients were excluded as they moved to outlier wards, therefore data for 80 patients (mean age 69 years; 65% male,35% women; 46% on dialysis with average dialysis vintage 4 years) was analysed. The most common reason for referral was nutrition support. Referrals were deemed appropriate for 75 (94%) patients. The mean number of days from referral to dietetic assessment was one working day. There was no significant difference between reason for referral and number of days to dietetic review 0-4 days (p=0.18) 71/80 (89%) patients had a recent weight documented; where weights weren't available this was predominantly due to patients being too unwell. Food charts were available for 48 patients, with 36 (75%) being fully completed. 52/80 patients were prescribed snacks as part of their nutritional care plan, however 40 (77%) did not receive snacks within 2-3 days. Only 12 patients (23%) received snacks in a timely manner. 29/80 (36%) patients required nutritional supplements as part of their care plan, with 25 (87%) receiving supplements as prescribed.
Summary
Overall the nutrition care process was efficient for the majority of patients in this audit, which will help to prevent deterioration in nutritional status during their hospital admission. A limitation of this work is that the nutritional status of participants was not recorded as part of the audit, and this should be included in future work. Aspects of nutrition care plans which were implemented well were completion of food record charts, recording weights, and providing supplements; however provision of snacks was poor and requires engagement from the Trust to refine this process

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Cultural influences on physical activity and exercise beliefs in patients with Chronic Kidney Disease- The Culture-CKD Study.

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Introduction

Cardiovascular disease (CVD) remains the leading cause of mortality for patients with Chronic Kidney Disease (CKD). Inactivity increases the chance of developing CVD. Interventions designed to increase physical activity (PA) levels for people with CKD are warranted. Research investigating exercise interventions in individuals with CKD has shown benefits in exercise capacity and arterial stiffness. Review of a recent study evaluating exercise post kidney transplant revealed 11 of 18 non-completers were from black and minority ethnic groups. This led to this pilot study, utilising a mixed-method approach to explore cultural and ethnic influences on the perception of, and decision to engage with PA and exercise training in patients with CKD from the most widely represented ethnic groups at an NHS Foundation Trust.

Methods

Participants were recruited from the renal unit at an NHS Foundation Trust between December 2019 and June 2020 for focus group discussion. Following completion and analysis of twenty individual semi-structured interviews, sixty-four patients with a diagnosis of CKD (stages 2-5), aged between 25 and 79 (mean age 57) were recruited for a focus group discussion. Individuals were approached using purposive sampling in accordance with ethnicity, to participate. Six, single sex focus group discussions were undertaken, with individuals from the following ethnic groups; Black African and Black Caribbean (male n= 8 , female n= 5) , South Asian (male n= 7 , female n= 6) and White Caucasian (male n= 6 , female n= 4). Translators were employed as required (n= 4). Interview data were transcribed verbatim and analysed using an inductive, thematic analysis approach, including line by line open coding grounded in the data. All participants completed the General Practice Physical Activity Questionnaire (GPPAQ) and Self-Efficacy to Regulate Exercise Questionnaire. Data was analysed using Spearman's rank correlation to determine if there was a significant relationship between the Self-Efficacy to Regulate Exercise scores and GPPAQ levels.

Results

Analysis of focus group data revealed a range of physical, psychological, social, and environmental factors that were perceived to influence exercise. Analysis identified four core themes; 'me as myself'; evolution as an individual with CKD; support and education; and taking ownership of health. Subthemes revealed the role of inter-personal relationships; socio-cultural beliefs and previous exercise exposure. Cross sectional analyses between groups suggested the need for specialist support from renal healthcare professionals to facilitate exercise engagement. Spearman's rank correlation revealed a significant correlation between GPPAQ levels of activity and Self-Efficacy to Regulate Exercise behaviour ($r = -0.40$, $p=0.01$).

Conclusion

These findings suggest a relationship between levels of self-efficacy for exercise behaviours and GPPAQ reported levels of PA. Thematic analyses suggests that the understanding, attitudes and beliefs to exercise

and PA are complex. It is important to understand the socio-cultural influences related to exercise and PA for individuals with a diagnosis of CKD from a variety of ethnic backgrounds. Understanding patient's experiences, thoughts and beliefs may be of relevance to clinicians to facilitate engagement with many elements of care. As such, this may help design more inclusive clinical services.

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Long-term Imatinib use causing tubulo-interstitial nephritis: a rare adverse effect

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Introduction:
Imatinib is a tyrosine kinase inhibitor used in treatment of certain haematologic malignancies. Its most common side effects are gastrointestinal symptoms, fluid retention and a drop in haemoglobin. Renal dysfunction is very rarely reported with it. Below is a case acute tubulo-interstitial nephritis (TIN) after prolonged use of Imatinib.

Case description:
A 72 years old gentleman was referred to the renal clinic with a declining renal function. He was clinically well on presentation. He denied any symptoms suspicious of vasculitis. There was no history of non-steroidal drugs, no history of recent antibiotic use. He was on Imatinib tablets for 20 years as prescribed by haematology for chronic myeloid leukaemia. Other significant background history included hypertension, mild chronic kidney disease (baseline creatinine 150umol/L), a bladder tumour treated in 2014 and a left nephrectomy for a renal cell carcinoma in 2018. His latest CT abdomen (post-surgery) in July 2018 did not show any active malignancy.
Examination was unremarkable apart from a blood pressure of 160/80. Bloods done in clinic showed acute kidney injury with a creatinine of 499umol/ L, potassium of 5.5mmol/L. A complete immunology screen and myeloma screen was sent (which later came back to be negative), renal ultrasound done showed no obstruction and normal sized right kidney. Renal biopsy was considered but due to him having a single kidney it was decided to try a conservative approach first. As there were no other offending agents in his medication history, he was asked to stop Imatinib to see if it helps in improving renal function, and blood pressure management was optimised.
Within a few days of his initial consultation, he presented to accident and emergency with chest discomfort and vomiting. On admission, bloods revealed a significant deterioration in renal function with a creatinine of 1449umol/ L and a urea of 60mmol/L. He was acidotic with bicarbonate of 4mmol/L and potassium was 7.4mmol/L. He was started on hemofiltration.
Due to the suspicion of possible interstitial nephritis, Prednisolone was started and Imatinib was kept on hold.
Kidney biopsy was done which showed active tubulo-interstitial nephritis, hence confirming the diagnosis. His renal function started recovering with the above treatment, and he came off dialysis with good urine output and much improved blood biochemistry.

Discussion:
This is an unusual case of a drug not known to cause acute renal failure being responsible for acute tubulo-interstitial nephritis. There have been a few studies linking Imatinib to renal function decline but the cause has been unclear. Looking at this case it might be reasonable to regularly monitor renal function whilst on Imatinib and seek urgent renal advice if any derangement.
There is also not much literature on cumulative dose toxicity of Imatinib, and it might be worthwhile investigating this further.
This case provides a good insight on a poorly understood side effect of a very important drug and may form a base for further research in this domain.

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Recurrent membranous post transplantation: histopathology, treatment and outcomes

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Introduction
Membranous nephropathy is reported to recur in 30-45% of transplants. The rates of reported recurrence are higher in centres that perform surveillance biopsies than those who don't. Optimal treatment is unknown. We examined recurrent membranous nephropathy in our cohort in terms of their histopathology, treatment and outcomes.
Methods
Patients with membranous as the cause of their ESRF who were later transplanted were identified from an in-house database. Their demographic and clinical data was collected from the electronic health record.
Results
36 patients with a diagnosis of membranous nephropathy were transplanted. Mean follow up was 6.44+/- 4.2 years. 41.6% had an episode of rejection (mean time to rejection 0.42+/- 0.15 years). Overall there was 22% graft loss (mean time from transplant 6. 5+/- 3.7 years), 11% deaths (time from transplant 8.6 +/- 2.3years) and 6% deaths with functioning grafts (at 6.95 +/- 2.3 years from transplant. Mean eGFR at 3 months and 1 year post transplant were 48.06 +/- 18.5 and 48.1 +/- 14.5.
30/36 patients had at least one biopsy following transplantation. Of those whose biopsies did not show recurrence, the mean time to the most recent biopsy was 2.9 +/- 2.7 years (range 0.02-9.3)
8/36patients (22%) had recurrence of membranous nephropathy. Their demographics and transplant outcomes are shown in table 1. This was detected on an indication biopsy in 7 patients and a surveillance biopsy in 1 patient.. The mean time to recurrence was 1.9 +/- 1.9 years (range 0.09-4.46 years). Their histological data is shown in table 2. Granular C4d staining of the glomerulus was detected in 6/8 biopsies prompting immunofluorescence and electron microscopy, leading to the diagnosis of recurrent disease. Histological anti-PLA2R staining was positive in 3/8 biopsies. Only 2/7 patients were serologically anti-PLA2R positive. 2/8 patients were DSA positive.

In the 4 patients with clinically significant proteinuria rituximab was used to treat with a complete or partial response in all patients (mean time 22.5 +/- 16.2 months [range 4.4-43.8 months]). The treatment and response is shown in table 3. There are no significant differences in rejection, graft loss, death or death with functioning graft between those with recurrence and those without recurrence in our cohort.
Discussion
Recurrent membranous nephropathy was frequent but not associated with increased allograft failure in our programme, with the use of rituximab in selected cases. Granular C4d staining of the glomerulus in transplant patients with membranous nephropathy could prompt further investigation with immunofluorescence and electron microscopy to look for recurrent disease.

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Validating the diagnostic accuracy of membranous nephropathy in the health improvement network (THIN) database

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Background

Membranous nephropathy (MN) is among the most common causes of nephrotic syndrome in adults worldwide. Despite this, there is currently no robust data on the epidemiology of MN in the UK population. The Health Improvement Network (THIN) is an electronic medical record database that holds longitudinal anonymised patient records for over 17 million patients and has shown to be generalisable to the UK regarding demographics and crude prevalence's of major conditions. To our knowledge, accuracy of the read codes for glomerular disease is yet to be validated. This will be the first study into MN validating the diagnostic accuracy using the THIN database.

Methods

THIN database was interrogated for patients with MN using read codes. Two cohorts were considered: Definite cohort, defined as read codes expected to correspond to a diagnosis of MN, and Probable cohort, defined as read codes that could correspond to a diagnosis of MN. In order to confirm the diagnosis of MN, a short questionnaire was sent to the GP practice of a randomly selected cohort of patients asking if the diagnosis of MN was correct, and that the diagnosis had been confirmed by a specialist renal centre, with or without a renal biopsy.

Results

267 patients with a record of MN were identified from the THIN database. 235 of the patients had Definite cohort read codes, with a mean age at diagnosis of 57 years. There were 155 (66.2%) male and 79 (33.8%) female patients. 32 patients were identified in the Probable cohort. GP questionnaires were sent to 71 randomly selected patients with 61 responses (85.9% response rate). This represented 23% (n=53) of the total Definite cohort and 25% (n=8) of the total Probable cohort. Of the 61 returned questionnaires, an MN diagnosis was confirmed in 96% (n=51) of patients with a definite read code and 25% (n=2) with a probable read code. Amongst the confirmed MN diagnoses in the Definite cohort, 88% (n=45) of the patients had primary MN.

Conclusion

The THIN database is a valid data resource for studying MN in patients with a read code from the Definite cohort list. Read codes from the Probable cohort list cannot be used unless confirmed on a case by case basis such as through the GP. The results of this study will feed into a larger project with an aim to describe accurately the epidemiology of MN in the UK population, and report the incidence and prevalence of specific secondary associations of MN. Once these factors are fully understood, diagnostic and care pathways for MN can be developed.

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A case report of peritoneal dialysis-associated peritonitis caused by Mycobacterium abscessus

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Introduction:- Peritoneal dialysis (PD)-associated peritonitis (PDaP) caused by the non-tuberculous mycobacterium species Mycobacterium abscessus is emerging as a severe infective complication of PD. M. abscessus can cause disseminated infection in immunocompromised individuals and is resistant to classical anti-tuberculous drugs as well as most antibiotics. Diagnosis of M. abscessus PDaP is often delayed, as it has a propensity to present as a culture-negative peritonitis and successful treatment presents a significant challenge. In the few reported cases abroad, the treatment usually required PD catheter (PDC) removal in addition to anti-microbial therapy (AMT). In the vast majority of instances, it resulted in a permanent switch to haemodialysis (HD).

Case:- A 50-year-old male, presented with fever, abdominal pain and cloudy PD fluid after returning from holiday abroad. He was systemically well with no signs of sepsis apart from a tender abdomen. The PDC exit site and tunnel appeared normal. The CRP was 80.7 mg/L (0-5 mg/L) and white cell count (WCC) was 6.0 x 109/L. Empirical treatment for PDaP was commenced with intra-peritoneal Vancomycin and Gentamicin. Microscopy of the PF showed a WCC of 155/µL, but no organisms were seen on Gram staining. M. abscessus was later cultured and confirmed through whole-genome sequencing. Quadruple AMT was commenced with oral Clarithromycin and iv Amikacin, Tigecycline, and Imipenem with Cilastatin. An emergency PDC removal with a peritoneal washout was performed as he deteriorated clinically with worsening abdominal pain and haemodynamic instability. This resulted in a significant improvement in his symptoms, vital signs and inflammatory markers. He was switched to HDF. Clarithromycin was discontinued due to prolonged QTc interval on day 16. On day 26, he developed hepatic impairment that resolved following cessation of Tigecycline. Amikacin and Imipenem were continued for five months. Imipenem was later switched to oral Linezolid. Audiology assessments confirmed Amikacin-induced tinnitus in spite of close monitoring of levels. He completed 20 weeks of treatment and remained well. There is no evidence of recurrence of infection after 4 weeks of completion of treatment.

Discussion:- M. abscessus is an environmental mycobacterium that is found in water, soil and dust and is related to mycobacteria causing tuberculosis and leprosy. It is known to contaminate devices and medical products. In the immunocompromised, it can cause respiratory infections. Our patient had no such history. The duration between PDC insertion and this episode was two years, making this an unlikely cause of infection. The history did not reveal any reason for contracting this organism. The optimum treatment duration and selection of anti-microbial therapy in the management of M. abscessus related PD peritonitis is unclear, primarily due to the paucity of confirmed cases and variability of the treatment regimens. PDC removal and peritoneal washout remain the mainstay of treatment. Our case highlights M. abscessus as an emerging organism in PD peritonitis, of which treating physicians should be aware and is, to our knowledge, the first reported case from the United Kingdom.

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Utilising a Delphi Consensus approach to model the progressive Chronic Kidney Disease (CKD) patient journey to Renal Replacement Therapy (RRT).

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Introduction:
Utilising Delphi methodology delivered via an expert multidisciplinary team (MDT) stakeholder group, an optimal 'best practice' care pathway for patients with progressive CKD not eligible for transplant has been developed. This pathway outlines the range of dialysis options comparing planned proactive versus unplanned reactive RRT. Granular economic analysis of both this ‘new’ approach and the current or existing standard of care is then applied to each stage of the pathway in order to highlight supported patient choice elements and the potential service improvements that could be implemented.

Method:
A Costed Integrated Patient Scenario (CIPS) process was deployed for data collection purposes and comprised the following elements: (1) Identification of MDT key stakeholders covering all aspects of the pathway to be evaluated, from patient presentation, through specialist intervention to managed care in the community, (2) Construction of a strawman to guide the process; this background narrative for a realistic, but fictitious patient including some base level initial steps within the pathway. (3) Initial meeting with the recruited expert MDT stakeholders to initiate consensus process, (4) Iterative Delphi consensus – three rounds to the team subsequent initial meeting, (5) Development of the storyline into a 'case study' text, reinforced with a parallel literature review, which considers commissioning implications, (6) Economic analysis of all health, social care, patient costs with comparison between the suboptimal and optimal pathways.

Results:
The outline CIPS will identify the prevalence of CKD, how this may escalate and influence the consequent patient experience and the subsequent impact on the [local] health economy. It will include a number of questions for clinicians and commissioners to consider, dedicated learning points and a final outcome – versus ‘what could have happened differently': expedited diagnosis, targeted treatment and monitoring related to deteriorating kidney function, and importantly the patient’s needs and choices for RRT. Both these suboptimal and optimal scenarios will be fully costed at each renal patient pathway stage in order to full identify the predominant cost drivers – and where changes could be implemented to improve overall patient management and economic utility.

Discussion:
The ambition for this CIPS is to help commissioners and providers understand the implications in terms of quality of life and financial costs, of shifting the care pathway of people living with CKD from costly unplanned reactive care to a more proactive, planned and patient-centred approach for RRT and treatment. The financial costs are indicative and calculated on a cost per patient basis. Furthermore, with the advent of Integrated Care Systems from April 2021, this CIPS is intended to support the future integration of renal home therapies fully in regional and/or network decision-making that centres on proactive budgeting, resource and capacity planning – as regional decisions to transform care pathways would need to take a population view of costs and improvement. Prior pathways derived in this way have been instrumental in

transforming service delivery, and of understanding the need to evaluate the full patient pathway effectively rather than discrete elements in isolation.

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Antimicrobial resistance of bloodstream infections in a Scottish haemodialysis population, with a focus on vascular access method

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Introduction

Infection is the second highest cause of mortality amongst patients with end-stage renal disease.1 Haemodialysis (HD) populations are exposed to conditions that heighten the risk of acquiring bloodstream infections (BSIs).2,3 Multidrug resistance (MDR) is a growing problem and associated with excess mortality.4

Antimicrobial choice influences MDR prevalence, and knowledge of resistance patterns facilitates effective antimicrobial stewardship.5 In this study, antimicrobial resistance (AMR) of BSIs in a contemporary Scottish HD cohort is reported by vascular access type – arterio-venous fistula (AVF), arterio-venous graft (AVG), tunnelled central venous catheter (TCVC) or non-tunnelled central venous catheter (NTCVC).

Methods

Retrospective observational data on adult patients utilising inpatient and outpatient HD across seven West of Scotland units were collected using the Strathclyde Electronic Renal Patient Record for the year of 2017. The prevalent HD vascular access type and microbial species for each BSI occurring >14 days apart were recorded. The associated AMR was verified using the NHS Greater Glasgow and Clyde and NHS Forth Valley Microbiology databases. MDR was defined according to the joint European Centre for Disease Prevention and Control and Centers for Disease Control and Prevention initiative6.

Results

There were 147 BSIs amongst 786 patients undergoing HD across 217,503 HD days. There were 126,674 AVF, 25,511 AVG, 64,353 TCVC and 965 NTCVC days, with BSI rates/1000 HD days of 0.39, 0.55, 1.26 and 3.11 respectively. There were 168 microbial isolates – 43 Gram-negative, 49 coagulase-negative Staphylococci, 36 Staphylococcus aureus, 8 Streptococcus species, 4 Enterococcus species, 22 other Gram-positive species, 5 Candida species and one unidentified organism. AMR data was available for 140 species. Table 1 displays AMR across vascular access subtypes, with comparison to Scottish population data.7 Figure 1 displays a graphical summary of microbial species AMR.

Although all Staphylococcus aureus isolates were susceptible to flucloxacillin and vancomycin, one MDR S. aureus BSI occurred in the AVF group (rate of 0.008/1000 HD days). Three Enterococci were MDR, including two glycopeptide-resistant strains, 1 in the NTCVC group (1.04/1000 HD days) and 2 in the AVF group (0.02/1000 HD days). There were 12 MDR Gram-negatives, 5 in the AVF (0.04/1000 HD days), 6 in the TCVC (0.09/1000 HD days) and 1 in the NTCVC (1.04/1000 HD days) subgroups. Three extended spectrum beta-lactamase producing enterobacterales were noted, 2 in the AVF (0.02/1000 HD days) and 1 in the TCVC (0.02/1000 HD days) group. One intrinsically carbapenem-resistant Stenotrophomonas maltophilia occurred in the TCVC group (0.02/1000 HD days).

Discussion

MDR BSI is common in the HD population, and there is a wide degree of variation between pathogens across the HD vascular subtypes. The susceptibility of Staphylococci to vancomycin and Gram-negatives to gentamicin suggest the empirical use of these antibiotics in this HD population remains appropriate. There

is higher Gram-negative AMR to ciprofloxacin and gentamicin compared with the Scottish population, potentially reflecting increased usage of these antimicrobials in the HD population. Gram-negative AMR to temocillin is concerning given this antibiotic was only recently introduced into the local formulary, highlighting the need for ongoing AMR surveillance.

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Using Quality Improvement Methodology to Increase Recruitment and Retention of Patients Receiving Dialysis Therapies at Home

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INTRODUCTION

Despite recognition of their well-recognised benefits from medical and psychosocial aspects, few patients requiring dialysis opt for home therapies. In 2017, UK Renal Registry reported that only 4.5% and 12.5% of dialysis patients have chosen home haemodialysis (HHD) and peritoneal dialysis (PD) respectively. Historically, our unit has a significant number of patients utilising home therapies although the recent decline in the PD programme has caused concern. As part of the Kidney Quality Improvement Programme , our team aimed to increase the number of patients opting for home dialysis therapies and reduce the number of patients leaving the service due to avoidable reasons.

METHODS

Using Life QI® software, the project team (patient and multidisciplinary team representatives), initially process mapped the patient journey, created a multi-level driver diagram, generated change ideas and developed specific plan, do, study, act (PDSA) cycles.

Strategies to promote recruitment and retention to home therapies were employed. In response to a decline in total PD numbers, our initial driver diagram was further refined in Autumn 2019 and prioritised the PD First campaign (fig.1). Analysis of our historical programme demonstrated the attrition rate between patient selection and successful PD at 90 days.

Key PDSA cycles included patient and carer involvement in the project team, improved education sessions, feedback surveys, early home visits, low clearance team collaboration and a culture of PD First amongst the clinical staff at all levels in order to promote recruitment to PD. Retention of patients on home therapies focused upon measures to standardise training, reduce infections (exit site and peritonitis) and mitigate avoidable drop off by anticipating failure and taking action to overcome potential obstacles to home therapies.

RESULTS

Overall, our home therapies programme is static. 5 patients start and leave home therapies per month. Our number of patients on the PD programme has fallen over the year yet the rate of decline has improved (fig 2). On average, 3 patients start and 4 leave PD per month.

Strategies to improve recruitment (education sessions, early home visits etc) have been actioned and attendance at support groups and education sessions has increased (fig 3).

Exit site and peritonitis numbers have declined which is a key component in the retention of those receiving peritoneal dialysis (fig 4).

DISCUSSION

Home based services and treatment require constant attention, surveillance and support to ensure a thriving programme. Quality improvement principles involve real-time data and encourage a collaborative, multidisciplinary approach to highlighted trends which is crucial in understanding a programme's vulnerabilities. A clear focus, strategy and actions, sometimes involving a change in culture and patient

pathway need not require extra resource but can start to promote and maintain recruitment and retention of home therapies.

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Phosphate additives in processed foods in the UK: how prevalent are they?

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Background
Limiting intake of dietary phosphate is recommended as the primary treatment for hyperphosphataemia secondary to Chronic Kidney Disease.[1] Dietetic advice on a low phosphate diet consists of limiting the intake of foods naturally high in phosphate and those that contain phosphate additives. Such additives are known to be present in a variety of processed foods and are legally added to food in the UK to maintain product quality and safety.[2] However; limited data exists on the incidence of these additives in UK foods. The aim of this study was to investigate the prevalence of phosphate additives in processed foods.

Method
Based on previous work that identified processed foods likely to contain phosphate additives,[2] products from three major supermarkets were assessed. Where more than one brand of a product existed, all were selected. Different varieties of products were also included. The presence of phosphate additives was identified from product labels and results were collated according to food type.

Results
Six hundred and ninety products were assessed and phosphate additives identified in 47% of these. Of the products reviewed, the highest incidence of phosphate additives was observed in processed cheeses and cakes where over 80% of samples contained phosphate additives. In contrast, less than 20% of potato products and ready meals assessed were found to contain them (see Figure 1). Variation was noted between brands of biscuits, breads, desserts and meat products, and the presence of phosphate additives varied according to variety in all other products except processed cheese.

Conclusion
Phosphate additives are widely present in a variety of commonly eaten processed foods. These foods are convenient, and can provide a useful contribution to nutritional intake when time, cooking skills and resources are limited. However, the presence of phosphate additives presents an additional challenge to individuals following a low phosphate diet, particularly when additives are found in foods that are not naturally high in phosphate such as soups, soft drinks and baked products. Advising patients on dietary modification is further complicated by the finding that not all products within a food group contain phosphate additives and variation can exist between brands. Although guidance can be given based on the above findings, successful implementation of dietetic advice to reduce intake of foods containing phosphate additives may be complicated by an individual's ability and willingness to check food labels, which to some may seem time consuming and impractical. Periodic reformulation of product recipes by food manufacturers may also alter the presence of phosphate additives, adding to the complexity of this process. Based on the findings of this study, clearer labelling by the food industry may be the only practical way to support renal patients in making appropriate food choices.

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Do outcomes for hospitalized patients with an acute kidney injury (AKI) vary across specialties in England?

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Introduction:

AKI rates vary depending on the clinical division under which a patient is admitted, with higher rates observed in areas such as general surgery and cardiology. Although there has been a rapid increase in studies examining AKI across different clinical settings, few have considered how mortality outcomes for AKI patients differ between specialties. Previously, the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) found that AKI mortality is lower in patients who are managed by renal specialists.
The current study aims to describe the 30-day mortality after AKI in specialties in England.

Method:

AKI is defined using the NHS England detection algorithm, which identifies potential cases of AKI from laboratory data based on serum creatinine changes. These data held by the UK Renal Registry (UKRR) were linked to Hospital Episode Statistics (HES) to derive information on the specialty of the responsible consultant at the time the alert was triggered and 30-day mortality.

The analyses was restricted to adult patients (aged ≥18 years) who had a hospital acquired AKI in 2017 from 2 to 14 days post admission to an Acute Hospital Trust in England. Multivariable logistic regression analysis was used to describe associations of treatment speciality with 30-day mortality amongst those with AKI alerts, adjusting for age, sex, comorbidity (Charlson Comorbidity Index), peak AKI stage, admission method (elective versus emergency) and deprivation.

Results:

A total of 109,643 patients were included, with a median age of 78 (IQR 67-86) years. The sample comprised of patients with peak AKI stage 1 (74%), stage 2 (16%) and stage 3 (10%). Regarding the hospital setting in which patients were treated, 67% were in a medical ward, 28% in a surgical ward, 2% in an acute care setting and 1% in a renal unit. The majority of the cases were emergency admissions (72%).
Most AKI alerts occurred in the following specialties; general medicine (22,866), care for the elderly (15,290), trauma and orthopaedics (10,584), cardiology (9,932) and general surgery (8,903). However, the highest proportion of HES consultant episodes with an associated AKI in 2017 were reported in specialties related to the cardiovascular system i.e. cardiac surgery (7.2%), cardiothoracic surgery (6.4%) and cardiac transplantation (4.8%).

Logistic regression analyses showed that, holding age, sex, deprivation, peak AKI stage, comorbidity and admission method constant, the odds of dying within 30 days of an AKI episode were between 1.8 – 3.0 fold higher in non-nephrology specialties (i.e. emergency and critical care, general medicine, care for the elderly, infectious disease, neurosurgery, oncology and diabetic medicine) when compared to nephrology (Table 1).

Conclusion:

Treatment specialty is associated with mortality for patients who develop a hospital acquired AKI, though this is likely confounded by underlying co-morbidity that leads to requiring particular speciality care, and frailty. Further investigations should be aimed at establishing which factors are contributing to this and in turn provide insight into the role of clinical and organisational factors in predicting outcomes, leading to better management of patients and driving improvements in patient care.

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Seasonality of Acute Kidney Injury for hospitalised patients in England

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Background and Aims:
Incidence of Acute Kidney Injury (AKI) is known to be seasonal, peaking in winter months among hospitalised patients. Previous studies have suggested that the seasonality of AKI is likely to be influenced by the seasonality of the underlying acute illnesses that are associated with AKI. Mortality of patients with AKI has also been reported as being higher in winter, reflecting well-described excess winter mortality associations.
Here we describe the seasonal variations of AKI alerts in England and the associated mortality rate using linked national databases.

Method:
Serum creatinine changes compatible with Kidney Disease Improving Global Outcomes (KDIGO) guidelines AKI stage 1, 2 and 3 are sent by laboratories in England as AKI alerts to the treating clinicians and the UK Renal Registry (UKRR). The UKRR linked the electronic AKI alerts to the Hospital Episode Statistics (HES) data, and identified AKI patients who were hospitalised. Descriptive statistics and investigation of the seasonal effect of 30-day patient mortality from the date of the AKI alert were carried out, using multivariable Cox regression and sequential adjusting for age, sex, index of multiple deprivation (IMD) and peak AKI stage.

Results:
The highest number of AKI episodes (N=81,276) was in winter, which is 6% higher than in summer (N=76,329) (Table 1). For patients who had an AKI episode and were admitted to hospitals, the crude 30-day mortality is 28% higher in the winter season when compared to the summer [HR 1.28 (1.25-1.31), p<0.01] (Figure 1). After adjusting season by age, peak AKI stage, IMD and sex, the 30-day mortality is still significantly higher (24%) in winter than in summer [HR 1.24 (1.21-1.27), p<0.01]. Winter mortality peak is confounded by age and AKI severity, which explained the drop in the hazard ratio at winter peaks; whereas season is not confounded by deprivation and sex. The pattern of seasonality varies with age: in age group 18-39, there were 26.1% of AKI episodes in summer and 23.3% in winter, whereas in age group >75, there were 23.7% in summer and 27.1% in winter.

Conclusion:
Analysis of England data confirms a seasonal pattern and a peak in AKI during winter months. Additionally it shows increased risk of mortality for patients with AKI in winter months. Future work will investigate the impact of comorbidities and case-mix on outcomes. Understanding the seasonal variation of AKI, can lead to an improvement in preventive care and clinical practice.

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Comparison of two treatment strategies for treating anaemia with erythropoiesis stimulating agent therapy among haemodialysis patients: findings from a marginal structural model

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Introduction: Erythropoiesis stimulating agents (ESAs), with intravenous iron supplementation, are the main treatment for anaemia in patients with chronic kidney disease (CKD). Although observational studies suggest better outcomes for patients who achieve higher haemoglobin (Hb) levels, randomized controlled trials (RCTs) in haemodialysis patients with cardiac disease (1) and patients with CKD (2-4) have shown poorer outcomes with higher target Hb, leading to changes in treatment guidelines (5). The aim of this study was to use electronic health record data to simulate a trial of a higher versus lower target Hb strategy in haemodialysis patients, to investigate associations of strategy with mortality, whilst taking account of time-dependent confounding by Hb levels.

Methods: Data were obtained from electronic records, from selected hospitals that record and submit ESA doses to the UK Renal Registry. The observational data were used to emulate a pseudo RCT to compare the effect of two target Hb strategies: 95-115 g/L (low Hb strategy) and 105-125 g/L (high Hb strategy). Protocol restrictions were applied to dosing decisions (e.g. by how much doses could be increased/decreased) and doses of up to 150 micg/week darbepoetin were allowed in both strategies. Patients were eligible if they were aged over 18 years and were on haemodialysis for at least 3 months. People were excluded if they had a high ESA dose (≥120 micg/week) and low Hb (<80 g/L) at the start of their eligibility. The outcome of interest was all-cause mortality. Inverse-probability weighting of a marginal structural model was used to control for measured baseline covariates of patient age, hospital, cause of end-stage renal disease and time-dependent covariates of Hb, previous ESA dose, ferritin and c-reactive protein. Each patient's follow-up was duplicated, with one copy of follow-up data assigned to the low Hb strategy and the other copy assigned to the high Hb strategy. Everyone was eligible for both strategies at baseline and follow-up was censored when a dosing decision deviated from protocol (6). We used inverse probability of censoring weights to account for protocol deviation and modality changes to peritoneal dialysis and transplantation.

Results: A total of 8,119 patients from 11 hospitals were eligible for the pseudo RCT, with follow-up from 2014-2016. There were 637 deaths from 72,782 patient months in the low Hb strategy and 641 deaths from 88,339 patient months in the high Hb strategy. The median weekly dose in both strategies was 30 micg/week darbepoetin. The hazard ratio (HR) (95% confidence interval; CI) for the high versus low Hb strategy was 0.66 (0.48–0.91) for all-cause mortality, when truncating weights at the 95th percentile (Figure 1). Truncating at the 90th percentile of weights gave a HR (95% CI) of 0.71 (0.58-0.88).

Conclusions: We did not find evidence of harm from a higher Hb target when examining all-cause mortality. Haemodialysis patients may benefit from a higher Hb under a dosing strategy that limits changes in dose and maximum dose. However, this observational study cannot exclude the possibility of unmeasured confounding.

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Early post-transplant blood transfusions are common and independently associated with allograft failure: results of a multicentre study

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Introduction
The clinical impact of post-transplant blood transfusions has been inconsistently reported in the literature. Inter-centre variation in clinical practices and patient demographics may contribute to conflicting outcomes. In this study, performed as part of a NHSBT and BTS national working group, we aim to review the incidence of blood product transfusion and allograft outcomes across 4 centres.

Methods
Patients receiving a renal transplant between 2016–2017 at Cambridge, Guys, Imperial and Oxford were included. The blood service at each unit confirmed the transfusion status for each individual up to a year post transplant. The collated data was analysed against nationally collected outcomes by NHSBT statistics department.

Results
221/723 (30.6%) of transplant recipients were transfused, with comparable transfusion rates between the units.

189/723 (26.1%) of patients received blood products only, 25/723 (3.5%) received both blood and platelets, whilst only 7/23 (1%) received platelets alone. Transfusions commonly occurred within the first week post-transplant [median time of 4 days (IQR: 0-12)].

Transfused patients were older ($p<0.01$), female (100/221 (45%), $p<0.01$), non-Caucasian (96/221 (43%), $p<0.01$) and waited longer for a transplant ($p=0.001$). They were more likely to receive kidneys from older donors ($p<0.01$) with a higher UKKDRI ($p<0.01$) with a longer cold ischaemic time ($p<0.01$).

Graft outcomes were inferior in the transfused group, who were more likely to have delayed graft function ($p<0.01$) and a lower eGFR at 3 and 12-month time points ($p<0.01$).

After risk adjusting for recognised factors associated with allograft loss, transfusion was found to be independently associated with graft failure; HR: 3.33 (1.65-6.71), $p=0.0008$, which was further analysed by transfusion with blood-only (HR: 2.69 (1.26-5.72), $p=0.01$), and blood and platelets together (HR:11.13 (4.26 – 29.08), $p<0.001$).

Conclusion
Transfusions are common in the acute post-transplant period and independently associated with inferior outcomes. Further studies are required to delineate the mechanisms associated with adverse outcomes.

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Comparison of outcomes using rituximab (MabThera) with the rituximab biosimilar Truxima in renal patients: a two centre retrospective study

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Introduction:
The effectiveness of anti-CD20 monoclonal antibody rituximab in treating a range of renal disorders including systemic vasculitis, other forms of glomerulonephritis and post-transplant rejection is well established. Truxima is the first anti-CD20 biosimilar approved for the same indications available in the UK since 2017. Currently Truxima costs 44% the price of MabThera. Studies have shown equal efficacy, safety and better cost effectiveness of Truxima in the management of haematological and rheumatic disorders. We investigated its efficacy in treatment of renal disorders.

Methods:
We retrospectively reviewed the outcomes of patients treated with either MabThera or Truxima, including MabThera naïve subjects and those who were switched following initial MabThera therapy to Truxima. We analysed proportion of patients entering remission, proportion with maintenance of remission, relapse and hospitalisation with infection between the groups, treated in two teaching hospitals. In one hospital subgroup we further analysed for differences in levels of proteinuria, hypogammaglobulinaemia and B cell depletion in the cohort of treated ANCA associated vasculitis patients. B cell depletion was defined as an absolute CD19+ cell count below 0.005 x 10 9 cells/L.

Results:
We identified a total of 492 patients who had received Truxima or MabThera. 134 patients were excluded from study due to insufficient data. Among 358 patients who were included 157 (43.9 %) were male and 201 (56.1 %) were female. Median age (range) of population was 57 years (19-93). The main indications for treatment recorded were granulomatous with polyangitis (36.3 %), microscopic polyangitis (20.39 %), other small vessel vasculitis (13.94 %), lupus nephritis (11.5 %), IgG4 vasculitis (2.5 %), minimal change disease (5 %), renal transplant related indications (4.74 %) and other (5.63%). 141 patients received Truxima, 71 patients of which were switched following initial MabThera therapy. Comparison of outcomes between the groups is shown in Table A.
There were a total of 140 patients in the subgroup of patients with ANCA associated vasculitis who had received Truxima or MabThera. The median (IQR) cumulative dose was 2 g in both groups. The proteinuria had decreased following therapy in both groups with Truxima ($p=0.05$) and MabThera ($p<0.001$). There was no significant difference between groups in CD19 depletion ($p=0.52$) and in development of hypogammaglobulinaemia with IgA<0.7g/L ($p=0.68$), IgG<7g/L ($p=0.2$) and IgM<0.4g/L ($p=0.63$) at last clinic follow up. Hospitalisation rate due to infection was 13.8% in the Truxima group and 9% in MabThera group ($p=0.48$). Relapse rate was higher in MabThera group 15.3% as compared to Truxima 0% ($p=0.04$), but the median (IQR) follow-up duration was significantly shorter in Truxima group (0.4 years) compared to the MabThera group (3.4 years, $p<0.001$).

Conclusions:

The rituximab biosimilar Truxima shows equivalent efficacy and safety profiles for renal indications when compared with reference MabThera and highlights its emerging use and potential to reduce costs in treating renal patients.

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Sodium Zirconium Cyclosilicate Corrects Hyperkalaemia Within 72 hours Among Outpatients With Severe Hyperkalaemia (Baseline Serum Potassium ≥6 mmol/L) Regardless of Renal Function Level or RAASi Use: Post Hoc Subgroup Analysis of a Phase 3 Trial

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Background and Aims:
Most patients with severe hyperkalaemia are treated in hospital settings and are often receiving renin–angiotensin–aldosterone system inhibitors (RAASi) and/or have chronic kidney disease. Sodium zirconium cyclosilicate (SZC) is an orally-administered, non-absorbable, inorganic, selective potassium (K+) binder for the treatment of adults with hyperkalaemia. We report time to achievement of normokalaemia by baseline RAASi use and estimated glomerular filtration (eGFR) level from a 12-month Phase 3 sub-study among outpatients with baseline serum K+ ≥6 mmol/L undergoing acute treatment up to 72 hours.

Method:
This international, multicentre, open-label, single-arm trial among adults with point-of-care (i-STAT) K+ ≥5.1 mmol/L included prespecified efficacy analyses by baseline serum K+ ≥6 mmol/L. During the acute phase (AP), patients received SZC 10 g three times a day from 24 up to 72 hours until normokalaemia (i-STAT K+ 3.5–5 mmol/L) was achieved, whereupon they entered maintenance treatment. In this analysis of the AP only, we report time to achievement of normokalemia (serum K+ 3.5–5 mmol/L) using the Kaplan-Meier (KM) method, mean change in serum K+ from baseline at 24 hours and distribution of change during the entire AP, and adverse events (AEs) by baseline RAASi use and eGFR level (<30 vs ≥30 mL/min/1.73m2).

Results:
Of 749 patients in the intention-to-treat AP population of the main study, 126 (16.8%) had baseline serum K+ ≥6 mmol/L, and the vast majority of these patients had achieved normokalaemia by 72 hours (KM estimated proportions 98.6% and 96.1% in the serum K+ <6 and ≥6 mmol/L groups, respectively).

Among patients with baseline serum K+ ≥6 mmol/L not on RAASi with an eGFR ≥30 mL/min/173m2 (no RAASi/eGFR ≥30), KM estimated median time to normokalemia was fastest, 22.5 hours (95% Confidence Interval [CI]: 22.0, 68.3), followed by patients on RAASi with an eGFR ≥30 mL/min/173m2 (RAASi/eGFR ≥30), 23.5 hours (95% CI: 22.6, 46.1), followed by patients not on RAASi with an eGFR <30 mL/min/173m2 (no RAASi/eGFR <30), 45.2 hours (95% CI: 22.6, 46.6), and slowest among patients on RAASi with an eGFR <30 mL/min/173m2 (RAASi/eGFR <30), 46.6 hours (95% CI: 45.7, 47.4). KM estimated proportions achieving normokalaemia at 24, 48 and 72 hours, respectively, were 57.1%, 69.4%, and 89.8% with no RAASi/eGFR

≥30; 54.9%, 73.0%, and 86.5% with RAASi/eGFR ≥30; 41.3%, 80.4%, and 100% with no RAASi/eGFR <30; and 25.4%, 75.8% and 100% with RAASi/eGFR <30.

Median/range/mean change serum K+ values at 24 hours were 4.9/4.3-6/−1.22, 5.1/3.8-6.2/−1.26, 5.3/4.7-6/−1.02, and 5.3/4-6.6/−1.00 mmol/L in the no RAASi/eGFR ≥30, RAASi/eGFR ≥30, no RAASi/eGFR <30, and RAASi/eGFR <30 groups, respectively. No patients with baseline serum K+ ≥6 mmol/L experienced an increase in serum K+ or hypokalaemia.

No AEs occurred in the no RAASi/eGFR ≥30 group. AEs occurred in 10.3% of patients in the RAASi/eGFR ≥30 group (n=1 each of myopia, nausea, urinary incontinence, and hypertension), 23.1% of patients in the no RAASi/eGFR <30 group (n=1 each of diarrhoea, urinary tract infection, and muscle spasms), and 8.7% of patients in the RAASi/eGFR <30 group (n=1 each of constipation, peripheral oedema, sinusitis, urinary tract infection, back pain, and skin ulcer). No AEs were serious or led to discontinuation.

Conclusion: Outpatient treatment with SZC rapidly normalized serum K+ among patients with baseline serum K+ ≥6 mmol/L with few adverse events. Although patients on RAASis and with an eGFR <30 mL/min/1.73m2 normalized at a slower rate, these patients nevertheless achieved normokalaemia by 72 hours. Neither concomitant RAASi therapy nor eGFR level appear to limit achievement of normokalemia with SZC among this population of outpatients with high baseline serum K+ ≥6 mmol/L.

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Dapagliflozin inhibits inflammatory and fibrotic responses in a human in vitro model of diabetic kidney disease

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Background
Diabetic Kidney Disease (DKD) is the leading cause of end-stage renal failure worldwide. DKD is characterised by albuminuria and glycosuria leading to tubulointersitial fibrosis. Our group and others have demonstrated a role for fibronectin in its pathogenesis and as a biomarker. However, urinary inflammatory cytokines clearly also have a role as biomarkers in DKD; emphasising inflammation as part of the disease process. There is a direct correlation between urinary IL-18, albuminuria and albumin excretion rate, identifying its relationship with DKD. SGLT2 inhibitors have been shown to reduce morbidity and mortality in patients with DKD, consequently we have investigated whether they may act by limiting renal fibrosis and inflammation in a diabetic milieu. Using an in vitro model of DKD we have tested the potential for dapagliflozin to inhibit IL-18 and fibronectin expression in primary human proximal tubule cells.

Method
Primary human PTEC were cultured on collagen IV. To create a diabetic milieu cell were incubated with glucose at different concentration (5, 7 and 25 mMol) with and without TGFβ1, 0.7 ng/ml. PTEC were subsequently treated with dapagliflozin at increasing concentration (0.1 µl, 1 µl and 10 µl). After 24 hours cells were lysed and RNA extracted. Following RT QPCR was performed for, IL-18 and fibronectin. Relative expression was calculated by delta delta Ct with GAPDH as a housekeeping gene.

Result
Neither TGFβ1 nor raised glucose alone induced fibronectin expression. However, the combination of TGFβ1, 0.7 ng/ml and D-glucose 25mMol induced a 2.5 fold increase in fibronectin RNA ($P<0.001$). This was almost completely inhibited by 1µMol dapagliflozin ($P<0.001$).
In the case of IL-18 D-glucose, 25mMol did not significantly alter IL-18 expression, however TGFβ1, 0.7 ng/ml significantly reduced IL-18 expression ($P<0.01$).
In the presence of TGFβ1 25mMol D-glucose increased IL-18 expression ($p<0.05$). Dapagliflozin significantly inhibited this IL-18 expression, but only at 0.1µM. There was no significant effect of 1 or 10 µM dapagliflozin on TGFβ1/Glucose induce IL-18.
We subsequently investigated the effect of dapagliflozin in 7 and 5 mMol glucose. Although Dapagliflozin had no significant effect compared to TGFβ1 at the lower glucose concentrations, a consistent pattern emerged of increasing IL-18 expression with increasing dapagliflozin concentration.

Conlusion
TGFβ1 /glucose mediated fibronectin and IL-18 expression can be inhibited by dapagliflozin. However, the role of glucose appears less in IL-18 expression and the effect of dapagliflozin is maximal at 0.1µMol. Further increase in dapagliflozin has a negative effect, increasing IL-18. Presumably this is due to lowered intracellular Na inducing an inflammatory response

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Comprehensive conservative kidney care clinic in a university teaching hospital - a service overview.

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BACKGROUND

The number of multi-morbid elderly patients who develop End-Stage Kidney Disease (ESKD) continues to rise. Comprehensive conservative kidney care (non-dialytic therapy), is often the preferred choice of management in these patients, as dialysis in this group of patients does not provide a significant survival advantage. Patients who are not for dialytic therapy are invited to attend a multidisciplinary clinic, either once their Estimated Glomerular Filtration Rate (eGFR) is ≤ 15 mL/min/1.73m2 or higher, if there is a clinical need. This study aimed to determine the current provision of Comprehensive conservative kidney care in our hospital.

METHODS

A retrospective analysis of all the patients attending the Comprehensive conservative kidney care clinic between 01/01/2015 to 31/12/2019 was performed. Variables included gender, age at referral, age at death, eGFR on referral and at death, first clinic date, date when left the clinic, Stoke Comorbidity score, number of hospital admissions and place of death. Descriptive statistics and Kaplan-Meier survival analysis were used to examine the data.

RESULTS

Over the 5 years, 124 patients were seen in the clinic. 69 (55.6%) patients were male. The mean age at referral was 83.2 years (95% CI 81.9-84.4, range 62-96). Mean eGFR on referral to the clinic was 13.3ml/min/1.73m2 (95% CI 12.6-13.9, range 5-25). Five patients (4%) had a Stoke Comorbidity score of 0, 73 patients (58.9%) had a score of 1 and 46 patients (37.1%) had a score of 2 at referral. They had a median of 4 hospital admissions (range 0-20).

Of the 124 patients, 111 patients continued to be followed up in the clinic over the 5 years. Of the other 13 patients who had left the clinic, 3 patients transferred to Chronic kidney disease clinic, 6 patients transferred to the care of their GP and 4 patients commenced renal replacement therapy.

Figure 1 shows the survival of patients.

Of the 72 patients who died whilst under follow-up of the Comprehensive conservative kidney care clinic, the average age at death was 85.4 years and the average eGFR at death was 10.9ml/min/1.73m2. 34 patients (47.2%) had died in hospital, while the remaining 38 patients died either at home, in a Nursing home or in a Hospice. The mean length of survival was 15.3 months from entry in to the clinic (range 4-1326 days).

DISCUSSION

The characteristics of our cohort are elderly, with a higher comorbidity score. The mean length of survival from entry in to our clinic was just over 15 months, showing the importance of forming an early individualised care plan with a holistic approach to address the needs of our patients, carers and their families. We have previously demonstrated that a multidisciplinary team approach is an ideal way to achieve this. Moving forwards, we aim to integrate formal tools in to our assessment to identify care needs. To improve conversations about our patients' goals and priorities, we plan to integrate the Serious Illness Care Programme.

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Ultrasound Kidney in AKI stage 1: do we comply with the current NICE guidelines?

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Background:
In our department we noticed that patients with Acute Kidney Injury (AKI) stage 1 were having Ultrasound Kidneys (USKUB) even though their AKI had resolved. This led to an audit to look at our AKI management care bundle and whether we were in line with NICE recommendations with regards to USKUB in AKI stage 1. The current AKI bundle recommends that all patients with AKI have a USKUB within 24 hours.
Methods:
We looked at all USKUB done in our trust over a period of 6 months. Of 2000 scans done, we selected 50 patients who had AKI stage one. Data was collected including any USKUB abnormalities, time taken for AKI to resolve and time taken from request to scan being done. We entered our data on Meridian, our trust data collection site for audits.
Results:
6/50 patients (12%) had abnormal USKUB
Of the abnormal scans, 4 patients(66%) had mild to moderate hydronephrosis, 1 patient (17%) had old hydronephrosis and 1 patient (17%) had atrophied kidney.
In 42/50 patients (84%), their AKI had resolved within 72 hours.
27/50 (54%) patients had USKUB within 24 hours, 41/50 patients (82%) had their USKUB done within 48 hours from time of request.
14/50 patients (28%) had their USKUB done after AKI resolved.
21/50 patients (42%) had USKUB requested as per AKI care bundle or just for having an AKI without suspicion of obstruction or pyonephrosis.
Summary:
NICE guidelines for AKI(NG148) state that an USKUB should be done for any patient with AKI where there is a suspicion of pyonephrosis (within 6 hours) or obstruction (within 12 hours) however, ultrasound is not recommended if there is a known cause for the AKI.
Our current AKI care bundle is not in line with NICE guidelines for AKI management with regards to USKUB. As a result of the findings, we have proposed a change to the care bundle to bring our management in line with current NICE guidelines.
The audit has been presented to our Deterioration Patient Group(DPG),Patient Safety Quality Group and at Medical Grand rounds to raise awareness of the guidelines. The DPG and PSQG have approved the new changes to the bundle.
If we can avoid doing 100 US kidney scans a year we could save around £5600(£56/scan). This could also save around 14 scanning days which could improve waiting time for scans. (Calculation based on 67 minutes per scan in an 8hour working day)

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Prevalence of acute renal failure in the HELLP syndrome

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Introduction
The syndrome hemolysis elevated liver enzymes, low platelets (HELLP) is a common complication of pre-eclampsia associated with acute renal failure (ARF). Hellp syndrome is responsible for a high morbidity and mortality maternofetal. The aim of our study was to investigate the prevalence and the ARF profile in the HELLP syndrome.
Patients / Materials and Methods
We conducted a cross-sectional study spread over 7 years 1stJanuary 2012 to 31 December 2019 in the Anesthesia and Obstetrics Service of the University Hospital in collaboration with Casablanca clinical hemodialysis and nephrology department at CHU Ibn Rushd Casablanca, in patients with HELLP syndrome it is complete or not.
Observation / Results
We identified 197 cases of preeclampsia complicated by HELLP syndrome mainly paucipares with a mean age of 30 ± 5,3. The pregnancy was followed regularly in 120 patients or 60.91 %. The HELLP syndrome was diagnosed in the medium term 34 weeks gestation. The IRA occurred in 70 patients on average 6 days after HELLP syndrome. Urine output was preserved in 51 patients while 43 were oliguric. With an average creatinine 32.6 mg / L, ARF was accompanied by HRP in 80 women in labor, eclampsia in 50 cases and DIC in 7 patients. Thirty-two patients required renal replacement therapy with a mean of 3 ± 2.2 sessions per patient, 3 progressed to chronic renal failure. Four cases of maternal deaths were recorded, all among patients with ARF associated with another complication, which corresponds to a 7.48% mortality. Nine infants died at birth, 5 cases of fetal death in utero were noted.
Discussion
HELLP syndrome is a serious complication of 3etrimester of pregnancy with high maternal-fetal morbidity and mortality, involving early treatment. The prevalence of ARI was 32% in our study.
Conclusion
Given the significant morbidity and mortality of the IRA in the HELLP syndrome, early adequate support is the guarantor of a better prognosis.

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Selective versus subtotal parathyroidectomy in secondary hyperparathyroidism in hemodialysis

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Introduction:
Secondary hyperparathyroidism is a common complication in chronic hemodialysis, The parathyroidectomy represent the ultimate treatment of hyperparathyroidism of dialysis, a fortiori in a context where access to medical treatment is limited.
The purpose of this study is to evaluate the value of the PTX 3/4, selectively, by comparing the rate of parathyroid hormone (PTH) obtained post-operative with that of patients with subtotal PTX.

Patients and methods:
This is a retrospective analytical study single center over 9 years (2010-2019) led to the nephrology department at CHU Ibn Rushd, on patients in end stage renal disease on dialysis with secondary hyperparathyroidism or tertiary with an indication to parathyroidectomy. Two groups were identified, one having undergone parathyroidectomy (PTX) Selective 3/4 (G1), the second a subtotal PTX 7 / 8th (G2).

Results:
Our study included 26 patients with an average age of 39.1 years (13-61) with a seniority average dialysis 102.17 ± 76.4 months and at 3 times a week 50% of patients. Surgical indications were dominated by strong secondary hyperparathyroidism in 90% treatment. 13 patients underwent PTX 13 3/4 and a PTX 7 / 8th. The evolution has been marked by hypoparathyroidism which involved seven patients G2 is (53.4%). A surgical failure has affected 15.38% of patients, 4.34% were taken surgically, all belonging to the G1. Statistical analysis showed a significant difference between the two groups in terms of hypoparathyroidism in group 2 noted in 53.4% of the patients (p = 0.005) and fail more often in group 1 (p = 0.03).

Discussion:
In our work, the success rate was over the PTX 7 / 8th of 38.4% with 53.4% of hypoparathyroidism, as opposed to PTX 3 / 4th that the success rate reached 70% without case 'reported hypoparathyroidism. Our results are comparable to those of the Tenon team that reported in a similar study, higher PTH levels in the group of 3 / 4th, and hypoparathyroidism in the group of 7 / 8th.

Conclusion:
Parathyroidectomy 3/4 in HPT2 provides a higher rate of PTH to a PTX 7 / 8th, avoiding the occurrence of hypoparathyroidism with risk of adynamic bone and on mortality. The risk of persistent or recurrent HPT2 is rare in case of selective PTX. Surgical reduction, in case of recurrence of HPT2, remains possible, especially as the remaining parathyroid was not dissected. This risk appears less than definitive iatrogenic hypoparathyroidism if subtotal resection.

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Anxiety and depressive disorders in chronic hemodialysis patients

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Introduction:
Hemodialysis is experienced as a vital need and is a heavy strain that is causing psychological distress expressed by anxiety and depression. The aim of our study was to estimate the prevalence of anxiety and depression in chronic hemodialysis patients.

Materials & Methods:
This is an observational cross-sectional study, carried out within the unit CASABLANCA CHU ibnrochd of hemodialysis in January of 2020 of 71 chronic hemodialysis patients, in collaboration with a psychiatrist, the scale of anxiety and depression (HAD) has been used to diagnose and assess the severity of anxiety and depression in this population.

Results:
Our study included 71 chronic hemodialysis adult patients, the average age of our patients was 46.5 years, ranging from 16 to 93 years, with a sex ratio M / F 1.1, seniority average hemodialysis is 17.3 years; patients are single, married, widowed, divorced in 66%, 26%, 5% and 3% of cases, 72.5% of our patients are without profession.
None of the patients is followed by a psychiatrist or under antidepressant or anxiolytic during the study, 46% of our patients have anxiety and depression with a male predominance in 56% of cases, anxiety was found in 15% of patients, 1 case of major anxiety, the average score of anxiety is 10 ± 2, depression was found in 36% of cases and 1 case of major depression, the average depression score was 11 ± 2.
Discussion
Our results confirm the high prevalence of anxiety and depression in chronic hemodialysis patients. The appearance of these disorders reflects the lack of acceptance and adjustment to illness. The pathogenesis of the psychological impact of dialysis is multifactorial. It is linked to the causal nephropathy, the startup circumstances of this technique, incidents in perdialytique and clean diseased conditions.
Conclusion
Anxiety and depression are common in patients on periodic hemodialysisThese results emphasizes the importance of collaboration between nephrologists and psychiatrists in order to offer hemodialysis patients psychological support and guarantee a better quality of life.

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What psychological factors are associated with neuropathic pain in chronic hemodialysis patients?

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Introduction
The pain (DL) is a sensory and emotional experience unpleasant. Chronic hemodialysis patients represent a population with a high prevalence of pain including neuropathic pain but insufficiently studied, the goal of our work is to explore the associations between neuropathic pain experienced by dialysis patients and their anxiety levels , depression.
Patients and Methods
This is a cross-sectional study, descriptive and analytical conducted in the month of January 2020, including 71chronic hemodialysis in renal unit CHU Ibn Rushd CASABLANCA, their characteristics were collected from medical records and interviews with patients, Neuropathic pain was identified through the questionnaire "DN4" which isa simple tool to search for neuropathic pain, the questionnaire is divided into 4 issues representing 10 items, If the patient's score is equal or greater than 4/10, the test is positive,and we used the HAD score to assess anxiety and depressionIt contains 14 items rated from 0 to 3, if the score is less than or equal to 7: absence of symptoms, if it is between 8 and 10 questionable symptoms and if it is greater or equal to 11: some symptoms.
Results
71 patients were collected with an average age of 46.5 +/- 15.4 years with extremes ranging from 16 to 93 years, the sex ratio M / F is 1.1The average time on dialysis was17.3 +/- 9.05 years (1-44). The prevalence of LD was64.4%. According to patients, the pain was considered neurological in 21% of cases. DN was symmetrical, proximal and systematized in a path of a nerve in 39%, 35% and 79% of the cases respectively. Anxiety and depression are associated with greater pain. The presence of negative emotions is also associated with more pain. The dramatization and avoidance strategies are associated with more pain, while ignorance painful sensations and persistence in activities associated with less pain, 46% of our patients have anxiety and depressive disorders, anxiety was found in 15% of patients, the mean score of anxiety was 10 ± 2 (3- 17), depression is found in 36% cases, the average depression score is 11 ± 2 (4-19)
Discussion
These results show the importance to pay attention to the emotional state of patients. Interventions on the emotions and ways to cope with pain could be proposed to the patients but also for caregivers to help them better support patients.
Conclusion
Chronic hemodialysis represent a population characterized by a high prevalence of doueleur. Neuropathic pain less often do not answer to nonspecific analgesics where the interest of the search in order to prescribe the right treatment to relieve patients.

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Evaluation and analysis of chronic pain in hemodialysis patients

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INTRODUCTION
Despite progress these recent years in support the hemodialysis, chronic pain remains a problem concern that ultimately affect the quality of life and psycho-emotional state, even among dialysis patients already psychologically fragile. However, it is often overlooked and its characteristics in chronic hemodialysis (HDC) are poorly understood. The purpose of this study was to evaluate the prevalence, features, impact and treatment of pain in our population of chronic hemodialysis patients and to determine the factors associated with it.
PATIENTS AND METHODS
cross-sectional study conducted in January 2020 including 71 chronic hemodialysis patients from the nephrology department of the CHU ibn rochd CASABLANCA. They were subjected to a questionnaire on socio-demographic characteristics, the characteristics of the pain, its impact on daily life, the various treatments performed. The pain is chronic if it persists for more than 3 months. The intensity was assessed using a visual analog scale.
RESULTS
Of the 71 patients, 64.4% report chronic pain, the average age of our patients was 46.5 years, ranging from 16 to 93 years, with a sex ratio M / F 1.1, seniority hemodialysis was 17.3 years.
The pain is continuous, frequent, intermittent and rare in respectively 55.5%, 27.5%, 13.7%, 3.44% of cases, it is a weak, moderate, severe, very severe in respectively : 13.7%, 58.6%, 17.24%, 10.3%, causing musculoskeletal was predominant in 75.8% of cases, the most common sites are: shoulders (47,23%), knees (34.5%), the head (41.2%) and the back (19.65%). It resounded on the patient's daily activity in 55.17%, and sleep in 41.3%, the treatment was essentially based analgesics in 58.6% of cases, these analgesics were level 1 in 47.1% cases and level 2 in 52.9% of cases. This is taken daily in 28.5% of patients, common in 42.8% and 28.5% rare among of them, the disappearance of pain was achieved in 65.51% of cases. In perdialyse, the intensity of the pain does not change in 79.4% of patients.
Pain was favored by advanced age and age dialysis (advanced age (p = 0.043) and age dialysis (p = 0.01).)
DISCUSSION
Chronic pain was common among our patients. Its prevalence in our study was 51%. This prevalence was similar to that reported in the literature [5-9]. Many reasons explain this situation. First, the field of kidney failure Chronic is itself a cause of this pain. In addition, studies have shown that pain Chronic appears at the beginning stage of the disease and worsens As the disease progresses to dialysis stage the [10-12]. In this area in addition to many comorbidities causing pain.
CONCLUSION
Chronic pain is a major problem in hemodialysis by its high prevalence, its significant intensity and its impact on life daily patient. However its management remains inadequate. Regular assessment of pain using a well-codified questionnaire is necessary to improve the care of dialysis patients.

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Troponin I in asymptomatic haemodialysis patients in end stage renal disease versus controls: Troponins I are not falsely positive

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Introduction:
Patients with end-stage renal disease (ESD) in haemodialysis (HD) have an increased incidence of coronary artery disease. The specificity of cardiac troponin I (cTnI) in these patients is controversial, and varies according to the studies and / or the assay method used. Our objective is to study the prevalence of high levels of cTnI in asymptomatic patients with ESD.
Patients and Methods: This is a prospective study that included 37 asymptomatic haemodialysis patients from the department of nephrology-haemodialysis of the University Hospital of Casablanca. Patients with a history of cardiovascular or ischemic disease, severe anemia or recent infection have been excluded.The samples were made before the HD session for the first group. The cTnI assay was performed using an enzyme immunoassay method using ST AIA-PACK cTnI 3rd GEN reagent on AIA 360 (cut off: 0.04ng / ml).
Results: The mean age of the patients was 40 years, with a slight male predominance (20H / 17F). The average HD duration was 16 years. None of the patients or controls had a cTnI level of > 0.04ng/mL.
Conclusion: According to our results, ESD and HD did not interfere with the cTnI assay. Several other studies have confirmed the specificity of cTnI in the diagnosis of coronary insufficiency. The main reason for the controversy is the lack of standardization of the reference values for the different assay methods. Also, it should be noted that most studies report an elevation of troponin T in ESD, which can be confusing for some clinicians

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A qualitative exploration of parental experiences of introducing and implementing Clean Intermittent Catheterisation on two - four-year-old sensate children.

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Introduction:
There is currently a lack of research describing the lived experiences of parents (and carers) who utilise Clean Intermittent Catheterisation (CIC) as a long term management for their child's bladder condition, throughout their journey from the point of diagnosis to initial introduction of this treatment to their child and longer-term management of their child's bladder condition. Our study aimed to understand the lived experience of parents across emotional, practical and social dimensions and how these experiences might change over time.
We were specifically interested in focussing our study on young children who are considered to have normal urethral sensations, as research has indicated that although introducing CIC to sensate infants can be successful, difficulties with CIC are more present for parents of young children (over 2 years of age) who are sensate as the procedure may cause the child pain and distress (Pohl, 2002; Bowmers et al, 1996). This finding has resonated with our own team's clinical observations and reported clinical outcomes, where greater challenges in acceptability for parents and success in implementation have been evident in families of young children, between two and four years old. We used qualitative research techniques to learn from parents about their challenges and strategies for overcoming difficulties to help inform our practice and improve both experience and clinical outcomes for future families.

Methods:
Eight parents took part in semi-structured interviews about their experiences of learning of their child's diagnosis and need for catheterisation, being trained to use CIC and implementing it at home with their child. All interviews were transcribed and a systematic method of Thematic Analysis (Braun and Clarke, 2004) was used to generate themes and sub-themes about parents' experiences.

Results:
Three key themes were identified reflecting three significant aspects of parental experience: 1) Encountering difficulties, 2) Establishing confidence, and 3) Perceived support. All parents encountered some level of psychological, procedural or logistical difficulties learning and/or implementing CIC on their child. The majority of parents managed to establish confidence in doing CIC on their children. Internal factors such as parental acceptance of CIC, experiential learning, planning, and routines, were all expressed by parents as being important in helping them establishing confidence with CIC. Furthermore, the external support parents perceived receiving (across the sub-themes emotional, practical and social support) was expressed by parents as influencing their experiences of introducing and implementing CIC on their child.

Discussion:
Our findings reveal important implications for how service providers could ensure parents feel as supported as possible during the CIC treatment pathway. For instance, in our institution, we have discussed the following three suggestions. Firstly it could be encouraged that both parents are taught CIC, to decrease the burden on one parent. Secondly, greater emotional support for parents should be available such as a

psychologist or a counsellor. Finally, medical services should create and promote opportunities for parents who are catheterising young children to meet and support each other.

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Recurrent thrombotic microangiopathy (TMA) in Pregnancy

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Introduction: Pregnancy induced atypical Haemolytic Uraemic Syndrome (aHUS) is a rare condition affecting 1 out of every 25,000 pregnancies. It is associated with significant long-term morbidity and mortality which may be reduced by prompt diagnosis and treatment. Diagnosis is complicated by similarities in presentation to more common pregnancy complications associated with a thrombotic microangiopathy (TMA) such as pre-eclampsia, new diagnoses of connective tissue disorders and rare but potentially fatal conditions such as thrombotic thrombocytopenic purpura (TTP). Early confirmation of underlying aetiology of TMA is critical to facilitate appropriate management.

Case: We report a case of a 22 year old woman with a previous liver transplantation for congenital hepatic fibrosis with recurrent TMA in pregnancy. She presented at 18 weeks in her first pregnancy with generalised swelling, breathlessness and 30kg weight gain. She was found to be hypertensive, proteinuric (urinary Protein: Creatinine Ratio 201.3 mg/mmol) with an acute kidney injury, deranged liver function, thrombocytopenia and evidence of a TMA. TTP was excluded (ADAMTS13 activity 22%) and connective tissue and autoimmune tests were negative. She suffered an intrauterine death in this pregnancy at 22 weeks and a subsequent early miscarriage. Placental histology was unremarkable. Subsequent genetic testing confirmed a complement mutation (heterozygous c.1855G>A (p.Val619Met) variant in exon 15 of the C3 gene), which was not present in the donor liver DNA.

In her next pregnancy she developed a recurrent TMA at 22 weeks' gestation (serum creatinine 199 µmol/l (from baseline 60), platelets 50x109/l and anaemia (Hb 107 g/L). Her blood pressure had increased to 160/100 mmHg, and she had substantial peripheral oedema. Other investigations were unremarkable and fetal scans were reassuring. However, Placental Growth Factor concentration (PLGF) was low <12pg/ml.

In discussion with the National Renal Complement Therapeutics centre treatment with Eculizumab (900mg) was commended but her renal function continued to deteriorate. A second dose (1200mg) was given after 5 days which led to stabilization and improvement in all markers within 3 days. However, fetal demise also occurred on Day 8 of treatment. Placental histology was suggestive of pre-eclampsia.

The patient has subsequently been counselled regarding the uncertainty of her diagnosis and the risk/benefit of prophylactic Eculizumab in a future pregnancy. She is now considering surrogacy for future pregnancies.

Discussion: This case highlights the diagnostic uncertainty of pregnancy associated TMA. Low PLGF and placental histology were suggestive of placental insufficiency; however, it remains unknown if these findings were secondary to a TMA triggered by pregnancy in the presence of a complement mutation.
It is important to recognise that the majority of complement proteins are synthesised by the liver, and therefore C3 should have been unaffected in this case due to liver transplantation, but the origin of upregulated complement activity in pregnancy is unknown.
There is increasing use of eculizumab to treat early onset pre-eclampsia, which may present a new therapeutic role for alternative complement pathway inhibitors. However, enhanced understanding of complement activity and its pathogenic role in placental disorders is needed to inform timing and dosing.

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Hydroxychloroquine usage in Lupus Nephritis Patients in a Single center

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Background:
Lupus nephritis is a common SLE manifestation that is caused by type 3 hypersensitivity reaction which results in immunocomplex formation.Treatment of lupus nephritis is based mainly on the class of lupus identified in the histopathology with evidence of proliferative glomerulonephritis usually necessitating the introduction of Immunosuppressive medications. However, hydroxychloroquine has been shown to reduce the risk of damage accrual, improve survival, and decrease the frequency of lupus flare. It also has been shown to improve kidney outcome. There is an increased probability of remission in patients with membranous nephritis treated with MMF when combined with hydroxychloroquine and also a lowered probability of decrease in kidney function if used prior to the onset of lupus nephritis. Both KDIGO and EULAR guidelines recommend the use of Hydroxychloroquine in Lupus Nephritis. Prior studies have identified the reduced odds of being on an antimalarial if a patient is seen by a Nephrologist as compared to a Rheumatologist. With this in mind, we intend to ascertain the awareness and use of hydroxychloroquine in biopsy proven Lupus Nephritis in our center.

Methods:
This is a retrospective review of 40 patients with biopsy confirmed Lupus nephritis diagnosed between 2005 and 2017 in a single center. Data was collected by painstaking review of clinical letters and medication history of the identified cohort.

Results :
83% of the participants were females. Twenty two patients aged between 30 and 50 years while 17% younger than 20 years old. Of these patients 62% of them were of Caucasian ethnicity 35% Asian and only 3% were Afro-Caribbean. Of the cohort 34% were not on hydroxychloroquine without precluding factors and all of them were on steroids and Mycophenolate mofetil treatment.

Discussion:
Data from this limited sample of lupus nephritis patients shows that Hydroxychloroquine is not prescribed to considerable number of our lupus nephritis cohort despite no identifiable precluding factor. The inference from this will be that the nephrology community remains unaware of the advantages inherent in the use of anti-malarial in Lupus patients. The other unlikely possibility is that nephrologist remains unconvinced of the evidence of its utility. We believe that it is the former and hence we intend to raise awareness of this particular line of management. Following this study we have commenced a Quality Improvement project to raise awareness of the utility of this age old drug and to actively encourage Nephrologist to prescribe hydroxychloroquine in lupus nephritis patients. A re-audit would be embarked upon in the future.

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Fistula Cannula - Is this an alternative to conventional haemodialysis needles?

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Abstract

Many patients experience problems with conventional haemodialysis needles such as pain, dislodgement and discomfort. A fistula cannula is a flexible and blunt plastic needle designed for haemodialysis cannulation, which may reduce these issues (Parisotti 2016). Its design is a sharp metal needle which is used to puncture the fistula or graft and then guide the blunt plastic sheath into the vessel. Once the sheath is in position, the needle is removed, leaving only the sheath in-situ. This project trialed the use of the fistula cannula in one satellite haemodialysis unit with the aim of evaluating their safety and impact on patient experience.

Method:-

Patients were invited to trial the cannula if they met any of the following criteria:-

1. Experienced needle dislodgement/infiltration previous 4 months.
2. Excessive pain while needles in-situ or while needles inserted.
3. Nickel allergy.
4. Excessive bleeding post needle removal.

Five patients met the criteria and trialed over a 3 month period, 21/10/19 – 22/01/2020 using the fistula cannula.

The following data was collected prospectively for each patient.

1. Pain score - 0 = no pain, 10 = significant pain on insertion and in-situ.
2. Arterial (AP) and Venous pressures (VP) - pumps reached full speed.
3. Duration of bleeding time post needle /fistula cannula removal.

Staff feedback was obtained via informal discussion at team meetings mid and end of trial.

Results (see table 1):-

There were no episodes of dislodgement, infiltrations or allergy during the trial period. All patients reported reduced discomfort at insertion and during treatment with cannula compared to needles. Neither arterial nor venous pressures were worse with cannula than with needles. Bleeding time was reduced by using the cannula for all participants. Statistical tests will be performed prior to presentation (if abstract accepted) to ascertain if differences were significant.

Staff required additional training to perform the cannulation but reported enjoying the learning curve of using this tool and that it results in better patient experience despite the inability to manipulate post insertion. Disadvantages include the requirement for an occlusive dressing to secure the cannula during haemodialysis and a clamp to prevent blood spillage on connection/disconnection from haemodialysis due to the absence of a one-way valve.

Conclusion:-

Fistula cannula appears to provide a safe alternative to conventional needles and improve patient comfort during haemodialysis. Because they are up to four times more expensive than conventional needles, widespread introduction beyond patients who experience difficulties with needles may not be an efficient allocation of resources. Long-term randomised trials would ascertain if they improve AVF/AVG longevity and or stop/slow down formation of aneurysms, which would make their use more cost-effective.

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Predicting relapse in ANCA-associated vasculitis; a systematic review and meta-analysis

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Introduction:
Relapses affect 30-50% of patients with anti-neutrophil cytoplasm antibody (ANCA) associated vasculitis (AAV) over 5 years. Whilst relapses are associated with accumulating disease and treatment related damage, prolonged maintenance therapy to reduce the risk of relapse is also coupled with toxicity. Whilst there have been studies looking at predictors of relapse in AAV, this research has yet to translate clinically into guidance on tailored therapy. The aim of this systematic review was to meta-analyse existing risk factors from the literature and then produce a model to help stratification of immunosuppression therapy for patients at risk of disease relapse.

Method:
A search strategy for MEDLINE and EMBASE was developed to include all studies identifying independent predictors of AAV relapse using multivariate analysis. The main inclusion criteria were adult patients with a new diagnosis of AAV made by a clinician, who had achieved remission with induction treatment. Abstracts were screened first by a single reviewer and full studies of those meeting the initial criteria were then screened separately by 3 reviewers. Individual risk factors at diagnosis were extracted, and pooled hazard ratios (HRs) calculated for those identified in >1 study. A model to predict time to first relapse based on identified risk factors was retrospectively tested using a single-centre cohort of patients with AAV.

Results:
Of the 2,122 abstracts reviewed, 111 full papers were screened for eligibility. 18 studies were deemed eligible for inclusion in the systematic review, identifying a total of 10 risk factors [Table 1]. Four significant risk factors remained in the meta-analysis after excluding studies due to data duplication. Three of these risk factors were baseline factors at diagnosis and 1 was after the initiation of maintenance therapy. The pooled HRs for the 3 risk factors at diagnosis were used to create a model; Azathioprine versus Mycophenolate Mofetil for maintenance therapy was not included. The risk factors in the model included PR3 ANCA positivity HR 1.69 (1.46-1.94), cardiovascular involvement HR 1.78 (1.26-2.53), creatinine >200µmol (relative to creatinine ≤100) HR 0.39 (0.22-0.69) and creatinine 101-200µmol (relative to creatinine ≤100) HR 0.81 (0.77-0.85). PR3 ANCA positivity was the most frequently identified risk factor and is demonstrated in the forest plot [Figure1]. Using data from 182 AAV patients from a tertiary renal referral centre to validate the model gave a modest C-statistic of 0.61. We were unable to reliably test cardiovascular system involvement due to the low incidence rate.

Conclusion:
PR3 positivity, a lower serum creatinine and cardiovascular system involvement are all associated with an increased risk of relapse and a combination of these risk factors can be used to predict an individual's

relapse risk to guide treatment. In order to produce a clinically useful model to stratify risk, we need to identify a greater number of risk factors with a focus towards more robust biomarkers.

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miR-141 Mediates Acute Kidney Injury Recovery

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Background
Acute kidney injury (AKI) is a global clinical problem that places a significant financial burden on the NHS. AKI is characterised by a sudden decline in renal function and mortality as high as 60%. Current AKI biomarkers have limited ability to classify disease and stratify rapidly progressing patients, and the underlying pathological mechanisms are poorly understood. In this study we hypothesised that alterations in urinary microRNA (miRNA) profiles could predict AKI recovery/nonrecovery after 90 days and that injury-specific changes would signify miRNA mediators of AKI pathology. To test this hypothesis we compared urinary miRNAs from recovered and nonrecovered AKI patients with unaffected individuals to identify biomarkers, then manipulated selected miRNA expression in injury models to investigate mechanisms.

Methods
Biomarker Study: Taqman Low Density Array analysis profiled 377 miRNAs in pooled urine samples from recovered (n = 6) and nonrecovered (n = 5) stage III AKI patients. Selected candidate biomarker miRNAs were then analysed by RT-qPCR in our complete patient cohort (n = 30) and controls (n = 10). Cell Model: Renal proximal tubular epithelial cells (PTECs) were incubated with 1 mM H202 for 24 h to induce tubular injury via oxidative stress, and expression of candidate miRNAs was manipulated using miRNA mimics. miRNA Target Selection: Computer algorithms predicted messenger (m)RNA targets for candidate miRNAs, and target mRNA expression was knocked down using siRNAs. Reporter Assay: Cells were transfected with control Renilla reporter vector plus either our luciferase reporter construct p-miR-Report-PTPRG (protein tyrosine phosphatase receptor type G) containing the PTPRG 3'-untranslated region (UTR) or empty luciferase vector, followed by miRNA mimics or controls. Animal Model: Our unilateral ischemia reperfusion injury (IRI) Lewis rat model was used in which the left kidney was clamped for 45 min, animals were then sacrificed 48 h later.

Results
Biomarker Study: Comparison of urinary miRNAs from AKI patients with controls detected significant injury-specific increases in miR-21, miR-126, miR-141 and corresponding decreases in miR-192 and miR-204; miR-141 best predicted nonrecovery. AKI models: Expression of miR-141 increased under oxidative stress conditions in vitro and unilateral IRI in vivo. RNA-sequencing confirmed miR-141 upregulation in tubular injury and implicated other miRNAs in AKI pathology. Forced miR-141 expression in the presence of H2O2 led to increased PTEC death and decreased cell viability. Analysis in silico identified 9 mRNA targets with 2 or more miR-141 3'-UTR binding sites, expression analysis of these mRNAs in PTECs highlighted PTPRG for further study. Luciferase analysis confirmed PTPRG was a direct miR-141 target, PTPRG siRNA knockdown under oxidative stress increased PTEC death and decreased cell viability.

Conclusion
We have identified association of increased miR-21, miR-126, miR-141 and decreased miR-192 and miR-204 detection with AKI. Forced miR-141 expression in our novel in vitro model caused increased PTEC death and reduced cell viability in tubular injury. PTPRG was shown to be a direct target of miR-141 and siRNA knockdown increased PTEC death and reduced cell viability, identifying PTPRG as a potential target for AKI therapy.

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Administration of subcutaneous Methoxy polyethylene glycol-epoetin beta (Mircera) in a paediatric cohort; an 8-year retrospective national centre study

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Introduction

Mircera is a pegylated formulation of recombinant epoetin beta which has been used in the management of chronic kidney disease (CKD) associated anaemia in adult patients in Europe and the US since 2007. There is less data demonstrating clinical safety and efficacy in paediatric patients, with only one paediatric phase II trial of 64 patients (DOLPHIN study) identified. We retrospectively reviewed our off-licence use of MIRCERA use in a single national centre, over 8 years.

Methods

Data were collated from electronic case records. All patients receiving Mircera from 2011 onwards were identified. Data collected included lab parameters before therapy, at each dose change, and completion of therapy: haemoglobin, parathormone (PTH), ferritin, haematinics. Demographics included gender, CKD stage and aetiology, reason for discontinuation of therapy, adverse effects. Efficacy of Mircera was defined as Hb levels≥100g/dL. An upper limit of Hb≥ 130 g/dL was applied, with ongoing administration at the same dose considered over-treatment. Primary outcomes were safety (number of adverse events), efficacy (time to target Hb), dose ranges and duration of treatment. Secondary outcomes included association of efficacy with hyperparathyroidism (PTH>60pg/ml), CKD stage, glomerular/non-glomerular aetiology, inflammation, medication, dialysis, transplant and iron status.

Results

77 patients were identified. Two patients were excluded as weight and Haemoglobin (Hb) values were unavailable, leaving 75 patients for analysis. 44 patients (59.5%) had Hb≥100g/dL before treatment, 55 (73%) post-treatment. A total of 243 doses of Mircera were administered and had Hb values available. 161 doses (66.3%) resulted in a Hb≥100g/dL. The mean initial dose was 2.2mcg/kg. Doses of 1-2 microgram/kg resulted in 70% of Hb values being ≥100g/dL. Higher doses (≥4mcg/kg) resulted in 79% of Hb values being ≥100g/dL but 11.9% were a Hb≥130g/dL. Dosing frequency ranged from 1 to 8 weeks, with the majority (72%) of doses administered 4 weekly.

Mircera was safe in paediatric patients. No patients discontinued therapy due to adverse events. Mean treatment duration was 20.5 months, with approximately 6 months treatment required to achieve stable (≥70% Hb values) consecutive Hb values.

Hyperparathyroidism was associated with Mircera hypo-responsiveness. 28 of 230 (12.2%) documented PTH levels were >60pg/mlof which 18/28 (64.3%) were associated with Hb<100g/dL. 202 of 230 (87.8%) documented PTH levels were <60pg/ml, of which 55/202 (27.2%) had Hb<100g/dL. Serum ferritin≥500ng/mL was also associated with reduced treatment efficacy. At baseline 11.7% of ferritin was ≥500ng/mL of which 68% had Hb<100g/dL. Similarly, post-treatment 14.3% of ferritin was ≥500ng/mL of

which 64.3% had Hb<100g/dL. Mircera was effective in all CKD stages, except CKD 3. Medication, aetiology, dialysis, transplant and iron status did not affect MIRCERA efficacy.

Conclusion

Mircera is safe and effective in children aged 2-18 years old. Fewer doses were associated with higher Hb in patients with PTH>60pg/mL, or ferritin >500ng/mL.

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Peritoneal Dialysis retraining: developing a strategy to reassess patient's technique when performing Peritoneal Dialysis and reduce the risk of Peritonitis

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Introduction

A new training programme was introduced in our Peritoneal Dialysis (PD) unit in 2018, the aim was to reduce the number of peritonitis episodes experienced by our PD population. It was decided that a technique check in the patients' home environment was required. This would be done periodically and would check for any deviations from the taught PD competencies. The anticipated outcome was a reduction of peritonitis episodes, therefore improve patient outcome.

Problem

It was observed that the peritonitis rates in our PD population had risen dramatically over the previous 2 years. Our team decided that we needed to closely monitor individuals' technique and compliance with performing PD at home. Literature and research in this area appeared limited and gave no indication or guidelines as to when, what or how a review of patient technique and understanding should take place.

Design
A programme of reassessment was devised to ensure all patients would be periodically observed in the home setting. It was determined that technique would be re-checked 1-3 months after commencing PD, then routinely every 6 months. Technique check would also be performed in the 4 weeks post peritonitis. To support continuity, a single assessor carried out the reassessments and identified areas of concern/need for retraining. A checklist was designed to identify areas that required examination, this checklist allowed the assessor and the patient to focus on areas of learning that needed to be revisited. On launching the programme, all existing and new patients were informed of the purpose and aim of reassessment.

Result

The retraining schedule commenced in January 2019, resulting in all existing/new PD patients being reassessed. A small number of longstanding patients, demonstrated some resistance initially. However, after discussing the aim of the reassessment programme, all PD patients valued the need for such action. All of the patients received retraining over the course of 6 months, this has now become a rolling programme of reassessment.

Conclusion

The reassessment/retraining did seem to impact on the number of episodes of peritonitis we experienced and resulted in a positive outcome for the PD team and patient population. It must be considered that reassessment and retraining of our patients is crucial to ensuring the longevity of PD as a renal replacement programme

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Coordinate My Care is under-utilised in conservatively managed patients with end stage renal disease

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Introduction:
The rising incidence of end stage renal disease in frail and elderly individuals has emphasised the need for 'best supportive care' services, which aim to promote quality of life and death in these patients rather than lifespan extension via renal replacement therapy (RRT). The NHS ambitions for end of life and palliative care describe "the need for honest conversation and the importance of joined up care". (1) Online care summaries, such as Coordinate my Care (CMC), give key information, such as advanced care plans, which are accessible by healthcare professionals in both primary and secondary care. CMC "aims to improve the efficiency and delivery of end of life care" (2). It provides information about patients thought to be in their last year of life for to GP surgeries, ambulance services and secondary care via an online portal.

Advanced care planning is less prevalent in frail renal patients than in patients with conditions with similar prognoses, such as cancer, despite renal patients often being more polymorbid and having more frequent contact with a greater range of healthcare professionals. There is little in the literature regarding uptake rates of electronic palliative care summaries amongst renal conservative care patients. It is known that amongst specialist palliative care services there have been uptake rates of 71% of patients having an electronic palliative care summary (3)

Therefore, we audited the patients known to our supportive care service within the last year, to see how many had an active CMC record.

Results:

We selected 100 of our supportive care patients for audit. Of those 16 had a CMC record. We also captured that 27 patients that had died: within the deceased cohort 22% of had had a CMC record.

Discussion

Compared to other patients on specialist palliative care registers, supportive care patients have a lower uptake of electronic palliative care summaries. To achieve the NHS ambitions for palliative and end of life care, more effort is required to improve the uptake of such records. This would enable the various stakeholders in primary and secondary care to have up to date information on supportively managed renal patients, and enable these patients to have more of a say in the care they receive during the remainder and at the end of their lives, and where this occurs.

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Home haemodialysis outcomes: A single centre experience ion the UK

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Objectives: Home haemodialysis (HHD) provides advantages in terms of flexibility, quality of life and overall outcome compared to in-centre Haemodialysis (HD). Despite these well recognised benefits, rates of home haemodialysis remain low with approximately 4 to 4.5% of the dialysis population receiving HHD. We analysed our experience of providing HHD in our area over the last 14 years.

Methods: Data were collected on all patients coded as receiving HHD from the renal computer system. Patients included had entered the HHD programme from 16/11/2005 up to the present day.

Results: Records were available for 86 patients. The majority were male who comprised 66% of the population versus 34% female. Most HHD patients were of European ethnic origin (74.4%) compared with 18.6% of South Asian origin and 6% Afro-Caribbean. This compares with an incidence of 29.4% and 10% of South Asian and Afro-Caribbean patients respectively in the local dialysis population. Of these 86 patients 62 were now no longer receiving HHD. The median length of time spent on HHD for patients who had dropped off was 19.5 months. The most common reasons for drop off from HHD were transplantation (39% of patients) and death (40% of patients). Drop off due to reasons of illness and frailty occurred in 8 patients (12.9%). Electing to change back to in-centre HD was uncommon (2 patients).

Conclusion: Data from our experience of providing HHD show that once started most patients remain on HHD until either transplantation or death. Drop off due to frailty or patient choice is uncommon. The data also suggest that the home HHD population does not necessarily reflect our overall dialysis population in terms of ethnicity and gender, suggesting that some cultural and social barriers towards take-up still exist.

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Neutrophil-to-lymphocyte ratio (NLR) is an independent predictor of all-cause mortality in patients with end-stage kidney disease on haemodialysis

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Introduction
Neutrophil-to-lymphocyte ratio (NLR) is a surrogate marker of systemic inflammation and has been shown to predict mortality in cancer and cardiovascular disease (CVD). Comparatively little is known about NLR in chronic kidney disease (CKD) and in particular, patients on long-term haemodialysis. We sought to determine the relationship between NLR and overall survival in a group of haemodialysis patients.

Methods
A retrospective analysis was performed of a prospectively acquired database of adults with CKD stage 5, receiving haemodialysis in a single Scottish health board, attending 2006-2017. Start date was date of haemodialysis initiation; end date was date of death or data extraction (10/01/20). NLR was calculated from routine clinically acquired haematology samples on the day of initiation of haemodialysis. Survival analyses were performed to evaluate variables associated with death during follow up as well as cardiovascular (CV) events over the same period. Covariables studied included age, gender, primary renal diagnosis, pre-existing diabetes, pre-existing CVD, first haemodialysis access, serum albumin, haemoglobin, adjusted calcium and phosphate (all assessed on day of haemodialysis initiation).

Results
430 patients were included of whom 59.3% were male and mean age on starting haemodialysis was 63.1 ± 14.1 years. Primary renal diagnoses were similar to national prevalence data. 41.2% had pre-existing diabetes (24.9% with primary renal diagnosis of diabetic nephropathy) and 17.2% had pre-existing ischaemic heart disease or heart failure. Median follow-up was 4.95 (2.3-6.7) years during which time 100 (23.3%) patients underwent renal transplantation and 276 (64.2%) patients died with a median time to death of 2.99 (1.5-4.65) years. Patients who died during follow up were more likely to have diabetes (49.6 vs 26.0% Chi Sq $p<0.001$) or pre-existing cardiovascular disease (20.7 vs 11.0%, $p<0.001$). NLR (but not total white cell count) was significantly higher in those who died compared to survivors (7.0 vs 5.5, $p=0.03$) with cumulatively worse survival across quartile of NLR (Figure 1, Log-Rank $p<0.001$). NLR was higher in patients with a catheter compared to a fistula as first haemodialysis access (7.6 vs 5.1, $p<0.001$). On multivariable survival analysis, NLR (hazard ratio [HR] 1.02, 95% confidence interval [CI] 1.00-1.03), initial haemodialysis using a catheter (HR 1.65, 95% CI 1.08-2.52), age (1.06, 95% CI 1.05-1.07) and diabetes (HR 1.6, 95% CI 1.3-2.1) were associated with increased risk of death. There were 94 CV events (21.9% patients) during follow up. Only increased age and diabetes were independently associated with CV events during follow up, with no significant differences in NLR between those with a CV event compared to those without.

Conclusion
In summary, NLR is a novel risk factor which may identify patients at risk of poorer survival in those requiring haemodialysis. It may be associated with dialysis access as a trigger of inflammation.

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Alternative complement pathway dysregulation in women with pre-eclampsia.

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Background and Aims
Pre-eclampsia (PE) is a leading cause of maternal and fetal morbidity and mortality, and women with chronic kidney disease are at particularly high risk. There remains no definitive therapy other than prompt delivery which is often required preterm. Research suggests evidence of complement dysregulation in patients with PE (1-4), although the evidence base requires strengthening to develop a better mechanistic understanding of the role of complement and the pathways involved to guide potential complement-modifying therapies. Our aim was to compare patterns of complement in the circulation (maternal blood), and at the maternal-fetal interface (umbilical cord blood) in healthy pregnant women, and those with PE.

Methods
Women without pre-existing medical conditions with PE and healthy controls were recruited from a tertiary obstetric centre. PE was defined as new onset hypertension (blood pressure ≥140/90 mmHg on 2 or more occasions), and proteinuria (protein to creatinine ratio ≥30 mg/mmol), after 20 weeks' gestation. Maternal blood samples were collected within one week prior to delivery, and umbilical cord samples collected immediately following birth. Samples were centrifuged and frozen at -80^{o}C within 4 hours of collection. Maternal and cord plasma were tested for markers of complement activity (iC3b, C3, properdin, C5b-9 and Ba) using electrochemiluminescent multiplex immunoassays (MesoScale Discovery). Clinical outcome data were collated.

Results
68 subjects were recruited (35 women with PE, 33 healthy pregnant controls). There were no significant differences in age, BMI, ethnicity, parity, or mode of delivery between groups, although samples were taken at an earlier mean gestational age in women with PE (35 weeks + 5 days versus 39+6, p<0.001).

When compared to healthy controls, women with PE demonstrated significantly reduced maternal plasma concentrations of properdin (4828.47 ng/ml versus 6876.85 ng/ml, p<0.001), iC3b (488.81 ng/ml versus 605.74 ng/ml, p=0.003), and C3 (1.90 g/l versus 2.36 g/l, p<0.001), and elevated maternal plasma concentrations of Ba (149.53 ng/ml versus 112.75 ng/ml, p=0.012). However, there were no significant differences in iC3b:C3 ratio or C5b-9 between study groups. See Table 1.

Cord blood analysis also identified significantly higher Ba concentrations in women with PE compared to controls (380.73 ng/ml vs 210.47 ng/ml, p=0.015). There were no other significant differences in complement components tested in cord blood between groups.

Discussion
This study, for the first time, highlights abnormalities in circulating properdin and Ba concentrations in the plasma of women with PE, and elevated concentrations of Ba in umbilical cord blood, suggesting activation

of the alternative complement pathway. Properdin acts as a positive regulator of the alternative complement pathway. Reduced plasma properdin concentrations seen in PE cases may suggest properdin consumption. Similarly, raised concentrations of circulating Ba, (an activation fragment of Factor B and also specific to the alternative pathway) are suggestive of heightened alternative pathway activity in maternal and cord blood in women with PE.

These findings contribute to evidence of raised complement activity in women with PE, thus complement inhibition therapy may be a potential therapeutic option as an alternative to expedited delivery in the treatment of PE.

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Outcomes of renal transplantation in adult patients with primary FSGS: a single centre experience over forty years.

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Introduction: Primary focal segmental glomerulosclerosis (FSGS) is a common cause of nephrotic syndrome in adults and children and often leads to end stage kidney disease (1). The aetiology may be podocyte injury from a "circulating factor"; in these cases, 30-50% patients may develop recurrent FSGS following renal transplantation (2, 4). Genetic mutations affecting structural podocyte proteins may also cause FSGS; however many identified mutations confer a very low risk of recurrent disease. A more detailed understanding of the patient population is required in order to individualise pre-transplant counselling, and to identify patients at high risk of recurrence (3).
Methods: We performed a retrospective database search of all patients transplanted at our centre since 1981 (n=3908 transplants in n=3533 patients) with ESRF due to primary FSGS. A detailed case note review was undertaken to exclude patients with secondary FSGS. We evaluated the course of their native kidney disease, and their transplant outcomes including the incidence of recurrent FSGS and graft survival. The diagnosis of recurrent FSGS was made in patients with supportive transplant histology and proteinuria (1).
Results: We identified 106 patients with primary FSGS who were transplanted, representing approximately 3% of the transplant population. Detailed follow up data were available for 75 patients with a median follow up time of 84 months. 63% were male, reflecting the higher incidence of FSGS in men. Median age was 43 (+/- 18) years at time of transplantation, and where known, 30 years at the time of FSGS diagnosis. 67% were Caucasian. Genetic analysis identified mutations in 6 patients (ACTNS4, NPHS2, ACTN4, NUP107 and INF-2 (N=2)) but was not available for the majority of patients in our study. 52% of transplants were from deceased donors and 48% were from live donors. In all patients with functioning grafts, the median graft eGFR was 46 ml/min and urine ACR 9.3 at median 96 months post transplant. We identified recurrent FSGS in 13 (17.3%) of patients. Recurrent disease was more common in young, Caucasian men and typically occurred early post transplant (median 1 month) but was diagnosed as late as 3 years post-transplant. Recurrent disease was treated with plasma exchange (n=9) and/or rituximab (n=3) in addition to maintenance immunosuppression with calcineurin inhibitor, anti-proliferative and corticosteroids. Despite treatment, recurrent disease led to graft failure in 10/13 (77%) cases. No cases of recurrent disease occurred in patients with identified genetic mutation.
Discussion: Our study shows that the rate of recurrent FSGS observed in our centre over 40 years is much lower than published rates (17.3%) but that recurrent disease is likely to lead to graft loss. Recurrent FSGS occurred more commonly in young Caucasian men. This information will guide more individualised risk counselling prior to transplantation in our multi-ethnic population (3).

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Outcomes of peritoneal dialysis catheter insertion: A singe centre experience

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Introduction: Timely peritoneal dialysis (PD) catheter insertion is essential to a successful PD programme. Nephrologist led percutaneous catheter placement in suitable patients is an alternative to surgical catheter placement that is cost effective and not dependent on the available surgical and anaesthetic resources. We reviewed our experience of both nephrologist led catheter insertions and surgical catheter placement over a four-year period.

Methods: We conducted a retrospective survey of all PD catheter insertions attempted between 2014 and 2018. Demographic and outcome data was collected on all patients. All catheters that were not functioning at 3 months were classified as a failed insertion.

Results: During the time-period surveyed there were 330 attempted catheter placements in 278 patients. 207 (63%) catheters were inserted percutaneously by a nephrologist (or in a handful of cases, an interventional radiologist) while 123 (37%) were inserted by a surgeon under general anaesthetic. 57 of the medically inserted catheters were non-functional before 3 months representing a failure rate of 28% while 32 of the surgically inserted catheters were had failed at 3 months representing a failure rate of 27%. Failure of drainage was the most common reason for failure. In total 75 patients had an insertion failure at the first attempt, 29 of these patients went on to have a successful reinsertion or manipulation and become established on PD. Of the remaining patient's the majority were established on in-centre haemodialysis with four patients converting to home haemodialysis at a later date.

Discussion: Our experience suggests that nephrologist led percutaneous PD catheter placement has comparable success rates to surgical catheter insertion and represents an option for centres in terms of providing timely dialysis access. Of note, only a small number of patients whose catheter insertion failed eventually convert to home haemodialysis despite initially choosing a home therapy.

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Diabetes and Real-World Investigation of Glucose Instability, Variability and Exposure in Haemodialysis Patients (DRIVE-HD) – A Technology Validation.

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The assessment of glucose levels in patients with diabetes and who are receiving renal replacement therapy is challenging. Risks relating to both high and low blood sugars are greater in this group than in other patients with diabetes. Traditional long-term control measures such as HbA1c are commonly invalidated by the rheological circumstances of individuals in this group, and traditional finger-stick monitoring is often problematic.

Interstitial fluid (ISF) continuous glucose monitoring devices have become commonplace in the management of patients with type 1 diabetes, but their utility and accuracy in individuals on renal replacement therapy remains to be formally validated, as theoretically the relationship between ISF glucose and blood glucose levels may be impacted by the dialysis. In order to undertake “real world” validation of this technology in this population group, as part of a wider program at Portsmouth Hospitals NHS Trust, we performed blinded interstitial glucose monitoring (FreeStyle Libre Pro – Abbott Diabetes Care) over 14 days in 69 individuals using insulin (11 type 1 diabetes and 58 type 2 / other diabetes) to treat their diabetes who were receiving in-centre haemodialysis. Results of ISF data were compared to those of time-linked fingerstick results undertaken by the individual over the same period, and blood glucose records from dialysis units. ISF sensors were applied to the upper (non-fistula) arm at an attendance for dialysis, and the usual BG meter of the individual checked for date / time consistency. After 14 days the sensors were removed and the SMBG meter of the individual was downloaded (Glooko-Diasend) where possible in order that capillary Glucose (CBG) values could be compared with their interstitially reported counterpart.

After validating CBG data for technique (2 individuals excluded), we compared CBG with its closest-timed ISF equivalent (within 7mins), excluding pairs in hypoglycaemia range (<4mmol/L) with a time difference of >2 mins or where an action to treat hypoglycaemia based on the CBG result was recorded. Results from 706 paired samples were compared using the Clarke Error Grid (figure 1), with 97.9% of results falling in the clinically acceptable A&B ranges.

To further investigate the impact of dialysis on the ISF validity, we compared the pairs from dialysis days (97.3% falling in A&B) with non-dialysis days (99.1% in A+B) confirming that whilst ISF values are slightly less concordant with CBG values on dialysis, they remain a clinically appropriate monitoring technique.

Conclusion

From this observational cross-sectional population study of individuals on haemodialysis treated with insulin for their diabetes we conclude that the accuracy of the ISF monitoring device FreeStyle Libre does not appear to be altered by the circumstances around haemodialysis and that such devices can be applied at any point during the dialysis period without significantly affecting the accuracy.

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Diabetes and Real-World Investigation of Glucose Instability, Variability and Exposure in Haemodialysis Patients (DRIVE-HD) – An exploration of Factors causing Glucose Variability (GV)

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Glucose Variability (GV) is an increasingly recognised risk factor for adverse outcomes and reduced quality of life in individuals with diabetes. Both day to day and within day glucose variability (instability) have been found to correlate closely to risks of hypo- and hyperglycaemia episodes and diabetes complications. However, there remains debate over the best way to measure such GV in populations and/or individuals with diabetes.
In population studies the percent coefficient of variation (%CV) has gained consensus for assessment, however at a clinical "real-world" level more debate exists as glucose levels for an individual are not normally distributed. Consensus has however been achieved over the presentation of CGM data using a graphical representation (the Ambulatory Glucose Profile – AGP). A simple numerical measure of individual variability which is also readily identifiable visually on the AGP is the inter-quartile range (IQR) – we have therefore used this as a primary assessment metric in our cross-sectional study of individuals with diabetes treated with insulin on haemodialysis using the FreeStyle Libre Pro blinded glucose sensor.

Individuals who had worn a sensor and achieved recording of at least 7 full days of data were categorised by diabetes type and treatment and also dialysis type and timing to try and understand common drivers for GV in this high-risk population (table 1).

Results
Timing of the dialysis session (am vs pm vs twilight) did not appear to impact on overall GV (as measured by IQR), nor did dialysis vintage or age. Those with type 1 diabetes had greater GV. Diabetes treatment had a significant impact, those individuals only requiring basal insulin for their diabetes treatment had a lower IQR (less GV) than those on either pre-mixed insulin or basal-bolus insulin ((3.6(3.1,4.6) vs 4.6(3.7,5.4) vs 4.9(4.1,6.7)mmol/L)) p=0.008
During periods on dialysis (compared to the equivalent part of the day off dialysis) the IQR was reduced by nearly 40% (from 4.1mmol/L to 2.3mmol/L – p<0.001)
Glucose control was also found to vary according to time in relationship to dialysis sessions – in the 6 hours leading up to dialysis the IQR was 3.4(2.3,5.2)mmol/L whereas in the 6 hours after it was increased to 4.2(3.0,5.4)mmol/L (p=0.005).
In contrast to other populations where night-time variability is very significantly reduced compared to daytime variability, in this population group the difference between day and night IQR was very small ((4.3(3.5,5.8) vs 4.0(2.9,5.7)mmol/L – p=0.03)

Conclusions
GV (as measured by IQR in individual patients) is a treatment target if morbidity and mortality in HD patients with diabetes is to be reduced. Factors with significant impact appear to be the diabetes treatment modality, and time relative to the period of dialysis. Before and during dialysis risk is relatively low, but rises significantly in the 6 hours following dialysis. Treatment and monitoring strategies should try to mitigate this risk.

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Proactive High dose Iron Therapy- Are we there yet? A closer look at 2 dialysis units following the Publication of PIVOTAL.

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Introduction

Renal Anaemia management has been based around dosing of Iron and erythropoiesis stimulating agents (ESAs) for the last 30 years. The latest practice changing study, PIVOTAL, showed that a proactive high dose iron regime (median Venofer dose 264mg/month) resulted in reduced requirements for ESAs and improved risk of death and non-fatal cardiovascular events, when compared to a reactive low-iron dose regime (median Venofer dose 145mg/month)
We look at how this has impacted on day-today practice in two satellite haemodialysis units before and after publication of PIVOTAL, with no formal change made to iron dosing algorithms.

Methods

We retrospectively examined 2 dialysis units over a 1 year period from October 2018-2019, bridging the publication of PIVOTAL. We compared iron dosing, ESA requirements, haemoglobin and ferritin levels at the start and the end of this period. We excluded patients who were intolerant of iron or had active cancer diagnoses or chronic infection.

Results

• 13 patients were included from Dialysis Unit 1 and 15 patients from Dialysis Unit 2.

• Monthly mean intravenous iron (Diafer) dosing in Unit 1 increased from 220mg in 2018 to 293mg in 2019, with mean ferritin levels rising from 332ng/l to 576ng/l

• Monthly mean Darbepoetin Alfa dose in Unit 1 decreased from 73mcg to 56mcg

• Monthly mean iron dose in Unit 2 was similar; 200mg in 2018 and 220mg in 2019, although mean ferritin levels rose from 351ng/l to 465ng/l

• Monthly mean Darbepoetin Alfa dose in Unit 2 increased from 130mcg in 2018 to 180mcg in 2019

• The mean haemoglobin was identical for both units at the beginning and end of the study period at 110g/l

• No patients included received additional red blood cell transfusions.

Discussion

These results show that in Unit 1, increasing iron doses resulted in reducing ESA requirements and a stable haemoglobin, suggesting that (at least) the laboratory result and drug dosing findings seen in PIVOTAL are reproducible outside of the trial environment.

In unit 2, findings were less clear cut. There was a more modest increase in the mean iron dose used, with an increase rather than decrease in ESA dose seen. There are likely to be patient factors responsible for this, but there may be physician-level differences as well.

We note that Unit 1 is run by a nephrologist who was a Principal Investigator for PIVOTAL, hence with trial experience of high dose IV iron therapy and prompt access to the trial results; we suggest that this accounts for some of the difference between the two units, and ongoing work includes ensuring treatment pathways are robust and evidence based.

Conclusion

High dose proactive iron therapy can reduce ESA requirements outside the trial environment, however practices still vary even within a single department.

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Diabetes and Real-World Investigation of Glucose Instability, Variability and Exposure in Haemodialysis Patients (DRIVE-HD) – Impact of population Glucose profiling with CGM on clinical decision-making and diabetes therapy decisions

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The Ambulatory Glucose Profile (AGP) provides a single image representation of the glucose experience of people with diabetes and so is a useful tool in the insulin management of diabetes.

69 individuals with insulin-treated diabetes undergoing regular centre-based haemodialysis were studied for 7-14 days with blinded CGM (FreeStyle Libre Pro). At the end of their data capture period each subject's data was subjected to clinical interpretation by an experienced diabetes clinician using a clinically derived risk score based on the AGP and also numerical data relating to time in range according to recently published international consensus reporting.

Results
Data from 85,731 points was analysed (43 data points - representing 0.05% of total - were missed through technical sensor issues

Using Time in range analysis where international consensus defines > 70% in range (3.9-10mmol/L) with <4% below this as optimal control, it is clear that very few of this group achieve optimal control – for descriptive purposes we therefore defined 4 categories of glycaemic control:
1) acceptable control as >50% in range with <10% below, and categories with
2) significant hypoglycaemia risk (<10% below 3.9mmol/L) and
3) significant hyperglycaemia risk (>50% of values above 10mmol/L) and
4) a final category with both of the above (>50% over 10mmol/L AND >10% below 4mmol/L)

Figure 1 provides AGP an example from each group as defined above.

Only 21 individuals (30% of the group) showed acceptable control whilst 20 (29%) showed significant hypoglycaemia risk, 23 (33%) significant hyperglycaemia risk and 5 (8%) the highest risk category of both hyper and hypoglycaemia risk

Using a 0-10 "clinical risk score" based on visual interpretation of the AGP (where 0 implies no indication for therapy change and 10 implies immediate indication for change (life-threatening risk) we were able to prioritise this group for therapy intervention, with 25 individuals falling in categories 0-3, 25 individuals falling in categories 4-6 and 19 individuals falling in categories 7-10

Conclusion
CGM analysis of glucose control in a haemodialysis population provides evidence of widespread glucose-related risk, with only 30% experiencing control which can be defined as acceptable. Both time in range and AGP analysis can identify those with the highest risk associated with their glucose experience in order to

prioritise therapy change, highlighting the importance of combined working between diabetes and renal clinical teams.

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Effect of frailty and comorbidity in pre-dialysis population

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Introduction
Chronic kidney disease (CKD) has a global health burden and is defined as either decreased kidney function shown by glomerular filtration rate (GFR) of less than 60 mL/min/1·73 m2, or markers of kidney damage, or both, for at least 3 months duration, regardless of the underlying cause. Frailty is usually defined as a state of accelerated vulnerability to physical stressors, including illness and trauma along with sarcopenia, weakness and decreased endurance. Frailty is associated with adverse clinical outcome and poor prognosis as a whole. This is due to progressive decline in the physiological systems accompanied by detrimental psychological health and limited social care. Rockwood frailty index is the most widely used clinical tool to diagnose frailty. Frailty is fairly common in CKD population and is associated with worse clinical outcome. Comorbidities play a vital role in the management and prognosis of patients with renal impairment. These comorbidities can be either presented separately or collectively in the form of a score that represents the burden as a whole. The Charlson comorbidity index (CCI) first published in 1987 utilizes sixteen comorbidities of varying weightage depending upon their strength of association with mortality. This study was done to evaluate the effect of frailty and comorbidity on pre-dialysis population.

Methodology
All patients with chronic kidney disease having GFR <20ml/min/1.73m2 are referred to Low Clearance Clinic (LCC), where a team of nephrologists and nurses work in a multi-professional clinic for patient centred care. Nurse lead patient education clinics are also undertaken to help patients make informed choice. Patients being referred to LCC for the first time or transferring from LCC to other clinics (Dialysis, transplant or conservative care clinics) or dying during the period from October 2018 to October 2019 were enrolled in the study. A total of 132 patients fulfilling these criteria were included in the cohort. Baseline demographics, choice of mode of renal replacement therapy, permanent vascular access formation, dialysis catheter insertion and venous mapping were recorded using electronic MEDITECH hospital software. CCI and CFI were calculated on referral to LCC and comorbidity burden was transcribed from the from the hospital electronic medical records.

Results
27.27% (n=32) of the total population died during the study period with a mean duration of length of follow up in LCC being 363 days (ranging from 23 to 1716 days). Thus, the cohort was divided into 2 groups; 96 patients in the alive group and 36 in the deceased group. There was statistically significant difference in CFI and CCI between both the groups as shown in table 1.

Conclusion
CFI and CCI scores are simple clinical tools that are predictive of mortality in CKD patients in low clearance/pre-dialysis clinics and can be used objectively in informed decision making for suitability for renal replacement therapy. Both CFI and CCL can be integrated into the EMR allowing real time assessment in this Real world study.

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‘Keeping an eye’ on hydroxychloroquine use in the renal clinic

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Introduction

International guidance recommends all patients with lupus nephritis receive hydroxychloroquine, unless there is a specific contraindication[1]. This is based on the multi-ethnic LUMINA studies which identified a survival benefit with hydroxychloroquine in SLE[2]. Hydroxychloroquine use is also indicated for other rheumatological diseases, many of which are associated with renal impairment and are therefore encountered in the nephrology clinic.

In 2018 the Royal College of Ophthalmologists published guidance on screening for hydroxychloroquine retinopathy to reduce risk of ocular toxicity[3]. All patients planning to receive long term therapy should receive a baseline eye examination within 1 year of starting treatment.

The aims of this quality improvement project (QIP) were:

1. To establish the frequency of hydroxychloroquine use in our renal unit
2. To establish rate of referral to ophthalmology services for ocular toxicity
3. To deliver an intervention to improve referral rates to ophthalmology for patients with lupus nephritis receiving hydroxychloroquine
4. To inform patients of the benefits and potential side effects of hydroxychloroquine

Methods

All patients receiving hydroxychloroquine were extracted from Renal Plus, the electronic database for renal patients in our renal unit. All patients with ‘lupus’ or ‘SLE’ in their problem list were also extracted.

Electronic records of patients receiving hydroxychloroquine were evaluated to establish if they were under ophthalmology review. For any patients with lupus nephritis receiving hydroxychloroquine not under ophthalmology review, an entry was made on Renal Plus prompting the clinician who next saw the patient to refer to ophthalmology. Referral of patients with a rheumatological indication for hydroxychloroquine was beyond the scope of this project (guidance states that responsibility of referral should lie with the initiating prescriber). A patient information leaflet to inform patients of the benefits of hydroxychloroquine use and potential side effects was also developed.

Reassessment of the proportion of patients referred to ophthalmology will be made 4 months after the study intervention.

Results

121 patients taking hydroxychloroquine were identified in our renal unit (which provides services for a catchment population of 1.26 million). 46% (56/121) patients taking hydroxychloroquine had lupus nephritis (see figure 1). An eGFR <60ml/min/1.73m2, described as a ‘severe risk factor’ for ocular toxicity[3], was present in 56% (68/121) of patients on hydroxychloroquine (see table 1). 54% (30/56) of patients with lupus

nephritis prescribed hydroxychloroquine had not been referred to ophthalmology prior to the QIP intervention. The post-intervention data has not been collected at the time of writing.

Discussion

The unsurprisingly high prevalence of excretory renal impairment (eGFR <60/min/1.73m2) in this study demonstrates that our cohort is a high risk group warranting close ophthalmological monitoring. It is important to note that hydroxychloroquine retinopathy is more frequent than previously reported with a prevalence of approximately 7.5% that can increase to 20-50% after 20 years of therapy[4]. The majority (54%) of patients with lupus nephritis prescribed hydroxychloroquine had not been referred to ophthalmology, as recommended by the latest guidance, prior to the QIP intervention. We anticipate that our intervention will improve rates of ophthalmology referral.

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Treatment preferences of older people deciding between dialysis and comprehensive conservative care – the UNPACK qualitative study

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Background

Older people with comorbid conditions deciding how to prepare for kidney failure face preference-sensitive decisions: the 'right' path depends upon what they consider important. Eighty-percent of UK older adults starting kidney replacement therapy receive haemodialysis.[1] Half die within three years,[1] and less than 20% receive a transplant.[2] Life-extension averages 18-months compared with conservative care (CC), but the least-well gain less.[3] Treatment is burdensome and quality of life - and death - are often poor.[4] Knowing what drives decisions between kidney failure treatment pathways could inform development of better-fitting care. This qualitative study supplements existing evidence by focussing on older adults with stage-5 chronic kidney disease. A future discrete choice experiment will quantify the trade-offs individuals make between the treatment characteristics identified as important.

Methods

Participants with eGFR<15 aged over-80 years, or over-65 with ≥2 comorbidities/a WHO performance status ≥3 were recruited from three UK renal centres. Purposeful sampling maximised variation in participant clinicodemographics.

Semi-structured interviews were conducted in participant's homes by an interviewer unknown to them (BH). Interviews were audio-recorded and anonymised transcripts were thematically analysed using constant comparative techniques, derived from grounded theory. Preliminary analysis is presented.

Results

Fifteen interviews (eight male, seven female) were conducted before saturation was identified (no new themes emerging). Participant age ranged from 65 to 90 (median 81); with a median eGFR of 12 (IQR 9.8-13.8). Nine participants were preparing for dialysis, six CC. Four relevant themes were identified: death, uncertainty/inevitability, decisions and trades (table).

- 'Death' reflects participants' descriptions of acceptance of the end-of-life. Especially those anticipating CC expressed a sense of readiness.
- 'Uncertainty/inevitability' reflects descriptions of unavoidable kidney failure which may yet be preceded by death. The uncertain onset of kidney failure was acknowledged as a source of frustration and confusion.
- 'Decisions' reflects descriptions of deciding between treatments for kidney failure. Some participants described being steered towards clinical courses of action. Others reported autonomous decisions. Some individuals expressed reservations about whether they were preparing for the right treatment.
- 'Trades' reflects evidence of weighing-up treatment aspects. Trades were often framed in terms of 'being able to do things'. Life-expectancy, treatment location and frequency, and functional ability were key characteristics.

Conclusion

Older people with comorbid conditions anticipating kidney failure recognise uncertain futures and closeness to death. They appreciate treatment benefits and burdens and weigh them up. They experience differing levels of agency during planning, but appear able to express their treatment and health outcomes preferences. This work provides qualitative information about their preferences for kidney failure

treatments, but does not quantify importance. Quantitative work building on the themes identified is underway, using a discrete choice experiment.

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Patient outcomes of a 2-exchange assisted continuous ambulatory peritoneal dialysis (aCAPD) programme for frail older patients

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Introduction: Recognising the burden that hospital haemodialysis places on frail patients in terms of time away from home, transport and haemodynamic shifts, we have developed a 2-exhange aCAPD programme to enable this group to receive a home-based therapy. Eligible patients for the programme include frail, mostly elderly patients who are symptomatic from their advanced kidney disease and have residual kidney function. The focus of the programme is to optimise patients' symptoms while avoiding a high treatment burden. At three months each patient has a follow up conversation with their consultant to discuss symptoms, treatment burden and to plan their future care. This is a quality improvement study to review the outcomes of the programme.
Methods: In this observational study, all 2-exchange aCAPD patients attending their routine review are approached for assessment. Frailty was assessed with the Edmonton Frail Scale (EFS), cognitive impairment with the Montreal Cognitive Assessment (MOCA), treatment satisfaction with the Renal Treatment Satisfaction Questionnaire (RTSQ) and symptoms with the Palliative Outcome Scale-Symptom Renal (POS-S Renal). Data was collected via direct patient interviews and assessments as well as a chart review.
Results: From September 2019, of the 17 patients currently receiving 2-exchange aCAPD, results have been collected from 41% (N=7) to date. The mean age is 82 years (range77-88) and 29% are male. 43% are diabetic. Figure 1 demonstrates the high number of co-morbidities in the population. Only 1 patient had previously received renal replacement therapy in the form of CAPD prior to switching to aCAPD. The mean time on 2-exchange aCAPD was 11months (range 0-24). 6 patients are receiving 2-exchange aCAPD 5 days a week while 1 patient receives it every day. 57% had at least mild frailty with an EFS of >8/17 (range3-11). 71% had memory impairment with a MOCA <26/30 (range 14-30). The median number of hospital admissions was 1 (range 0-3). 43% have travelled outside of the UK (with family support) since commencing assisted CAPD. 83% reported high satisfaction with treatment with a RTSQ of >55/66 (median 62/66). 57% reported a low symptom score with a POS-S Renal <10/68 with a median of 8 (range 7-27). Pain, lack of energy and poor mobility were the most commonly reported symptoms.
Discussion: Our results demonstrate a frail, elderly population with multiple co-morbidities and memory impairment. Although our population number is small and they are not matched to the assisted PD and HD populations published in the FEPOD study (1) they do compare favourably to both groups in terms of the RTSQ score; median of 62 vs 55 for assisted PD and 62 vs 51 for HD. Our population also compare favourably to both groups in terms of symptoms as measured by the POS-S Renal score; 8 vs 14 for assisted PD and 8 vs 16 for HD.
Conclusions:
Patients receiving 2-exchange aCAPD have a high treatment satisfaction and low symptoms score compared to previously published data. Assessment of our programme indicates that 2-exchange could potentially become the dialysis modality of choice for the frail renal patient.

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In-patient dialysis sessions are associated with higher ultrafiltration rates

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Introduction

High ultrafiltration rates and short dialysis treatment times are associated with morbidity and mortality in prevalent haemodialysis patients. The limited studies of the delivery of in-patient haemodialysis have, while demonstrating shortened inpatient treatment time, concentrated mainly on small molecule clearance. We set out to evaluate the delivery of haemodialysis to all in-patients with particular attention to the prescription of time and fluid removal.

Methods

In a single-centre large renal unit we prospectively collected haemodialysis data on all in-patients over a fourteen-day period. Ultrafiltration volumes are reported as percentage of target weight, for in-patients this was defined as the post-dialysis weight for each dialysis session. An unmatched cohort of stable dialysis patients was identified from our centre and dialysis data for a period of one year was used as a comparator.

Result

During the observational fortnight 69 patients (aged 42–88, mean 65 years, 55% male) undertook a total of 215 in-patient dialysis sessions. The median number of dialysis sessions was 2 sessions (range 1 to 10) sessions over the fortnight. In this cohort, 26 were incident to haemodialysis (<90 days since haemodialysis start), comprising 60 of the 215 dialysis sessions.
In-patient measurements were compared against 12 828 out-patient dialysis sessions in an unmatched cohort of 100 patients (aged 28–89, mean 65 years, 54% male).
The achieved volume of ultrafiltration was similar with in-patients, (2.7 ±1.5% of target weight [mean ±sd]), as compared to out-patients (2.8 ±1.3% of target weight, p=0.14). However, dialysis session time was significantly shorter with the in-patient group (3.0 ±0.8h) than in out-patients (4.0±0.5h, p<0.001). In keeping with this, ultrafiltration rates were higher but also more widely distributed with in-patients (8.4 ±4.4 ml/h/kg) as compared with out-patients (7.1 ±3.3 ml/h/kg, p<0.001))
Dialysis session time remained significantly shorter even when excluding incident haemodialysis in-patients (3.1 ±0.8h). Excessive ultrafiltration (ultrafiltration rate >13ml/h/kg) occurred more frequently with in-patient than out-patient sessions (16% vs 4%, p<0.001). Symptomatic hypotension was reported in 3% of in-patient sessions.

Discussion

In-patient dialysis, when compared with out-patient dialysis, is associated with shorter dialysis sessions and as a result, higher ultrafiltration rates despite similar target ultrafiltration volumes. It is unclear whether shorter dialysis treatment times relate to factors arising from the prescription, the logistics of in-patient

delivery or patient factors. Novel approaches to prescribing inpatient dialysis moving away from dry weight measurements may reduce extremes of ultrafiltration.

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Primary cutaneous Nocardia infection in a renal transplant patient

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Nocardiosis is a rare but recognised opportunistic infection in solid organ transplant patients. Infection is either by direct inoculation or haematological spread after inhalation of the bacteria from soil. The incidence of Nocardia infection in renal transplant cases is 0.2% and usually causes disseminated infection. Infection is more common within the first year after transplantation, if heavily immunosuppressed or with a history of Cytomegalovirus (CMV) viraemia.

A 52-year-old gentleman with a history of deceased donor renal transplant in 2011, on tacrolimus and azathioprine, presented in December 2017 with an abscess on his left hip after localised trauma, but with no skin damage. His past medical history included type 2 diabetes, (the cause of his end-stage renal failure), CMV viraemia in 2012 and paraplegia from transverse myelitis. Initially the patient was treated for an infected haematoma, but subsequently developed further abscesses. The abscesses were incised and drained and a CT chest, abdomen and pelvis revealed no underlying malignancy or disseminated infection. Wound and pus swabs, as well as tissue culture showed no growth, so the patient received multiple courses of clarithromycin. On the patient's third admission, a pus swab revealed a light growth of Nocardia farcinica. The patient received three months of Co-trimoxazole and Linezolid however due to complications, he completed treatment with ciprofloxacin.

The patient re-presented three months later with further abscesses affecting his groins, buttocks, ankle and back. Swabs, skin biopsy and tissue culture were performed which again showed no growth. An aspiration of one abscess again showed a moderate growth of Nocardia farcinica. The patient was treated with three months of intravenous Imipenem and six months of Moxifloxacin. The abscesses did resolve. Given the recurrent nature of the abscesses he underwent further imaging with repeat CT, an MRI brain and a transoesophageal echo, all of which were negative.

Nocardia farcinica typically causes disseminated infection in transplant patients, however this case demonstrates it can also cause primary cutaneous infection. Furthermore, due to difficulties culturing it, it can easily be mistaken for simple skin infections. Treatment is often challenging and requires prolonged courses of intravenous antibiotics. The experience detailed in this case report point to a requirement to include Nocardia infection in the differential diagnosis of any transplant case presenting with abscesses, and not simply those in which the risk factors outlined above are displayed.

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The prevalence and potential aetiological factors associated with restless legs syndrome in patients with chronic kidney disease

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Background and Aims
Restless leg syndrome (RLS) is strongly associated with chronic kidney disease (CKD). It is defined as abnormal movement of limbs, associated with periods of inactivity and occurring in circadian fashion. RLS affects nearly a quarter of the CKD population negatively impacting quality of life and sleep quality. Despite being common there remains a poor understanding of both causative factors in RLS and treatment options. Low iron levels, high body mass index, calcium levels, serum phosphate, C-reactive protein, low haemoglobin levels and vitamin D have been found to be of significance in RLS. Other predictors include duration of dialysis, smoking, presence of diabetes mellitus and hypertension.

This study aimed to estimate the prevalence of RLS in a local population of CKD patients and identify possible factors that may contribute to RLS.

Methods
Patients who met study criteria were recruited from the local dialysis units and renal clinics. The International RLS Study Group rating scale and criteria were used to diagnose and asses if patients suffered from RLS and its severity. Laboratory data, demographic data and co-morbidities were recorded, and potential associations examined. Data was the analysed using independent sample t-testing, Mann-Whitney U test and Chi-squared test. P value for significance was set as 0.05.

Results
A total of 212 patients with CKD 4 (92); CKD 5 (14) or on dialysis (106) were examined. Prevalence of RLS was lowest in CKD4 (27.2%) followed by CKD5 (28.6%) and highest in dialysis patients (33.6%).

In those with CKD non dialysis female gender was a significant predictor of RLS ($p<0.005$). The presence of CVD was protective against RLS ($p = 0.044$). RLS correlated with high ferritin concentrations and low eosinophil counts. Mean eosinophil count was 0.240 (95% CI 0.198-0.282) in non-RLS and 0.095 (95% CI 0.054-0.136) in RLS group with $p<0.01$. Mean Ferritin was 177.45 (95%CI 129.19-225.72) in non-RLS and 323.89 (95%CI 155.78-492.00) in RLS group with $p=0.015$.
In the dialysis group prevalence of RLS was again higher in females with 23 (47.9%) being affected compared to 18 (28.6%) of males but failed to reach statistical significance ($p=0.056$). In the dialysis population mean neutrophil count was 4.65 (95%CI 4.23-5.07) in non-RLS population and 6.35 (95% CI 5.06-7.65) in RLS population ($p=0.03$).
Discussion
Rates of RLS in the studied population were 3-8% higher compared to results in a previous systematic review. The difference may be due to bias in taking part in the study. Female gender and paradoxically raised ferritin (potentially related to inflammation) were significantly associated with RLS. Eosinophil counts were also lower in the CKD population with RLS while neutrophils were elevated in the Dialysis population. This may perhaps reflect an underlying inflammatory process rather than allergic process.

Conclusion

The study has demonstrated that RLS remains a significant patient reported outcome in patients with CKD and may be related to underlying inflammation. Targeting this pathway may be useful.

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Treatment burden and capacity in older people with chronic kidney disease: a qualitative study

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Background
Older individuals (aged 60+) with chronic kidney disease (CKD) frequently have multiple comorbidities that together represent 'disease burden'. Demands on patients arise not only from symptoms, but from the workload incurred in managing these conditions (including arranging and attending appointments, having tests, taking medications) and their impact. These have been described as the 'treatment burden' and are often driven by individual disease guidelines/pathways. An individual's ability to manage them has been described as 'capacity'. While early CKD may not entail much treatment burden, progression to stage G3b-G5 may lead to new disease management requirements, including lifestyle change, greater clinician involvement and more frequent monitoring. The nature and extent of treatment burden and factors that support capacity for older individuals with CKD are not well understood.
Methods
Semi-structured interviews were conducted with 29 individuals aged over 60 with varying degrees of CKD severity (stage 3b-5, not requiring renal replacement therapy) to explore treatment burden and capacity in the context of CKD stage and comorbid conditions. One primary care and one secondary care focus group with multiprofessional healthcare teams working with CKD patients were conducted to explore their perceptions of patients' treatment burden and capacity. Interviews and focus group discussions were recorded and transcribed verbatim. Inductive thematic analysis was used to analyse the data.
Results
Eighteen participants were recruited in secondary care and 11 in primary care. Mean age of participants with CKD was 75 years. Sixteen participants were male and 13 female. Eleven, 12 and 6 were CKD stage 3a/3b, 4 and 5, respectively. Treatment burden was categorised into 4 themes: (a) understanding CKD, its treatment and consequences, (b) adhering to treatments and management (such as lifestyle changes), (c) interacting with others including health professionals and family in the management of their CKD and (d) monitoring treatments and their effects. Experienced burden and capacity were compounded by care deficiencies, existing co-morbidities and other life responsibilities such as caring for relatives. Capacity was categorised into 5 themes: (a) personal attributes (such as optimism, pragmatism), (b) social network (including family, friends, carers, service providers), (c) financial resources, (d) life responsibilities, and (e) environment (geographical distance to unit, adaptations to home).
The secondary care group included consultant nephrologists, nephrology specialist nurses, research nurse, renal dieticians, renal pharmacist, and the multidisciplinary team (MDT) coordinator (n=10). The primary care focus group consisted of general practitioners from a single practice. Health professionals noted patient characteristics (anxiety, sociodemographic factors), appointment attendance (travel, parking, waiting time), multiple medication, and system factors (poor communication with patients, fragmented care, multiple care providers) contributed to treatment burden. Continuity of care (nephrology) and taking ownership of a treatment plan were considered to enhance capacity.
Conclusion
Patients with CKD experience considerable treatment burden, which is influenced by individual-level and system-level factors. Better infrastructure (for example more effective transport services), more holistic

care, and provision of medication aids may help reduce patient workload and enhance patient capacity which in turn will improve patient experience, adherence and health-related outcomes.

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Cellular senescence inhibits renal regeneration after injury with senolytic treatment promoting repair

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Introduction
The ability of the kidney to regenerate successfully after injury is lost with advancing age, chronic kidney disease and after irradiation. The factors responsible for this reduced regenerative capacity and the increased propensity towards fibrosis remain incompletely understood.

This study addressed the hypothesis that the presence of chronically senescent renal epithelial cells generated in response to ageing and kidney disease drives fibrosis and impairs the renal regenerative response after subsequent acute renal injury.

Materials and Methods
Analysis was undertaken on published transcriptomic datasets and staining was performed on anonymised human renal biopsies at Edinburgh Royal Infirmary. In vitro studies were undertaken in human proximal renal tubular epithelial cells (PTECs), using 10Gy gamma-irradiation to induce senescence. In vivo studies compared baseline structure, function and injury responses in young, young-irradiated and naturally-aged 2 year old mice after ischaemia reperfusion injury (IRI) to the kidney . Administration of the Bcl2/w/xL inhibitor ABT-263 which has been shown to selectively deplete senescent cells was used in vitro and in vivo to test its selectivity in senescent vs healthy PTECs in vitro and its safety and efficacy in in vivo studies.

Results
Consistent with the hypothesis, studies of human renal disease demonstrated that senescence biomarkers CDKN1A and CDKN2A rose significantly in kidney disease at a transcriptomic level (Fig A-B). Staining for p21cip1 protein produced by CDKN1A demonstrated significant elevation in human renal biopsies from patients with impaired kidney function (Fig C). In vitro and in vivo studies showed that senescent renal epithelial cells generated in response to irradiation and with physiological aging produce multiple senescence-associated secreted factors including TGFβ1 (Fig D-H). Senescent epithelial cells displayed highly selective sensitivity to the effects of ABT-263 (Fig G). In vivo studies (Fig I-M) showed that animals with increased numbers of senescent cells developed augmented fibrosis and reduced tubular proliferative capacity after injury. Treatment with the Bcl2/w/xL inhibitor ABT-263 reduced senescent cell number and restored a 'young' regenerative phenotype to kidneys, reducing fibrosis, increasing healthy kidney weight and reducing markers of senescence in aged and young-irradiated mice exposed to further injury (Aged: Fig N-R, Young-Irradiated: Fig S-V).

Conclusions
Senescent cells are key determinants of renal regenerative capacity and represent important emerging treatment targets to protect aging and vulnerable kidneys in man.

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Soft target weight: a novel haemodialysis protocol which allows dry weight variability and reduces excessive ultrafiltration

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Background
Excessive ultrafiltration, in terms of either a large volume or a fast rate, is associated with intra-dialytic symptoms, loss of residual function and mortality in haemodialysis patients. A major contributor to excessive ultrafiltration is within-individual variation in ultrafiltration volume, which arises from variation in pre-dialysis weight, and the concept of achieving a fixed target weight by the end of dialysis. Haemodialysis protocols which allow variable target weight have not been studied.

Methods
Weight variation was observed in haemodialysis patients and healthy controls to estimate the proportion of pre-dialysis weight variation due to dry weight variation. These estimates were used to derive a novel protocol for setting ultrafiltration. Mathematical modelling was used to simulate the effect of the novel protocol on haemodialysis parameters.

Results
Amongst 20 haemodialysis patients mean(sd) pre-dialysis weight was 102.98(1.03)% of target weight. Amongst 10 heathly individuals mean(sd) daily weight was 100.0(0.71)% of average weight. A four-component model of pre-dialysis weight was derived using these estimates, in which the best estimate of pre-dialysis excess fluid is the midpoint of excess weight and average fluid gain, and a novel protocol (termed "soft target-weight") proposed in which this estimate is used to set ultrafiltration for haemodialysis. In simulations designed to model the effect on dialytic weight changes, the novel protocol reduced ultrafiltration variation by more than half (0.59 vs 1.28% of target weight, $p<0.001$), without increasing the variation in post-dialysis fluid excess. Excessive ultrafiltration rates (over 13ml/h/kg) were far less frequent using the soft target weight protocol (1.6% vs 7.1% of sessions, $p<0.001$).

Conclusion
Considering dry weight as variable allows the development of a novel protocol for ultrafiltration in which target weight does not have to be achieved: it is therefore a soft target. This protocol is predicted to substantially reduce ultrafiltration variation, therefore limiting excessive ultrafiltration rates. Clinical studies are planned to evaluate this protocol, which is a zero-cost intervention with the potential to improve symptoms as well as clinical outcome for haemodialysis patients.

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Endothelial glycocalyx heparan sulphate plays a key role in glomerular filtration barrier function in health and is amenable to therapeutic targeting in diabetes

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Introduction: An estimated 647 million people worldwide will have diabetes mellitus (DM) by 2040, which causes life altering microvascular complications, such as diabetic nephropathy (DN). The endothelial glycocalyx (eGlx) is a protective layer that lines the luminal side of blood vessels and contains proteoglycans (core proteins with glycosaminoglycan (GAG) sidechains) that help maintain vascular permeability, and are damaged during DM. Heparanase degrades the GAG, heparan sulphate (HS), and is upregulated in DN. Heparanase inhibition and knock-down both prevent the development of DN. The objective of this study was to show that HS, specifically within the endothelial glycocalyx, is important in glomerular barrier function and that prevention of its shedding, by a novel class of heparanase inhibitor (HI),1 is protective in DM.

Methods: Endothelial glycocalyx HS was removed in mice by i.v injection of heparinase III, or by knock-down of Ext-1 (an HS biosynthesis enzyme) in endothelial cells using Tie2rtTA, tet-O-Cre, Ext-1fl/fl (Ext-1fl/fl) mice. A mouse model of type 2 diabetes (db/db) was used whereby HI or vehicle was given, i.p. daily, from 9-11wk of age. Mice were Ringer perfused for glomerular permeability studies or Alcian blue/ glutaraldehyde perfused for electron microscopy (EM).Glomeruli were isolated from ringer perfused kidneys and apparent albumin permeability was measured in single capillaries from individual glomeruli.2 Alcian blue perfused kidneys were processed for EM, imaged, and eGlx depth and percent coverage were measured using ImageJ. Urine albumin creatinine ratios (uACR) were measured at endpoint.

Results: A significant reduction in glomerular endothelial glycocalyx depth and coverage was seen with heparinase III treatment and Ext-1fl/fl mice. These were associated with significant increases in glomerular albumin permeability. In diabetic mice, eGlx depth and coverage was significantly reduced and uACR was significantly increased. Diabetic mice treated with HI no longer had a significant increase in uACR and eGlx depth/coverage and glomerular albumin permeability was significantly restored when HI was given.

Conclusions: We confirm that endothelial glycocalyx HS plays a direct role in the glomerular filtration barrier demonstrated by targeted HS removal. We also demonstrate that heparanase inhibition in DN, using a novel and clinically relevant inhibitor, directly enhances the glomerular endothelial glycocalyx, resulting in normalised glomerular albumin permeability.

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Ixazomib Associated Thrombotic Microangiopathy (TMA) in a Myeloma Patient

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Introduction

Proteasome Inhibitors (PIs) are now a cornerstone in myeloma treatment. Ixazomib increases median time of progression-free survival when used in treatment of refractory/ relapsing multiple myeloma (MM). Drug-induced TMA (DITMA) is increasingly recognised as an adverse effect of PI treatment with most cases linked to Bortezomib and Carfilzomib. TMA, characterised by microangiopathic haemolytic anaemia and thrombocytopenia, can result in organ failure, including acute kidney injury (AKI).

Case study

A 75-year-old female was diagnosed with IgG kappa MM 4 years previously and had a relapse with serum kappa light chain of 309.6 mg/L. She was started on treatment with Ixazomib, Lenalidomide and Dexamethasone. Four days later she was admitted with AKI (creatinine of 278 µmol/L) and was oliguric with urine output of 300 mL/ 24 hours, vomiting and diarrhoea. No other new medication was taken. Ultrasound showed no urinary tract obstruction. Urinalysis showed 2+ blood and 2+ protein, urine protein: creatinine ratio (uPCR) was 57 mg/mmol. Stool culture was negative. A full blood count showed thrombocytopenia and anaemia (Table 1). Despite intravenous rehydration, her renal function continued to deteriorate reaching a creatinine peak of 406 µmol/L.

Renal biopsy revealed the presence of TMA in light microscopy (LM), subsequently the electron microscopy (EM) reported myeloma casts (Figure 1). Results of haemolytic screen can be found in the table below. Following drug discontinuation her renal function stabilised, then partially. She remains in CKD stage 4 and currently under regular follow-up in the low clearance clinic.

Discussion

TMA remains a rare cause of kidney disease in MM patients. Although MM alone is a potential underlying cause of TMA, the timing of AKI coincides with initiation of the new drug makes DITMA a likely diagnosis. So far there are only 3 case reports of association between Ixazomib and TMA. The patient was treated with steroids, Rituximab and plasma exchange in the first report1, FFP and plasma exchange in the second one2 and Eculizumab in the latest one3. By comparison, our patient's renal function was improving following discontinuation of treatment and no plasma exchange was initiated. Out of the two main mechanisms of DITMA that have been described (immune-mediated and dose-dependent toxicity), there is a possibility that it is an immune response as she developed AKI within 21 days after treatment initiation.

This case highlights the importance of recognising DITMA as a potential cause of renal impairment in patients treated with Ixazomib as early recognition can influence their outcome significantly. It also underlines the importance of histological diagnosis for AKI in MM patients. The most important step is to discontinue the implicated drug and refrain from its further use in the future.

Conclusion

To our knowledge, this is the first report of drug-induced TMA due to Ixazomib where improvement in renal function is achieved solely with drug discontinuation.

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Transplantation of elderly patients is associated with inferior outcomes compared with younger patients.

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Introduction
Transplantation of older patients is increasing as the number of older people offered renal replacement therapy grows. Which older recipients benefit from transplantation (from a prognosis and quality of life perspective) is not always clear. The aim of this retrospective study was to review patient outcomes by age, to help inform both clinicians and patients.

Methods
1738 patients all receiving Alemtuzumab induction and tacrolimus monotherapy were studied. Transplant outcomes were obtained from a prospectively maintained registry.

Results
1232 <60, 415>60-70 and 91>70 year olds were transplanted over a 15 year period. Older patients were more likely to receive a deceased donor transplant and have diabetes ($p<0.01$). Younger patients were more likely to receive a live donor pre-emptive transplant and have an underlying diagnosis of glomerulonephritis ($p<0.01$). Older patients had a longer median length of stay post transplant at 9(8-13), 11(8-17) and 12.5(10-20) days, in the <60, >60 and >70 groups respectively, $p<0.01$.

Transplant outcomes are shown in the table attached.

Discussion
This study shows that transplantation does not offer the same prognosis for older patients. Despite uniform immunotherapy, older patients were more likely to have infection but lesser risk of rejection. Further evidence is needed to determine the best management in terms of RRT modality, patient selection, and how to tailor immunotherapy in the older population.

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Can Far-infrared therapy improve pain associated with vascular access whilst on haemodialysis? A short pilot study.

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Introduction
Pain in vascular access at the time of dialysis is a concern for some patients on haemodialysis (HD) and an important clinical goal for improving quality of life. Far-infrared (FIR) therapy has been shown to reduce AVF occlusion rates, needling pain, improve vascular access blood flow, AVF diameter and primary patency. Our unit has a number of portable FIR machines for patients to use at home primarily, but we wished to assess if FIR reduced access pain whilst on HD in centre.
Methods
Using a questionnaire, we visited the notion that FIR therapy would be useful to help relieve pain whilst on HD and to see if there were any other benefits.
39 patients were identified across a main unit and 3 satellite units. They each had FIR therapy for 40 minutes during HD 3 times/wk. There were 20 males and 19 females. Access was as follows; 17 radio-cephalic AVF, 19 brachio-cephalic AVF, 1 brachio-basilic AVF and 2 Arterio-venous Grafts (AVG) the majority of the patients had an established AVF/AVG and 6 patients had a newly formed AVF. The patients were asked after a minimal 4 weeks of FIR therapy to complete a short questionnaire.

Results
Prior to the use of FIR most patients questioned reported a degree of pain was over needling sites, in the shoulder area or over the whole arm (on the AVF arm). In addition to this the pain was at various stages of treatment, during HD, post HD as well as throughout the whole HD session.
31 patients reported a reduction in the pain with the use of FIR that they had either during dialysis or cannulation of AVF.
8 patients did not have a reduction in pain but 4 of these patents did not report any pain prior to using FIR and used the FIR following infiltration or to improve AVF prior to needling.
7 patients used the FIR therapy for bruising following infiltration and they felt the bruising reduced more quickly than they thought.
4 of these patients had used the FIR at home and had found it easy to use.
1 patient did not use the FIR until he had needling problems and needed radiology intervention, but whilst waiting for the procedure found that FIR was of benefit.
3 patients had their tunnelled dialysis catheters removed as they tolerated cannulation with no concerns.
1 patient stated that they would not want to carry out any session of HD without FIR therapy.

Discussion
It is clear that the FIR therapy benefited the majority of our patients in terms of reduction of pain and in some cases allowed more tolerance during cannulation. FIR may also improve bruising from needling or infiltration and may also be useful for patients who need regular interventions and experience pain whilst waiting for treatment. FIR is a simple non-invasive treatment to improve a patient's quality of life that consumes little nursing time with no extra input or consumables.

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Service Evaluation to describe fluid assessment characteristics in patients with stage-3 Acute Kidney Injury (AKI) requiring dialysis

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Introduction
Acute Kidney Injury is characterised by sudden loss of renal function with numerous clinical causes. Kidney hypoperfusion and volume depletion of the systemic circulation is the most common cause of AKI (36.5%) (1). Whereas established AKI with oliguria may lead to fluid accumulation and potential for peripheral and pulmonary oedema. It has been repeatedly demonstrated that there is a link between fluid overload and mortality, as well as increased morbidity and length of stay (2). The impact of robust fluid assessment including the use of bioimpedance in patients with stage-3 AKI is not well researched.

Methods:
A service evaluation was undertaken to evaluate the routine fluid assessment performed in stage-3 AKI patients requiring dialysis in a single centre with a large renal population. Prospective and retrospective data was collected from the January to June 2019. Descriptive statistics were used to analyse the data. Exclusions include advanced Chronic Kidney Disease (CKD) and critical care admission prior to starting Haemodialysis (HD).

Results:
Twenty patients were included in the study. 70% (n=14) were male with overall average age of 72 (SD=11) years old. Most common comorbidities in these patients are hypertension (45%), Type 2 diabetes (55%) and cancer (45%). Nine patients (45%) were described as fluid overloaded and 9 patients as dry/dehydrated on admission via a clinical assessment (falling to five at initiation of HD). The most common cited causes of AKI were sepsis, dehydration/hypovolaemia and medication. These individual and combined factors contributed to the development of AKI (8 patients).
Six months post-admission, four patients (20%) were considered end-stage renal disease. Mean age was 68 (SD=10) with Charlson comorbidity index, suggesting a likely 2% survival at 10 years. Ten patients were alive and not on HD (50%), mean age was 77 (SD=11) with an estimated 2% survival at 10 years. Six patients died (30%) within 3-months of initiating HD (5-88 days) (mean age 67, SD=10) and an estimated survival of 53% at 10years. Mean NEWS2 score at time of HD was low, at 1 (SD=1). Six patients were readmitted within 30 days. Mean length of stay 22 days (SD=20).

Discussion
This service evaluation provides a snapshot of patient characteristics and fluid assessment of patients with stage-3 AKI requiring HD. The findings are comparable to other studies with mortality cited for stage-3 being at 33.3%(3). Renal replacement therapy is slightly higher than in other literature 14%(4). The lack of sensitivity of NEWS2 score for patients with AKI is supported by Faisal, Scally (5), who stated that NEWS has little role in the escalation of patients with AKI. Compounded with the younger age of the patients who died and their greater estimated chance of survival, further exploration is required to identify a more robust method of identifying deterioration in this group.

Conclusion

There is evidence to suggest that NEWS2 is not useful at detecting deterioration in patients with stage-3 AKI. Further exploration is required to determine if robust fluid assessment could improve management in these patients.

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The fourth “T”

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Introduction

Uraemic pericarditis is well described in patients with acute renal failure, but is not often considered in the differential of haemodynamic instability during haemodialysis. Although uncommon, progression of uraemic pericarditis to tamponade must be promptly recognised to ensure survival. We report a case of cardiac tamponade during acute haemodialysis, which we believe has a number of important learning outcomes for the renal community.

Case Summary

A 65-year-old Caucasian male with rapidly progressive diabetic nephropathy was transferred to our tertiary renal unit with fluid overload and refractory hyperkalaemia. He had presented to the referring hospital the previous week with an infected diabetic foot ulcer, complicated by acute on chronic renal failure. He required a session of haemofiltration to manage hyperkalaemia on the local intensive care unit. Echocardiography revealed moderate impairment of LV function, but no pericardial effusion. He had been stepped down to the ward for 3 days but had not shown any renal recovery.

On examination, the patient was drowsy, disoriented, and grossly fluid overloaded, with evidence of pulmonary oedema and anasarca. He was haemodynamically stable and saturating at 94% on 4L/min nasal cannulae. There was no pericardial rub and serum urea was 24 mmol/L. A temporary femoral line was inserted to facilitate acute haemodialysis. On bleed out into the circuit (roughly 150mls), he became hypotensive, bradycardic and hypoxic. This progressed to pulseless electrical activity despite delivery of atropine, and return of the circuit. Intubation and cardiopulmonary resuscitation proceeded, including delivery of a 250ml fluid bolus. Return of spontaneous circulation was achieved after 5 minutes. Bedside ultrasound revealed a 3-4cm deep pericardial effusion with fibrin stranding, causing clear tamponade with right ventricular diastolic collapse. Whilst awaiting transfer to cardiac theatres, the patient became periarrest and we proceeded to urgent ultrasound-guided bedside pericardiocentesis on the renal ward using a standard central line kit. 170mls of haemorrhagic serous fluid was drained, with restoration of blood pressure and resolution of echocardiographic features of tamponade. The central line was left in the pericardial space for 24 hours on the intensive care unit, until it stopped draining. The patient was discharged home 2 weeks later with ongoing outpatient haemodialysis three times weekly and remains well.

Discussion

This case highlights the need to consider uraemic pericarditis with pericardial effusion as a cause of haemodynamic compromise on haemodialysis. Important learning points include the rapidity of effusion development; the minimal change in intravascular volume required to precipitate tamponade; the relatively low serum urea (which is only a marker of “uraemia”); and the lack of clinical clues. A rub can only be heard when there is minimal fluid between pericardial layers, and autonomic neuropathy may prevent compensatory tachycardia. Bedside ultrasonography is available on most renal units for vascular access and

renal biopsy. We suggest that renal physicians consider training in limited bedside echocardiography, eg subcostal view with an abdominal probe, to facilitate diagnosis of this condition.

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Validating a method of continuous non-invasive arterial pressure measurement during haemodialysis

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Validating a method of continuous non-invasive arterial pressure measurement during haemodialysis.

Introduction:
Intradialytic haemodynamic instability is a significant clinical problem, leading to end-organ ischaemia and contributing to morbidity and mortality in haemodialysis patients. Non-invasive continuous blood pressure monitoring is not part of routine practice but may aid detection and prevention of significant falls in blood pressure during dialysis. In this study we sought to perform initial validation of a novel method of continuously estimating blood pressure using pressure sensors in the extra-corporeal dialysis circuit, which does not require any direct contact with the person having dialysis.

Methods:
Participants >18 years old with a well-functioning arteriovenous fistula were recruited from our prevalent dialysis population. Pressure sensors on the arterial needle and venous bubble trap were used to derive continuous arterial pressure waveforms during dialysis sessions, which were corrected for blood pump speed (derived from the venous line waveform) by Fourier analysis. Data were continuously recorded at a sampling frequency of 1KHz and filtered by a moving average filter with a window length of 5 seconds. These pressure traces were then compared with: i) time-synchronised brachial blood pressure values taken at 30-60 minute intervals; and ii) with reconstructed time-domain blood pressure waveforms from digital artery pulse wave analysis (Finometer, Finopress NOVA) using mean absolute error.

Results:
To date, data from 4 participants have been acquired and analysed. Median age is 59 (IQR 42-78) years and three are male. Three have a radiocephalic and one has a brachiocephalic arteriovenous fistula, none of which had ever required intervention for stenosis.
There was a strong linear relationship between derived pressures from the arterial pressure sensor and brachial blood pressure values (Figure 1a), demonstrating that changes in the derived arterial needle pressure (after correction for pressure waveforms from the blood pump) are proportional to changes in systemic blood pressure ($r=0.92$, $p<0.001$). There was also good agreement within individuals between derived pressures from the arterial pressure sensor and the beat-to-beat blood pressure values from the Finometer; an example is shown in Figure 1b (mean absolute error 5.3mmHg). An additional eight participants have been recruited and will be studied by April 2020.
Conclusion:
In this proof-of-concept study, we demonstrate that it is possible to track changes in blood pressure during dialysis sessions using pressure readings from the arterial needle of an arteriovenous fistula, corrected for dialysis pump flow rate. This method may allow continuous non-invasive estimates of absolute or degree of change in intradialytic blood pressure. Further validation is required in a larger number of dialysis sessions.

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Efficient extended follow-up and its effects on patient questionnaire responses: lessons from the EQUAL study in the UK

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Introduction
The EQUAL study is a European prospective cohort study in elderly patients with chronic kidney disease stage 4, aiming to understand when dialysis should be initiated. 1479 patients were recruited, including 507 from UK centres[1]. Research nurse-led "traditional" follow-up ceased after 4 years in the UK, in which patients answered validated questionnaires: Dialysis Symptom Index, SF-36, and three others. This was converted to "efficient" follow-up with postage from the UK Renal Registry. Condensed versions of the Dialysis Symptom Index and SF-36 were developed into a questionnaire of 80 questions over 8 pages for efficient follow-up, compared to 102 questions over 11 pages in traditional follow-up. Here we describe response and error rates of questionnaires.

Methods
In traditional follow-up, local sites administered patient questionnaires in research clinics three- to six-monthly. After receiving consent for efficient follow-up, questionnaires were administered by post from the UK Renal Registry. Questionnaire response and error rates for six-monthly traditional follow-up and the first efficient follow-up are presented here for UK participants who responded to efficient follow-up. Errors are defined as: a missing answer; missed double-page spread of questions; duplication of answers; and crossing answers out.

Results
Of 83 patients who consented to efficient follow-up, 60 returned a completed questionnaire. Patients were recruited to EQUAL over 4 years and therefore traditional follow-up ranged from 12 to 48 months, average 32.5 months. Response rates across traditional follow-up (Figure 1) steadily fell from 54/59 (91.5%) patients to 0/2 (0%) patients at 48 months. Efficient follow-up was on average 28 months after the last traditional follow-up, and 60/83 (72.3%) patients responded. 51/60 (85%) patients filled in the questionnaire without assistance.

Average error rate per questionnaire increased with time in traditional follow-up (102 questions) from 4.7/102 (4.6%) to 12.5/102 (12.3%) at 42 months. In efficient follow-up, 315/4800 (6.6%) errors were made in 60 questionnaires of 80 questions each. Common errors included patients missing individual questions in 143/315 (45.4% of errors), or missing double-spread pages of questions in 65/315 (20.6%) errors. In 73/315 (23.2%) errors, patients made errors in the Dialysis Symptom Index questions, ticking "no" to experiencing a symptom alongside a quantifier indicating "not at all bothered" by the symptom.

Discussion
Evidence demonstrated possible follow-up fatigue in traditional follow-up. The efficient follow-up questionnaire was shorter than in traditional follow-up, so our comparison has limitations; but increased response rates suggest that sending questionnaires back via post may be more acceptable to patients than attending a research clinic.

The error rate did not increase in efficient follow-up, however mistakes were seen that are less likely with research nurse delivery, such as skipped double-spread pages. Errors in the Dialysis Symptom Index

highlights the importance of choosing appropriate questionnaires for patients, especially as the majority of patients filled in questionnaires without assistance from family. This study adds evidence to considering postage of research questionnaires as a useful form of follow-up, which may make research participation more accessible. Further work will seek to verify these findings with all 507 patients in traditional follow-up.

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Association of postural balance and falls in adult patients receiving haemodialysis: a prospective cohort study.

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Introduction: People receiving haemodialysis (HD) for the treatment of stage-5 chronic kidney disease (CKD-5) are at high risk of falls (1.18–1.6 falls/person-year) and fall-related injuries. Chronic kidney disease (CKD) can negatively impact on the sensory information processing (i.e. visual, proprioceptive and vestibular) required for the fine tuning of postural balance control. Previous research has shown that people receiving HD have a poorer postural balance compared to non-uraemic, age-matched individuals, as evidenced by the higher sway of centre of pressure (CoP) measures (range: +22% to +139%) assessed during static posturography. However, the question as to whether a higher postural sway is associated with adverse clinical outcomes such as falls in people receiving HD has not been addressed yet. Therefore, we aimed to explore the association between static posturography-based measures of postural balance and risk of falling.
Methods: Seventy-five prevalent CKD-5 patients on HD were recruited from three Renal Units for this prospective cohort study, which was conducted between October 2015 and August 2018. Static postural balance was assessed with a Bertec force platform in eyes open (EO) and eyes closed (EC) conditions. The following centre of pressure (CoP) measures were taken for the analysis: CoP range in the mediolateral (Range-ML) and anterior-posterior (Range-AP) axis, root mean square range in the mediolateral (RMS-ML) and anterior-posterior (RMS-AP) axis, CoP velocity along the mediolateral (CoPv-ML) and anterior-posterior (CoPv-AP) axis, and the 95% confidence ellipse area (Area95). The number of falls experienced during a 12-month follow-up were recorded by a researcher on a monthly basis. The association between all postural balance variables and falls (yes or no) was analysed using logistic regression modelling. ROC curve analyses were also performed to explore the differences in prognostic accuracy among postural balance measures.
Results: Sixty-eight participants completed the 12-month follow-up and were therefore included in the final analysis. Twenty-five participants (36.8%) experienced at least one fall during the study period. In univariable logistic regression analysis, higher sway of CoPv-AP in EO (OR: 1.11, 95%CI: 1.01-1.23, p= 0.036), Range-ML in EC (OR: 1.04, 95%CI: 1.01-1.07, p= 0.02) and RMS-ML in EC (OR: 1.21, 95%CI: 1.02-1.45, p= 0.034) were associated with increased odds of falling. After adjustment for sex, Charlson comorbidity index (age factored in) and number of prescribed medications, only Range-ML in EC (OR: 1.04, 95%CI: 1.00-1.07, p= 0.036) was associated with increased odds of falling. CoPv-AP in EO exhibited the greatest prognostic accuracy (AUC: 0.69, 95%CI: 0.55-0.82, p= 0.01), however this was not statistically different (p-values≤ 0.631) from CoP measures of area (AUC: 0.65, 95%CI: 0.51-0.80) and range (AUC: 0.65, 95%CI: 0.51-0.79).
Conclusions: This prospective cohort study showed that higher postural sway (i.e. lower postural balance) was associated with increased odds of experiencing a fall during 12 months of follow-up. CoP measures of range, velocity and area displayed similar prognostic value in discriminating fallers from non-fallers. The clinical utility of static posturography for the prediction of future fall-risk in people receiving HD warrants further investigation in larger observational studies.

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The benefits and mechanisms of peer support for people who start dialysis without preparation

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Introduction
Peer support (PS) - the provision of informational and emotional support by people with experience of illness to others sharing the condition – is valued by people with kidney disease (Hughes et al 2009) and can bring about behaviour change (Perry et al 2005). Its use has not been studied among people who start dialysis without preparation. Such individuals experience greater morbidity, mortality, hospitalization, and reduced quality of life. PS might ameliorate some of these disadvantages.
This paper reports a qualitative analysis of interviews conducted as part of a pilot study exploring the feasibility and effects of giving PS to people presenting late to renal services. It was supported by a BRS/BKPA grant and received required ethical approvals.

Methods
All cognitively able individuals starting maintenance dialysis at our Trust between 28/10/17 and 27/10/18 and within 90 days of presentation to kidney services or without attending a preparatory (low-clearance) clinic were invited to participate.
Interventional participants were offered four sessions of PS in the month following dialysis start in addition to standard care. The peer supporters were volunteer patients themselves living with RRT with training in and experience of supporting other patients.
Participants' experiences of starting dialysis without preparation and receiving PS were explored through semi-structured interviews. These were transcribed verbatim. Analysis was performed inductively and guided by Braun & Clarke's six phases of thematic analysis.

Results (See Fig 1 for thematic map)
Nine of the eleven participants who received PS and completed follow-up were interviewed (one died before interview and one declined).
Starting dialysis with little preparation was a negative experience for all participants. Difficulties resulted from its adverse physical and practical impacts, together with feelings of shock and loss of control. Inadequate delivery and comprehension of information lead to patients having little understanding of what was going on or their options.
The support participants described receiving from peers could be divided into emotional, appraisal, and informational support. For most participants the experience was entirely positive. Elements which made it particularly meaningful and valued were the authenticity of reports from those with lived experience of dialysis and the usefulness of non-verbal information (seeing their supporter looked normal, observing that dialysis wasn't painful, etc). Meeting people who had not just survived but thrived on dialysis gave hope, encouragement, and reassurance, making recipients feel immediately better and more empowered to make a successful life on dialysis for themselves.
'I do not have a life anymore. All my life is just, I feel like I am just repeating a cycle… I feel so worthless… she gave me hope, she gave me the confidence that I needed' (F, 52)
'It wasn't explained to me in layman's terms. That is the big problem… I have learnt more from the patients than I have the medical staff to be honest' (M, 69)

Conclusions

Information from peer supporters is more understandable, authentic, and meaningful than information provided by professionals. PS mitigates some of the difficulties associated with starting dialysis suddenly and should be available to all.

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Dapagliflozin inhibition of non-canonical Smad signalling prevents fibrotic outcomes in diabetic kidney disease

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Background: Renal fibrosis is a prominent pathological feature of chronic kidney disease (CKD). Diabetic nephropathy (DN) is the leading cause of CKD, and the severity of scarring directly correlates with the deterioration of renal function in diabetic patients. Following the advent of successful therapeutics targeting glucose uptake at the proximal tubule (PT), we propose an important role for SGLT2 inhibition in reducing fibrogenic signalling. Additionally, we investigated the putative signalling pathways involved in mediating these anti-fibrotic effects and present a mechanism of action.

Methods: Primary human proximal tubule epithelial cells (PTEC) were cultured on collagen IV. They were treated with D glucose 7mM (control), 25mM (high) or 7mM + 18mM L glucose (osmotic control), +/- TGFβ1 at 0.75ng/ml. The cells were also administered Dapagliflozin (SGLT2 inhibitor) and MEK Inhibitor U0126 (0.1µ -10µM). Western blotting and quantitative real time PCR were performed to detect the level of cellular and secreted proteins; SGLT2 and Connective Tissue Growth Factor (CCN2) as well as intracellular signalling proteins, phosphorylated extracellular signal regulated kinase 2 (P-ERK 2), phosphorylated Smad3 MH2 domain and phosphorylated Smad3 linker region serine 204. Gamma glutamyl transferase staining was performed to confirm proximal tubule epithelial cell phenotype.

Results: In a manner comparable to our previous findings on secreted CCN2, dapagliflozin (0.1 -10µM) inhibited high glucose (HG) +TGFβ1 induced CCN2 RNA expression at 24h in human primary PTEC, (P*<0.01). TGF-β1, 0.75 ng/ml treatment alone resulted in an increase in P-Smad3 (Smad3 phosphorylated at the MH2 domain serine 423 &425 and P-Erk2 at 5, 30 and 60 minutes. (P*<0.01). HG treatment was associated with an increase in phosphorylated ERK2 at 30 minutes (P*<0.05). Dapaglilfozin 1µM and U0126 10µM treatment inhibited this effect, confirming SGLT2 and MEK involvement. HG+TGF-β1 treatment resulted in a significant increase in Smad3 phosphorylated at serine 204 of the Smad3 linker region at 30 minutes (P*<0.05). The increase in serine 204 phosphorylation was inhibited by dapagliflozin 1µM and U0126 10µM treatment.

Discussion: In this model, neither TGF-β1 nor glucose alone induced CCN2 RNA expression. The increase in CCN2 required both 'hits' and was blocked by dapagliflozin. In investigating the point of convergence between glucose and TGF-β1 we have identified an SGLT2 mediated regulation of Smad3 activation. Our evidence supports an ERK mediated pathway indicating glucose- ERK2 phosphorylation. TGF-β1 mediated phosphorylation of serine 204 is believed to be through GSK3β[1] and therefore not inhibited by U0126. Hence, it may be that targeting glucose induced ERK activation will prove a better strategy for the treatment of diabetic kidney disease. Potential negative effects of SGLT2 inhibitions are discussed in our complimentary abstract submitted to UKKW 2020.

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Structural brain changes in Haemodialysis patients compared to Healthy Controls assessed using MRI

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Introduction
Ischaemic end-organ damage during haemodialysis (HD) is a significant problem and leads to functional/structural deterioration in the long term. We compared the structural morphology of the brain in a prevalent haemodialysis group compared to age-matched healthy controls using magnetic resonance imaging (MRI).

Methods
Structural 1mm isotropic T1-weighted magnetization-prepared rapid gradient echo (MPRAGE) MR images were acquired on a 3T Phillips Ingenia scanner in prevalent HD patients (n = 10) and age-matched healthy volunteers (HVs) (n = 10). HD patients were scanned 1 hour prior to their scheduled dialysis session. All participants completed the Montreal cognitive assessment (MOCA) and trail making tests (TMT) A & B on the day of their MRI scan. Voxel-based morphometry analysis was performed using Statistical Parametric Mapping software (SPM12). Images were registered to the Montreal Neurological Institute (MNI) template and segmented into grey matter volume (GMV), white matter volume (WMV) and cerebrospinal fluid (CSF). A general linear model of HD patients and HVs, adjusted for total intracranial volume (TIV) and age, was interrogated to assess differences between the groups using a voxel-wise two-sample t-test at a false discovery rate (FDR) of $p < 0.05$.

Results
Median age of the HD group (HDs) was 59 (18) yrs vs 60 (17) yrs in the HVs (p=0.727). In the HD group, dialysis vintage was 18.5 months (IQR 52) and 3 participants had diabetes. The HD group took longer to complete TMT B compared to HVs [74 (44) s vs 51 (35) s; p=0.07], but there were no differences in MOCA scores [27 (1) vs 29 (2), p=0.15] or TMT A [30 (15) s vs 20 (13) s; p=0.134].

The WMV/TIV ratio was 0.349 (0.05) in the HDs, significantly lower than the value of 0.365 (0.02) in HVs (p=0.021). GMV/TIV was also lower in the HDs [(HDs 0.380 (0.07) vs HVs 0.421 (0.02), p=0.013], whilst the CSF/TIV ratio was higher [(HDs 0.286 (0.1) vs HVs 0.216 (0.05), p=0.006]. When GMV/TIV was plot as a function of age, a similar gradient was found for the HDs and HVs (Figure 1a). In contrast, WMV/TIV versus age had a significantly greater decline in the HDs compared to HVs (Figure 1b).

Voxel-wise analysis showed that this lower WMV was widespread in the HDs with the greatest reduction in WMV in right cerebral white matter, right inferior temporal gyrus and left supramarginal gyrus. In contrast, the only area of significant GMV difference between groups was that of reduced GMV in the right middle frontal gyrus of the HDs. There were no brain regions that showed higher WMV or GMV in HDs compared with HVs.

Conclusion:
There are significant alternations in the structural brain morphology in HD patients, with predominant loss in WMV when compared to HVs. The greater decline of WMV/TIV in the HD group compared to HVs

supports an accelerated ageing phenomenon in HD patients. We are currently combining these morphological findings with diffusion tensor imaging to assess the effect on white matter tracts.

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An audit on the efficient use of renal procedure lists and the impact of the procedure list on the hospital length of stay (LOS)

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Background: The renal patients have Tenckhoff and Permacath catheters inserted for peritoneal dialysis and haemodialysis respectively. These procedures are done by the nephrologists in the Interventional Radiology suite once every week. The patients are either admitted to the renal ward electively on the day of the procedure or they have them done while they are already an in-patient for a related or a different medical problem.

Aim: To assess if the interventional lists are being utilised efficiently and to see if in-patients are staying longer in hospital waiting for a procedure as they are done only once every week.

Methods: The list of patients undergoing renal procedures, their LOS in hospital, procedure cancellations, reasons for cancellations - extracted from the Hospital's Clinical Management system and from the discharge summaries – were retrospectively reviewed from 1 Jan 2018 to 31 Dec 2018.

Results: 115 procedures were scheduled to happen. None of the procedure lists had been cancelled. 12 procedures (10.4%) were cancelled and rescheduled – 5 were cancelled because the procedure list had over run, 4 because the hospital was on black alert, 2 because the patient was on clopidogrel and 1 because the patient had an infection. Of the 103 procedures that were performed – 48 (46.4%) were done electively and the patients were admitted on the day of the procedure; 55 (53.6%) were done on patients who were already admitted to hospital for a related or a different medical problem. Of the elective patients (48 patients), all but one (98%) were discharged on the same day or the following day. The one patient who stayed for 3 days had an AV fistula operation done during the same admission. The length of stay (LOS) for those who were already in-patients (55 patients) was dictated by the primary reason for their admission. However, 16 patients out of these cohort of 55 patients (29.1%) were discharged home on the day or the day after the procedure implying their LOS in hospital would have been extended for having to wait for the next (once weekly) renal procedures list.

Discussion: The renal procedures list can be improved further by better patient preparation a few days prior to the procedure. Nearly a third of in-patients being discharged on the day of the procedure or the day after may imply that their hospital LOS would have been extended for having to wait for the next procedures list. An additional interventional list in the week or installing fluoroscopy facility in the renal ward procedures room would help the situation.

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Examining the clinical utility of antiphospholipase A2 receptor antibody testing in a real-world setting

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Background

Anti-phospholipase A2 receptor antibody (PLA2r Ab) is a biomarker for diagnosis and monitoring of patients with primary membranous glomerulonephritis (MGN). Reports suggest 70%-80% of patients with primary MGN will have an elevated PLA2r Ab level at diagnosis. Currently quantitative PLA2r Ab testing is performed out of centre at a cost of £26.74 per assay, with a turnaround time of 21 days. Our aim was to examine the diagnostic utility of PLA2r Ab testing within our centre and the impact on our biopsy practice.

Methods

We performed two separate searches of the West of Scotland Electronic Renal Patient Record for: (i) patients who had undergone native renal biopsy from beginning 2016 to end 2019; (ii) patients who had had PLA2r Ab testing for any indication (including first diagnosis of MGN or monitoring of treatment response). Patients received standard screening for secondary causes of MGN. PLA2r Ab was measured by enzyme linked immunosorbent assay (ELISA). Patients diagnosed with biopsy-proven MGN during the study period were sub-divided based on degree of proteinuria at biopsy: urine protein: creatinine ratio (uPCR) <100mg/mmol 100-300mg/mmol and >300mg/mmol were regarded as minimal, moderate and nephrotic respectively. Renal function at biopsy was assessed by serum creatinine.

Results

There were 623 adults who underwent native renal biopsy between 2016 and the end of 2019: 64 (10%) had a histological diagnosis of MGN, all of whom had PLA2r Ab tested. Fifty of these patients were classified as primary MGN, of whom 33 had a positive PLA2r Ab (66%), while 17 had a negative or non-diagnostic result (33%) (figure 1). There were no patients with a positive PLA2r Ab who had a histological diagnosis other than MGN. In the PLA2r Ab positive sub-group median age was 66 years (IQR 57-74), median PLA2r Ab 126 RU/mL (IQR 49-422), median serum creatinine 90 µmol/l (IQR 75-120) and median uPCR 592 mg/mmol (IQR 472-919). From these data, we calculated our local positive predictive value (100%), sensitivity (66%) and specificity (100%) for primary MGN in patients undergoing native renal biopsy.

There were 503 patients who had PLA2r Ab testing for any indication during the same time period; eighty had PLA2r Ab positive MGN, including 41 patients with a historical diagnosis where PLA2r Ab was tested for disease monitoring. We identified six individuals with a positive PLA2r Ab result in whom biopsy was deferred with a presumptive diagnosis of MGN. Twenty four patients with moderate proteinuria had a positive PLA2r Ab, all were tested for disease monitoring Fifty-four patients (10.7%) had PLA2r Ab measured with minimal proteinuria, all of whom had a negative result.

Discussion

Within our centre, the proportion of patients with primary MGN who were PLA2r Ab positive is similar to previous studies. Given the high sensitivity and positive predictive value of PLA2r Ab testing in our population, a positive result may be sufficient to justify deferring a renal biopsy. We identified a substantial number of patients who underwent PLA2r Ab testing without an appropriate clinical indication, with important implications for resource utilisation.

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Five and Ten Year Outcomes of a Large Cohort of Patients with Membranous Nephropathy treated with Tacrolimus

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Introduction

Tacrolimus is used to treat membranous nephropathy (MN), however there are few data on long-term outcomes.

Methods

This is a long-term retrospective cohort study of 114 patients who received tacrolimus as first line immunosuppression for nephrotic syndrome (NS) secondary to MN from January 2000- June 2018 in our institution.

Results

94/114 patients received tacrolimus monotherapy, 20/114 received dual therapy with mycophenolate. The mean age at diagnosis was 52 years (range 23-83). 65% were male. 47% were white, 12% black, 39% Asian, 2% other. Baseline mean eGFR was 79.2ml/min (19-90).

100/114 (88%) achieved complete or partial remission of NS, at a mean time of 6.5 months (range 1-45.7).

14/114 (12%) did not achieve remission with tacrolimus. 11/14 switched to alternative immunosuppression with rituximab (7), cyclophosphamide (CyP) and steroids (3), rituximab followed by CyP and steroids (1). Only 3/14 subsequently achieved remission from NS (all 3 had received additional treatment with rituximab).

47/100 (47%) patients who achieved remission following tacrolimus had at least one relapse; 45 relapsed with reduction/cessation of tacrolimus, 2 relapsed with therapeutic tacrolimus levels (>5ug/L). 30/47 were treated by restarting therapeutic level tacrolimus, 13 received rituximab, 2 CyP and steroids, 2 no treatment. 30/30 retreated with tacrolimus re-achieved remission and 11/30 had a second relapse: 10/11 after weaning/stopping tacrolimus, 1 with therapeutic tacrolimus levels. The second relapse was treated with restarting tacrolimus/dose increase (5), rituximab (5), rituximab followed by CyP and steroids (1). 5/5 retreated with tacrolimus remitted again, 1/5 retreated with tacrolimus had a third relapse treated with rituximab.

The mean duration of tacrolimus when used as initial treatment was 32.4 months (1.0-89.2). 45 of the 53 who did not relapse have stopped tacrolimus. In these patients the mean duration of tacrolimus treatment was 31.0 months (10.5-65). The mean follow up since stopping tacrolimus was 66.4 months (0.5-165.4).

At 1 year the mean eGFR was 61.3ml/min (11-90). 5/114 patients reached ESRD and 3 had died (1 on dialysis). Of the 5 patients who reached ESRD following the initial tacrolimus treatment none achieved remission of NS despite 4/5 switching to alternative immunosuppression. Their initial mean eGFR was low at 44.6ml/min (19-69).

70 patients have 5-year follow-up. At 5 years mean eGFR was 60 (15-90), 1 patient had ESRD (total 6) and 2 died (total 5).

37 patients have 10-year follow-up. At 10 years the mean eGFR was 63 (21-90), 2 patients had ESRD (total 9) and 3 died (total 8).

Discussion

The long-term data from this study, one of the largest reported cohorts of patients treated with tacrolimus for MN, suggests tacrolimus is effective in both achieving and maintaining remission of NS in MN. Non-response of NS to tacrolimus is predictive of non-response to other immunosuppression and associated with early progression to ESRD, as is low initial eGFR. Relapse rates on weaning tacrolimus are high, even after long courses of treatment. Patients achieving remission from NS with tacrolimus have well maintained eGFR and low rates of ESRD at 5 and 10 years despite the need for long-term treatment.

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The relationship of the follow-up peritoneal white cell count and the catheter outcome in patients with PD peritonitis

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Objectives
Peritonitis is a major cause of technique failure in patients on peritoneal dialysis. Catheter loss can be associated with a day 3 peritoneal dialysate white cell count > 1090/mm3 (Chow CJASN July 2006).
We wished to see whether the fate of the Tenckhoff catheter was similarly related to the day 3 white cell count in our patients.

Methods
We reviewed the records of peritoneal dialysis patients at our hospital between 2014 and 2018 inclusive who had had peritonitis. The data were extracted from e-Med and our hospital electronic patient records. Concordance of data were then cross-checked with departmental paper records. We determined the date of the follow-up white cell count and its value. We identified cases where the Tenckhoff catheter was removed because of the peritonitis.

Results
There were 182 episodes of peritonitis of which 49 led to catheter loss. In 11 of those cases of catheter loss a replacement catheter facilitated continuation of peritoneal dialysis without haemodialysis.

See Tables 1 and 2

Conclusions
The day 3 white cell count has an association with catheter outcome: 56% catheter loss with a higher count vs. 25% catheter loss for a lower count. This is not seen with white cell counts on other days.
The lack of data for 56 episodes of peritonitis limits this interpretation of the data.
We need to have more emphasis on ensuring a day 3 peritoneal white cell count allowing for weekends.

Reference
Predictive Value of Dialysate Cell Counts in Peritonitis Complicating Peritoneal Dialysis
Kai Ming Chow, Cheuk Chun Szeto, Kitty Kit-Ting Cheung, Chi Bon Leung, Sunny Sze-Ho Wong, Man Ching Law, Yiu Wing Ho and Philip Kam-Tao Li
CJASN July 2006, 1 (4) 768-773

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The association between the Standardising Outcomes in Nephrology – Haemodialysis Fatigue measure and UK patient- and treatment- related characteristics.

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Introduction: Fatigue is highly prevalent in patients receiving haemodialysis (HD) and has been identified as a critically important core outcome by patients and health professionals. The Standardised Outcomes in Nephrology – Haemodialysis (SONG-HD) has established a core outcome measure for fatigue. The association of fatigue assessed by this measure with patient- and treatment-related characteristics is unknown.

Methods: We used the SONG-HD Fatigue to assess fatigue in patients receiving HD three times a week as part of a larger study. The 3-item measure is comprised of questions on tiredness, energy and effect of fatigue on usual activities over the past week. We also used a visual analogue scale (VAS) to measure the severity of fatigue at the time of assessment on a scale of 0-10. Demographic information and self-reported health literacy were also collected. Chi-squared and T-tests were used to compare patient demography with the 3 items of the measure and VAS respectively.

Results: In total, 194 patients completed the SONG-HD fatigue measure across five centres in England, who had been on kidney replacement therapy for a mean of 4.22 years with a mean age of 63.8 years, 62.3% were male, 79.9% Caucasian and 22.2% dialysing via a line. Quite a bit or severe was reported in 54.4% for tiredness, 56.9% for lacking energy and 54.2% for limited usual activities, and the mean VAS score was 5.0. All aspects of the instrument were reported as more prevalent in younger patients, in line with previous studies. Compared to older patients, the VAS from younger patients appeared to be more highly correlated with the individual questions of tiredness (correlation coefficient 0.684 vs 0.537) low energy (0.698 vs 0.545) and impact of fatigue (0.697 vs 0.602). Caucasian patients reported similar VAS scores to non-Caucasian patients (5.1 vs 5.7, p=0.23), despite Caucasians being an average of 10 years older. The proportion of patients with a VAS >6 increased with diabetes (60.3% vs 42.9%, P=0.019) but did not reach statistical significance in those with previous myocardial infarction (44.4% vs 50%, P=0.654) or heart failure (60% vs 48.3%, P=0.320). The mean VAS was 5.3 after the one-day and 5.0 after the two-day interdialytic interval (P=0.218), despite ultrafiltration rates of 5.2 and 6.9ml/kg/hr respectively (P<0.001). Increasing ultrafiltration rates was not correlated with increased fatigue scores. There was a trend toward patients who travelled >20 minutes to dialysis to report greater tiredness, low energy and impact on usual activities. Patients with decreased health literacy reported higher VAS fatigue scores (6.4 vs 5.0, P=0.012), quite a bit or severe fatigue (77.4% vs 49.7%, P=0.005), low energy (80.6% vs 50.9%, P=0.002) and limited usual activity (74.2% vs 49.1%, P=0.010).

Discussion: The SONG-HD measure was easily completed by patients in this study. Clinically plausible associations between patient characteristics and components of the fatigue measure were observed but did not reach statistical significance. The strong relationship between limited health literacy and fatigue may indicate that different underlying patient characteristics or the presence of barriers to symptom control affect fatigue in this group.

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The rise and fall of peritoneal dialysis: a service development initiative to enhance peritoneal dialysis provision

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Peritoneal dialysis (PD) has been an established dialysis therapy for patients with kidney failure since 1978. PD is the most cost-effective therapy for patients with kidney failure and it has better clinical outcomes and quality of life compared to unit haemodialysis.
The use of PD in the UK has declined from 1993 onwards. The reasons for this include lack of availability of clinicians with interest in PD, inadequate service provision for PD catheter insertion, and lack of positive promotion of PD in chronic kidney disease (CKD) clinics. We set to address this downward trend with the aim being to improve patient choice and create a more cost-effective service.

Patients were selected based on their personal preference and on their renal function (eGFR <15). Measures taken to improve PD take-on included:
1. Improved education in CKD clinics
2. Addressing nephrologist bias
3. Planned PD catheter insertion: Moncrief's technique which can be done months prior to the patient needing dialysis (see figures) and catheter retrieval at a later date through a nurse-led service

Advantages of the Moncrief technique
1. Patient choice
2. Elective procedure with flexibility of PD start date
3. Reduced need for temporary haemodialysis lines
4. Cost-effectiveness

Over the 5 years of adopting this approach, the prevalence of PD population in our hospital increased from 14% to 21%, compared to an unchanged national average over the same period (see chart).

Complications with the Moncrief technique:
- 1 severe post-op haemorrhage
- 3 cases of delayed function requiring laparotomy.

A top down costing study of the provision of dialysis modalities in a number of UK hospitals showed the cost of unit haemodialysis per year per patient to be £35,023 with the cost of Peritoneal Dialysis per year per patient being £15,570.
On comparison with UK statistics and based on the population at our hospital, this equates to a saving of £97,265 per year.

Planned PD catheter insertion using the Moncrief technique is achievable, and is effective in enhancing the prevalence of PD. No additional resources were needed to achieve the increase in PD proportion from 14% to 21%. Increasing PD take-on in our hospital has proven cost-effective whilst also ensuring patient autonomy.

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The use of the kidney failure risk equation to risk stratify patients referred to a tertiary renal centre

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Title: The use of the kidney failure risk equation to risk stratify patients referred to a tertiary renal centre
Introduction: The current NICE guidelines suggest that all patients with chronic kidney disease (CKD) and an eGFR<30 mls/min/1.73m2 should be referred for specialist assessment. However better information regarding individual risk for progression to kidney failure may improve clinical decision-making. The 4-variable Kidney Failure Risk Equation (KFRE), which incorporates age, gender, albuminuria and geographical location, has been developed as a calculator to predict risk of progression. The aims of this evaluation were to i) examine the 5-year outcome of patients CKD referred to a tertiary centre and ii) retrospectively calculate the 5-year risk of progression using the KFRE in our cohort and compare this to actual outcomes.

Method: We examined the clinical characteristics and outcomes over 5 years of all patients with CKD referred to our centre in 2012. All the data was collected retrospectively through electronic patient records. 5 year risk of progression to kidney failure at baseline was calculated using the KFRE. Those who score between 0 to 5% are considered low risk, 5 to 15% are intermediate and >15% have a high 5 year risk of progression to kidney failure.
Results: In 1 year, 635 new patients with CKD were referred to nephrology outpatients. 41% were females and 32% were above the age of 75. At the time of referral 28% had CKD stages 1 and 2, 11% had stage 3a, 20% had stage 3b, 32% had CKD 4 whilst 9% had CKD 5. Over the 5-year period 82 patients (13%) started renal replacement therapy (RRT) of whom 22 had died. 31% of patients referred had died before needing RRT. 36% patients were still under nephrology care whilst 45% had been discharged. 10% of patients with CKD stages 1-4 had progressed by at least 1 stage during the follow up period. Only half of the referred patients actually needed a nephrology-specific intervention (e.g. anaemia or bone management, dialysis or a kidney biopsy) beyond just blood pressure control. Using the KFRE in the 530 patients in whom all data was available, 171 were high risk (32%), 80 were intermediate risk (15%) and 279 were low risk (52.6%) of progression at time of referral. Of those with a high 5-year risk of progression, 34.5% were dead at five years follow up and 42.1% were on RRT. Of those who had low or intermediate risk only 2.6% required RRT during the 5-year follow up
Conclusion: Over a 5-year follow up period only half of patients with CKD referred to tertiary care required a nephrology specific intervention beyond just blood pressure control and just 13% required RRT. In this limited retrospective analysis the KFRE helps identify patients at higher risk of progression. Further work needs to be done to evaluate whether the KFRE can be used in primary care to identify which CKD patients are most likely to benefit from referral to secondary care.

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Factors affecting health-related quality of life in persons approaching dialysis

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Background: End stage kidney disease (ESKD) and dialysis are associated with complications including fatigue, anxiety, reduced physical function, and reduced appetite, which may result in reduced health-related quality of life (HRQoL). Exercise, education, and nutritional interventions in pre-dialysis and dialysis patients have been found to prevent deterioration in HRQoL in persons with ESKD. "PREHAB" (Pre-emptive rehabilitation in persons approaching dialysis) is a prospective randomised trial aiming to determine the effect of a multi-component exercise, nutrition and educational intervention upon clinical and HRQoL outcomes in persons approaching dialysis. The aim of this work was to assess factors influencing HRQoL in participants prior to starting dialysis.

Methods: Patients with eGFR≤15ml/min/1.73m2 who were able to exercise and anticipated to require dialysis within 6 months, were invited to participate in the "PREHAB" trial. Comprehensive baseline assessment of HRQoL, physical function and nutritional status was undertaken using validated methods. Factors which may influence HRQoL were assessed using Functional Assessment of Chronic Illness Fatigue Tool (FACIT-F), Duke Activity Status Index (DASI), Functional Assessment of Anorexia/Cachexia Therapy Appetite Scale (FAACT-A), Hospital Anxiety and Depression Scale (HADS), Kidney Disease Distress Thermometer, Montreal Cognitive Assessment (MoCA), Barthel Index and EQ5D.

Results: Data for 57 participants (35 male, 22 female, mean age 64.4 years) were analysed. Results are summarised in Table 1. Overall, there were trends towards increased levels of fatigue and anxiety, and reduced appetite, perception of physical function, and cognitive function. When results were analysed according to age, younger participants (≤65years) reported increased fatigue (FACIT-F 27 vs 14; p=0.0001), increased anxiety (HADS-A 9 vs 3; p=0.0003), and increased disease-associated stress (Kidney Disease Distress Thermometer 5 vs 2; p=0.005) in comparison to older participants (>65 years). Participants with reduced nutritional status (as determined by Subjective Global Assessment (SGA) ≤5) were more likely to experience increased fatigue (FACIT-F 30 vs 18; p=0.02), increased anxiety (HADS-A 10 vs 6; p=0.04 and EQ5D Anxiety/Depression score 4 vs 2; p=0.03), increased difficulties doing usual activities (EQ5D Usual Activities score 3 vs 2; p=0.01), reduced physical activity (DASI 26.95 vs 35.95; p=0.007) and reduced appetite (FAACT-A 15 vs 10; p=0.05), in comparison to well-nourished participants (SGA 6-7), although these differences were no longer significant after correction for multiple comparisons. Unexpectedly, cognitive function (MoCA 27 vs 25; p=0.04) was better in those with reduced nutritional status.

Conclusion: Several factors which can negatively influence HRQoL are prevalent in this cohort of patients approaching dialysis, including increased fatigue and reduced physical activity. We also observed that younger patients are more likely to experience fatigue, increased anxiety and increased disease-associated distress. Malnutrition was associated with trends towards lower physical activity, reduced appetite, anxiety, increased difficulties with usual activities, and greater perception of fatigue. These findings are important for planning interventions to prevent deterioration in HRQoL, to ensure that they focus upon the relevant aspects most likely to be beneficial to patient care.

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Demographic variability of kidney function in live donors- a large single Centre analysis

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Introduction:

Living kidney donation contributes to 30% of transplants in the UK1. This practice is encouraged due to better outcomes in transplant recipients. Donor assessment requires thorough evaluation but there are variations in kidney function with changes in age, between ethnic groups (BAME) and gender. Age-, gender- and ethnicity-specific measured GFR (mGFR) reference ranges derived from large healthy donors' series are lacking. In this large single centre study, we provide mGFR range in different healthy donor groups and compare mGFR with the performance of estimated GFR formulas and creatinine clearances.

Methods:

We have analysed data from 997 live donors between February 1995 and October 2019. Using pre-donation measured GFR (Tc EDTA-GFR) as the gold standard, we compared the performance of CKD-MDRD, CKD –EPI (represented in units ml/min/1.73m2), 24-hour creatinine clearance (Cr Cl) and Creatinine clearance by Cockcroft Gault (CrCl C-G) (represented in units ml/min) between age, ethnicity, and gender. We also calculated the Relative Bias ((mGFR-eGFR)/mGFR), and the accuracy (P30) of different eGFR equations compared to mGFR. P30 was defined as the percentage of patients whose eGFR was within +/-30% of the mGFR.

Results:

422 (42.32%) donors were male. 616 (62%) donors were Caucasian, 228 (23%) South Asian, 114 (11%) Afro Caribbean and 39 (4%) of other ethnic groups (Arabic, oriental and mixed ethnicity) (Graph 1). The mean mGFR was 100.08 ml/min/1.73m2 (SD 10.87). The mean mGFR for males and females were 105.77 vs 95.72 ml/min/1.73m2, respectively (p=0.05).
63 (6%) donors were older than 65 years. Mean mGFR compared between young and > 65 years old donors were 103.44 vs 82.27, respectively (p= 0.0028). Afro Caribbean males had the highest function and Asian females had the lowest function by mGFR amongst all compared groups, but this difference was not significant (p=0.54). As predicted, there is a linear decline in mGFR with increasing age.

Creatine clearance measured in 24-hour urine collection overestimates function in all compared groups. Creatinine clearance by Cockcroft-Gault tends to underestimate function in healthy living donors over 65 years old (Table 1). GFR calculated by CKD-EPI formula was comparable to mGFR amongst all age groups, genders and ethnically diverse living donors (Table 2+3). CKD-EPI performed better in terms of least bias and highest accuracy compared to MDRD for all donor subgroups (Table 3).

Conclusions:

mGFR declines with age and healthy older donors (>65) have significantly lower mGFR compared to younger donors. Afro-Caribbean donors have higher pre-donation GFR and female South Asian donors the lowest GFR, however, these differences were not statistically significant. 24-h Cr Cl overestimates kidney function and should be used with caution and corrected for size. Calculated GFR by CKD EPI formula comes closest compared to mGFR in all groups and it could be reliably used as a first screening tool for assessing the function of living donors pre-donation, irrespective of age, gender or ethnicity.

Reference:

1. https://www.odt.nhs.uk/living-donation/living-donor-kidney-transplantation/

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Post renal transplant diabetes

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Introduction:
New onset diabetes after transplantation (NODAT) has been recognized as a common complication post renal transplantation. Early screening and management of NODAT are recommended to prevent complications of diabetes which may affect long term survival of the graft. Current evidence suggests risk factors that predispose to Type 2 Diabetes Mellitus in the general population could also predispose to NODAT. Specifically for transplantation, diabetogenic properties of immunosuppressive therapies have been described.

Aims:
To identify incidence of NODAT in a single-centre, review its management and clinical outcomes (diabetes control).

Methods:
We used our hospital renal database to identify all renal transplant recipients who were diagnosed with NODAT from 1 May 2017 – 30 August 2019. We then reviewed the electronic notes, results and clinic letters for the identified population to obtain information about their graft, date and method of diagnosis of NODAT, immunosuppression therapy, diabetes medication, HbA1c and if it had resolved.

Results:
The incidence of patients diagnosed with diabetes post renal transplant was 19.8%. The average HbA1c at time of diagnosis was 51.1 mmol/mol. Diagnostic tests used included random glucose (21.7%), HbA1c (32.6%), both random glucose and HbA1c (39.1%) and Random glucose, HbA1c and Glucose Tolerance Test (2.2%). The tests for 2 patients were not known (4.3%).
23 patients (50%) were given dietary and lifestyle advice, 15 patients (32.6%) were on single oral antiglycaemic agents (either sulfonylurea, biguanide or dipeptidyl peptidase-4 inhibitors), 1 patient (2.2%) was on a combination of 2 antiglycaemic agents, 5 patients (10.9%) were on insulin therapy and 2 patients (4.3%) were on combination of oral antiglycaemics and insulin. Five patients received care from a diabetologist, 2 from diabetic specialist nurses, 1 from community diabetes team, and 6 in primary care. For the remaining 32 patients, the nominated team for diabetes care was not specified, but under review of the renal transplant team.
21 patients were still on treatment; 13 were managed with lifestyle and dietary advice, 9 no longer had diabetes and were off treatment. 2 patients had died and another had his care transferred to a different centre (hence outcome was not known).

Conclusion:
Our centre's incidence rate of NODAT appears to be consistent with the literature. The study identified varied regimens of management for NODAT. We need to review the use of HbA1c alone in diagnosis of NODAT as there may be other confounding factors affecting HBA1c levels in the early transplant period. 22 (47.8%) of the patients did not require pharmacological treatment and 9 of these patients had resolution of diabetes. Key management strategies identified are early diagnosis of NODAT, using glucose tolerance tests, review of immunosuppression therapy and regularly diabetes review to ensure improvement in their

diabetes control, and hopefully resolution. We are not a steroid-free centre but are reviewing considering steroid-free immunosuppression, especially in groups of patients with risk factors for developing diabetes.

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Introducing a dashboard approach to improve documentation and monitoring of Haemodialysis (HD) patients.

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Problem
Nursing documentation is a written or electronic record that describes the health condition of a patient or the care provided to that patient. The Nursing Midwifery Council (NMC) code asserts that registered healthcare professionals' records need to be clear, concise and accurate. However, it remains the nurse's responsibility, to give high-quality patient care that is safe, effective and evidence-based, to ensure their records are legal, ethical and professional.
Following a review within our HD unit, nursing documentation was found to be variable in quality, some exceptional, some poor. This ultimately affects efficacy of communication, continuity of care and monitoring of patients. It was found that with differing levels of record-keeping, there were lapses in vital care and continued monitoring of our renal patients.
Purpose
We wanted to improve our documentation to meet standards expected by the Trust and the NMC, ensuring high-quality care and on-going surveillance of our patients to maximise the patient experience, reduce patient harm and provide an evidential governance tool. We also wanted consistency and conformity with documentation, ensuring all staff were using a standardised, holistic care pathway, with on-going re-evaluation standards.
Design
We introduced a dashboard approach, basing it on retrospective empirical evidence. A dashboard is a tool used to analyse data, which is then displayed. Carrying out a monthly audit of key areas of the documentation and surveillance tools we use. We ensured up to the moment continued monitoring. Locally derived target were set following discussions with the renal management team. Using a colour coded Red, Amber, Green (RAG) system to highlight specific areas and themes the data was presented monthly, in a fun, easy to read display
Findings
A plethora of data has been simply analysed following monthly audits and findings interpreted into percentages and displayed for staff to see on a dedicated Continuing Improvement Dashboard. The data shows major improvements in target weight assessments, Waterlowe assessments, the frequency of handling plans, virology screening and care planning re-evaluation. There were several areas in the documentation that have been deemed not fit for purpose and areas for improved staff training were also identified.
Conclusions
By using a RAG dashboard approach, we have been able to convert data into actionable processes. These have been instrumental in improving the complex needs of renal patients in our unit. We have also provided the Trust with a governance tool that is more relevant and individualised to the needs of the out-patient HD Renal population. We can now see at a glance where we excel and where we need to make changes to improve. Initially, it appears that we have inspired staff to improve the quality of their documentation, surveillance and on-going monitoring of our renal patients endeavouring to ultimately enhance the patient experience.
Relevance

The dashboard is an ever-changing audit tool, which has facilitated identification of problems, which we have tackled. It has provided us with confidence that we can work as a team to improve the lives of our patients and improve the quality of our activity.

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Quantifying the positive environmental impact of a virtual kidney clinic in East London

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Introduction

The NHS produces higher emissions than the global average for healthcare services and is responsible for 5.4% of the UK's total carbon emissions. East London has a disproportionately high prevalence of CKD and ESKD with previous traditional models of care for CKD in East London based on multiple outpatient visits. The virtual CKD service in East London allows clinicians to manage the majority of patients in primary care with approximately only 10% of virtual referrals requiring a hospital visit. This model has the potential for a reduction in air pollution by reducing multiple trips by vehicle to hospital sites. Accordingly, we studied the potential positive impact on the environmental footprint of the NHS using a virtual clinic system for a high-volume clinical service.

Methods

The virtual CKD service has been operating since Dec 2015. We used routinely collected data from four inner London CCGs to identify individual post codes of patients referred to our service. Using geographic co-ordinates produced by the Office of National Statistics for each postcode, we calculated the great-circle distance to one of four London Hospitals (using the Haversine formula) which correspond to secondary care renal services for these CCGs. We applied a simple uplift to account for patients not travelling in a straight line between co-ordinates.

We assumed each virtual appointment equated to a standard outpatient visit and then for each postcode we multiplied distance to hospital by the total number of virtual appointments. We surveyed patients arriving to general nephrology clinics at two of the London Hospitals documenting the mode of transport used to travel to clinic. We applied this to work out the percentage of miles that would have been driven by both private transport (using national average 2018 CO2 emissions of 141.9 g/km) and patient transport (assuming all patient transport used diesel vehicles based on the Sustainable Development Unit Health Outcomes Travel Tool) to estimate the carbon saving of a virtual clinic system.

Results

There have been 16,599 virtual appointments since the virtual CKD service began until November 2019, the majority (54.8%) of which were new appointments. In our survey of travel to two general nephrology outpatient clinics, 39% travelled by public transport, 8% by patient transport and 53% by car or taxi. We estimated a crude total travel distance of 64,049 miles across all four CCGs. We estimate 33,710 miles would have been travelled by private vehicle (equivalent to 7.7 tCO2e saved) and 5,054 miles by patient transport (equivalent to 3 tCO2e saved) representing a total potential saving of 10.7 tCO2e saved over the duration of the vCKD clinic service. This is equivalent to 11.9 commercial flights between New York and London.

Conclusion

Climate change is a public health issue and will threaten human life and health care infrastructures around the world if it continues to occur. Expanding virtual clinics for suitable patients across a wide range of

settings and specialties has huge potential to deliver a reduction in carbon emissions associated with the NHS.

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Single centre clinical outcomes of membranous glomerulonephritis over 10 years

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INTRODUCTION: Membranous glomerulonephritis (MN) is the most common cause of nephrotic syndrome affecting non-diabetic adults worldwide, representing between 30-40% of patients who present with nephrotic syndrome. Untreated, 20-30% will progress to end stage renal disease whilst 30% will undergo spontaneous remission. Historically diagnosis has been made by kidney biopsy, though more recently anti-phospholipase A2 receptor antibodies (anti-PLA2Rab) have been shown to have a specificity of over 99% for MN. The aim of this evaluation was to explore the clinical outcomes of patients who presented with membranous glomerulonephritis over a 10-year period

METHODS: We identified all patients who were diagnosed as having MN over a 10-year period. Clinical, biochemical and treatment details were extracted from electronic patient records. Analysis of data was descriptive and Kaplan Meier curves were used to represent renal survival. We defined complete remission of MN as a protein:creatinine ratio (PCR) of less than 30mg/mmol and partial remission as a PCR<350mg/mmol with a greater than 50% reduction from peak values. Progression of chronic kidney disease (CKD) was defined as a change in at least one CKD stage.

RESULTS: 102 patients were diagnosed as having MN from 2008 to 2018, with 66% being men and a median age at diagnosis of 64 years. 90% had biopsy-proven MN while 10% were diagnosed solely by a positive anti-PLA2Rab. The median eGFR at presentation was 52 ml/min/1.73m2 and median urine PCR was 584 mg/mmol. 82 patients had idiopathic MN, 20 patients had secondary MN, 17 of whom had cancer. Over a median follow-up of 66.5 months (range 12-185 months) 13 (12.7%) patients started on renal replacement therapy (RRT) of whom 5 have died. At the last follow up 71% of the original cohort were alive and free of RRT. Of those that remain RRT free, the latest median eGFR was 50 ml/min/1.73m2 and PCR of 98 mg/mmol. At the last follow up 48% of the total cohort were in a complete remission whilst 14% were in partial remission. 52% of patients received immunosuppression of whom 26% received more than one form of immunosuppressive therapy. Of those who received immunosuppression, 19% died, 15% required RRT and 25% progressed CKD stage. 26% and 9% of the immunosuppressed patients were in a complete or partial remission respectively whilst 37% and 14% of the non-immunosuppressed group were in complete or partial remission at the last follow up. 28% of those who were not immunosuppressed had progressive CKD though only 6% have started RRT.

CONCLUSION: Membranous glomerulonephritis follows a variable path in terms of outcomes, ranging from spontaneous remission, partial remission and progressive CKD. Whilst 71% of patients with MN were alive and free of RRT at last follow up, just under a third of patients had progressive CKD irrespective of whether they were immunosuppressed or not. The introduction of anti-PLA2Rab as a biomarker both for diagnosis and treatment response may allow a more personalised approach to immunosuppression in the future.

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The development of novel method for non-invasive continuous blood pressure monitoring during haemodialysis

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Background and Aims

Brachial artery blood pressure is recorded intermittently and often sporadically during haemodialysis, making it challenging to detect subtle changes is pressure that may portend intradialytic hypotension. Current methods of continuous blood pressure monitoring are limited to research tools that restrict arm movement and can be uncomfortable. To address the need for non-invasive continuous monitoring that does not adversely affect patient experience, we aimed to develop a method by which blood pressure can be estimated using pressure sensors on the arterial dialysis needle and venous bubble trap to derive an arterial pulse waveform.

Methods

We placed two additional pressure sensors in the dialysis circuit. An arterial sensor measured pressure from the arteriovenous fistula. A "Y" connector was attached to the standard arterial needle - one lumen was attached to the standard dialysis line, the other to a sterile accessory pressure transducer. A venous sensor was attached to the venous bubble trap on the dialysis machine once priming was complete. Each pressure sensor unit consisted of a pressure sensor (Honeywell Gauge sensor ± 0-300mmHg) and a sealed pressure transducing membrane to separate the pressure sensors from the blood compartment. These were connected to the dialysis blood lines using single-use accessory pressure transducers that maintained a sterile barrier (integrated permeable membranes that occlude if in contact with blood or fluid). Each transducer was suspended vertically on the drip stand of the dialysis machine during study sessions to maintain a column of air in the lumen.
Once the sensors were connected, pressure data were continuously recorded directly into Matlab (Mathworks) via a National Instruments data acquisition device.
Haemodynamic data were concurrently collected using a digital finger cuff for non-invasive continuous blood pressure monitoring (Finopress NOVA). The finger cuff was attached for 1 hour time periods and gives reconstructed systolic, diastolic and mean arterial blood pressure (MAP). Brachial cuff measurements were also taken every 30 minutes on the finometer and were recorded in the same Matlab program. This ensured exact time synchronisation between Finopress and pressure sensor data.

Results

Data from the venous bubble trap were used to accurately derive dialysis pump speed. This allowed the arterial waveform to be separated out from the pressure signals that originated from the peristaltic blood pump. Figure 1 shows an example of data from a study session with the negative arterial pressure, the venous pressure and the derived pump speed and time synchronised brachial blood pressure readings. This method has been piloted in 12 dialysis treatment sessions.

Conclusions

This method shows promise in accurately separating the arterial waveform from the steady-state and dynamic changes in the speed of the dialysis pump to derive arterial blood pressure. Continuous and non-invasive intradialytic blood pressure monitoring without patient discomfort or the need for additional sophisticated equipment may provide a valuable tool for the early detection of blood pressure changes to prevent intradialytic hypotension.

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Investing in the team: Use of realistic case scenarios to facilitate intra-professional team learning.

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Background: To enable effective learning, individuals' need psychological safety. Learning in the workplace is advantageous as it provides context, highlights relevance to clinical practice and involves the multi-professional clinical team. However, providing learning opportunities in the clinical workplace is becoming increasingly challenging with shift-pattern working and medical/multidisciplinary team (MDT) staff shortages. Here we present two-year data from a simulation course designed to facilitate practical learning that mimics clinical encounters and strengthens collaborative relationships amongst MDT members.

Methods: A full-day renal case scenario and patient communication simulation course for renal SpRs in their first two years of training and renal nurse specialists was held in November 2018 and December 2019. A panel of MDT nephrology experts and medical educationalists peer-reviewed the course. Participants received pre-course reading, and scenarios were sandwiched by a pre-scenario team discussion and a post-scenario guided debrief. The "PARROTS" (Promote reflection, Align feedback, Retrieve peer input, Reveal standards, Outline gaps, Turn up strategies and Summarise) and "Diamond" debrief models (1) were used. Peer-to-peer learning occurred in the scenarios, through "round-table" guided discussions and practical demonstrations of haemodialysis and peritoneal dialysis by specialist nurses. A high faculty:learner ratio(1:2) enabled provision of guided personal reflection and mentorship throughout the day. The course was evaluated with pre and post-course questionnaires which included assessment of knowledge across different domains of renal medicine, confidence managing scenarios and free text boxes to ascertain what about the course facilitated learning. A further questionnaire was sent to the first cohort a year after participation to assess whether the course had any impact on their individual practice. Statistical significance was tested by a non-parametric paired t-test, the Wilcoxon signed rank test.

Results: A total of 19 learners; 11 renal SpRs and 8 specialist renal nurses attended; with 6 MDT renal specialist faculty and 3 educationalists present on each course. Learners completed pre and post-matched questionnaires, 95% overall response rate. Quantitative analysis demonstrated increased knowledge following the course across all domains, including acute kidney injury, transplantation, haemodialysis and peritoneal dialysis, mean knowledge score increased significantly 56% to 72% ($p<0.05$). Improved confidence in managing each scenario was reported post course, mean score increased significantly from 56.90% to 71.18% ($p<0.005$). Qualitative analysis highlighted "intra-disciplinary interaction", "reflection" and "practical skills" as the greatest enablers of learning.
The one year follow-up questionnaire was completed by four SpRs, response rate (67%), in 17 out of 20 domains (85%) they reported the simulation led to a direct improvement in their clinical practice. All reported that it was a useful addition to the training programme, with three out of four SpRs feeling it could help towards preparation for a consultant role.

Conclusion: This renal intra-professional simulation course improved knowledge and confidence in managing complex scenarios and patient communication across the MDT, and has been reported by SpRs to have helped improve their clinical practice. The opportunity to learn from peers and faculty across the MDT through reflection and discussion of personal clinical experiences was deemed the most valuable enabler of learning.

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Kidney transplantation in patients more than 70-year-old: right for the patient, wrong for the organ? - A single centre study

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Introduction

It remains unclear if it is appropriate to offer Kidney transplantation routinely for patients over the age of 70.

Methods

This was a retrospective cohort study. We analysed data from 21 patients aged 70 years or above at the time of transplantation from years 2008-2015. These patients were accepted for transplant after they passed tests performed according to our high cardio-vascular risk protocol. Our transplant immunosuppression protocol does not take in to account patient age; patients are grouped as low or high immunological risk irrespective of age and receive Basiliximab induction, Tacrolimus, Mycophenolate mofetil (1g BD, reduced to 500mg BD after 30 days) with steroid withdrawal on D7 in low risk patients. We collected data from EPR to analyse 1y and 5y patient and death censored graft survival and graft function.

Results

N=21, 19 were first transplants and 2 had one previous transplant. Mean age 72.38 (Range 70-77y). 6 LD, 1 DBD, 14 DCD donors. 4 died during 1st year- 80.9% 1y patient survival, 94% 1y death-censored graft survival, 1 died in year 2 post Tx, 16 patients survived at 5 years - 76.19% 5y patient survival, 100% death censored graft survival. 9 patients are alive to date (January 2020) all with functioning grafts. To date, 12 patients died (mean age 73.25Y, 3LD, 9DCD, mean age at death 77.16 (72-85). Mean 1y eGFR was 43.22ml/min and at 5y it was 42.88/min.

Discussion

We found that in transplant recipients aged 70 and above, both 1y (80.9%) and 5y patient (76.19%) survivals were inferior compared to data from the overall transplant cohort that includes all age groups (local audit data of 96-100% 1y patient survival and registry data of 93% 5y patient survival for our centre). Majority of the deaths occurred within 1y post-transplant. However, death censored graft survivals were comparable to overall cohort suggesting that in those who survive, the transplant kidney functions well with acceptable 1y and 5y eGFRs and keeps them dialysis independent.

The renal registry data of 2014 cohort for patients over 65 on dialysis shows 1y patient survival 80% (comparable to 1y survival of our transplant cohort) and 45% 5y patient survival (in contrast to 76.19% 5y patient survival in our cohort). In summary, transplant patients over the age of 70y have similar 1y but superior 5y patient survival compared to those on dialysis but inferior 1 and 5y survival rates compared to overall transplant cohort.

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Choosing renal replacement therapy- do patients start and stay on the same modality?

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Background:
Renal replacement therapy (RRT) should ideally be started in a planned way, but this requires patients to actively engage in and make complex decisions about their health. A planned start is associated with improved outcomes and a higher likelihood of undertaking a home therapy or renal transplantation. Despite its importance, there is a paucity of published data in this area. Last year, the results of a retrospective study looking at unplanned dialysis starts at Centre 1 were presented. Here we report data from our sister hospital, Centre 2, on determinants of late decision making and late modality change in our population.

Methods:
We conducted a retrospective analysis of patients referred into the Nephrology service who started RRT in 2017. Data was collected on demographics, choice of RRT at pre-dialysis education, eGFR at education, actual starting modality and modality at 6 months.

Results:
A total of 124 patients were included. 71.0% were male, 41.9% were of non-White ethnicity and 30.6% were in the most deprived Index of Multiple Deprivation decile. 92.7% had a documented date of referral to the Kidney Failure Support Team. At referral, the mean age was 61.6 years and mean eGFR 16.2 mL/min/1.73m2. 87.1% (n=108) had a documented decision on choice of modality (42.6% HD, 51.9% PD, 0.9% conservative management, 4.6% undecided).

A total of 77 patients (62.1%) started on HD. Of these, 40.3% started on an AV fistula, 10.4% on a tunnelled dialysis catheter and 49.4% via temporary access. Of those who had a documented decision on RRT, 83.3% (n=90) started on their chosen modality (46 HD and 44 PD). All patients who chose HD started on HD. 12 patients who chose PD started on HD. All undecided and conservative management patients (n=6) started HD (5 via a temporary line). Of the 16 who had no recorded decision, 13 started on HD (11 via a temporary line) and 3 on PD.

At 6 months, 49.2% (n=61) were on HD (1 home HD), 35.5% (n=44) were on PD, 1 was transplanted, 2 recovered renal function, 2 transferred to other HD centres and 11.3% (n=14) were deceased. Overall, 64.5% (n=80) remained on their chosen modality at 6 months. A higher proportion of patients who were undecided, had no documented RRT decision or who had a late modality change (n=34) were male (73.5%) and of non-White ethnicity (44.1%).

Conclusions:
The majority of patients at our centre who made a decision regarding dialysis modality started and remained on their chosen modality. Almost all who were undecided, had no documented decision or who made a late modality change started HD via a temporary line. Similar to Centre 1, our data show that a higher proportion of these patients were male and of non-White ethnicity. Further work is needed to address the behavioural and cultural factors that influence late decision making in order to improve outcomes in this group of patients.

We would like to acknowledge and thank Dr Stephanie Stringer and Dr Alice Culliford for their prior work at Centre 1.

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Improving Kidney Transplant rates in the South West through the Kidney Quality Improvement Partnership (KQuIP)

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A new renal transplant network has developed in the South West (SW). The national KQuIP initiative has stimulated and supported six SW renal units to create the SW Team Transplant (SWTT). The focus on improving transplantation was agreed at an inaugural meeting in October 2018 with clinicians and patients present in response to data showing variation across the region. The ongoing project has been successful, as measured by enthusiastic representation from all units, data collection, tangible improvements in patient care, and the use of formal quality improvement (QI) techniques.

There had been no regional clinical policy meeting in the region for five years; factors hindering regional collaboration included the large geographical area and no available funding for health professionals to attend meetings or take on additional work.

Why has SWTT been successful? At the inaugural meeting a shared decision to pursue improvements to transplant care was made across the 80 attendees, and a regional lead nominated. Using the KQuIP framework each unit committed two multi-professional team members to attend quarterly meetings and lead on QI projects locally. Subsequent meetings were chaired by the regional lead and supported by the KQuIP programme manager who provided ongoing QI and leadership support through unit visits. In addition, KQuIP supported a two day residential leadership course that emphasised leadership skills, and fostered a strong team ethic amongst leads. A flat structure has been adopted at meetings, with the regional clinical lead summarising NHSBT data and team members presenting their unit's data (activity, innovation, challenges), enabling healthy and honest discussion and sharing of learning. Patients and relatives also attend with a rolling agenda item led by them. National leaders from the UK Renal Registry, The Renal Association, Northern Ireland and Transplant First have attended meetings, presenting key concepts, sharing experiences and motivational themes.

What has been achieved? SWTT has met on six occasions. SMART objectives were discussed and agreed, to ensure legitimacy of the project. A common purpose was agreed and a regional driver diagram developed using the LIFEQI platform. This has served as a project plan and focus for the team, and has been added to and amended with debate and agreement at subsequent meetings. Change ideas such as e-referral, one stop clinics, patient experience measures and an 18 week pathway have been introduced using a PDSA approach. Data is collected through the Transplant First dashboard as well as locally, by tracking patients along the newly introduced pathway. Units have employed QI techniques to measure their local improvements. A WhatsApp group has encouraged the rapid exchange of ideas between meetings.

What next for SWTT? Units are collecting data for improvement which is being shared across the region and over time individual units and the region will be able to compare important transplant care markers. The regional team members are working well together as a network, and although many have primarily transplant expertise, the newly developed QI skills and ongoing KQuIP support may be applicable to other projects e.g. improving renal patients' access to exercise.

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Glomerular microRNAs are Primary Instigators of Diabetic Nephropathy

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Introduction

MicroRNAs (miRNAs) are key regulators of glomerular function and have been implicated in the pathogenesis of diabetic nephropathy (DN). Previous profiling studies showing altered DN miRNA profiles were performed at single time points in established diabetic models, providing a "snapshot" of dynamic miRNA expression. In this study we proposed that aberrant miRNA expression triggers DN development and used a unique longitudinal sequencing approach to test this hypothesis. We determined the temporal relationships between miRNA and messenger (m)RNA expression, and related them to disease phenotype in the db/db mouse.

Method

MicroRNA sequencing (miRseq) and parallel whole transcriptome sequencing (RNAseq) were performed on glomerular extracts from db/db DBA/2J mice, and wild-type littermate controls, at 4, 8 and 12 weeks (n = 3 per group, per time point). Ingenuity Pathway Analysis (IPA) was used to compare miRNA and mRNA changes from 4-12 weeks, and to investigate miRNA:mRNA target interactions potentially driving DN pathogenesis.

Results

We observed differential expression (DE) of 68 miRNAs, but no mRNAs, as early as 4 weeks; 4 weeks before onset of demonstrable hyperglycaemia and insulin resistance. IPA showed significant enrichment in inflammatory (NFκB/Jnk) and fibrotic (TGF-β/Smad) pathways for these 4 week DE miRNAs, 70% of which were also changed at 12 weeks. Paired interaction analysis at 12 weeks identified 22 reciprocally expressed miRNA:mRNA target pairs with roles in mitochondrial dysfunction (miR-7a-5p/alpha-synuclein), insulin-like growth factor 1 signalling (miR-16-5p/IGF-1) and cytoskeletal regulation (miR-223-3p/stathmin).

Discussion

We have shown, for the first time, that glomerular miRNA changes associated with established diabetic pathways of oxidative stress, inflammation and fibrosis are transcriptionally activated as early as 4 weeks. These findings support our hypothesis that changes in miRNA expression are an initiating insult in DN, and highlight miRNAs as potential therapeutic targets to arrest disease development. Correlation of parallel miRseq and RNAseq data to identify pathogenic miRNA:mRNA interactions provides an effective screening approach for miRNA candidates with therapeutic potential that merit further mechanistic investigation.

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Dietetic Assistant versus Specialist Renal Dietitian: Investigating efficiencies in the Dietetic workforce

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Background
Increasing demands on healthcare and the gap in workforce or funding supply mean introducing new roles and changing the skill mix of dietetic teams will continue to be necessary. The National Workforce planning guidance document1 advocates a structured systematic approach to planning, implementing and monitoring new roles or changes to skill mix. When planned effectively, new roles and skill-mixes will contribute to securing safe and sustainable care. The renal workforce document2 states that Renal Dietetic Assistants (DAs) and renal Band 5 dietitians form 7% and 5% of the renal dietetic workforce. The aim of this descriptive, scoping project was to better understand the scope of work that the renal dietetic assistant undertook and how this new skills-set impacted on the renal dietetic workload.
Method
A time and motion study was carried out to show the work activity of a dietetic assistant during their 18.75hr/1125mins working week, for 2 weeks. During the same period a Band 7 captured their work activity over the same time frame. Work duties were coded and recorded on an Excel spreadsheet, then analysed to show the impact of a DA in the dietetic workforce.
Results
Analysis of the work activities recorded in time (mins) of the DA and Band 7 shows that the DA spent 50% of their time seeing routine oral nutrition support patients. The Specialist Renal Dietitian (Band 7) concentrated on complex nutrition support reviews in ICU and renal HDU, which amounted to 55% of time spent. 25% of their time was spent on routine nutrition reviews e.g. clinic reviews. An illustrated non clinical role fell under project which totalled 7% of time for the Band 7 and 9% for the DA time. The DA was able to assist with implementation of a new nutrition screening tool by auditing ward equipment and calibration dates of weighing scales, which freed up time for the Band 7 to produce a training package to assist implementation of the screening tool. Examples of differences in activities are shown in Figures 1 & 2.
Conclusion
Incorporating a DA into the dietetic workforce did not increase the Band 7's productivity in terms of numbers of patients seen each. However, including a DA in the workforce shifted the Band 7 Renal Dietitian's caseload towards more clinical complexity, and freed up time for engaging in renal service development/QI projects such as implementing a new renal nutrition screening tool. Working together on such projects maximised value of both the DA and the Band 7 by synergistic and collaborative working.

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Recipient outcome after declining a deceased-donor kidney offer

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Background
The decision to accept a deceased-donor kidney depends on organ quality, and also recipient factors, such as an estimate of mortality on dialysis, and the likelihood of receiving a more favourable offer. Whilst outcome after transplantation has been well studied, with several donor-related risk factors widely accepted, little is known about the outcome after declining a kidney, such as the influence of recipient factors on the chance of subsequent transplantation.

Methods
Over a 12 month period at a single UK centre, all potential recipients were identified for whom a deceased-donor kidney offer was declined, with subsequent transplant outcomes recorded.

Results
Kidneys were declined for 145 patients, aged 24 - 78 (mean 54.1 years), due to donor / organ quality (57.2%), recipient illness / unavailability (26.2%), and positive crossmatch (4.8%) with the remaining offers withdrawn (11.8%), largely due to delayed cardiac death.

Over a mean follow-up of 12 months, 88 patients (60.7%) received at least one further offer. Second offers were made on average of 103 days after the initial organ decline, and tended to be from slightly younger donors (55.2 vs 58.9 years, p=0.054) with the same HLA match (3.2/6 antigens matched).

By the end of observation, 65 patients (44.8%) had been transplanted, 40 (27.6%) remained on the wait-list, 34 (23.4%) were temporarily or permanently suspended from the wait-list, and 6 (4.1%) had died. Highly sensitised patients (calculated HLA reaction frequency over 75%) were less likely to be transplanted (21.4 vs 52.7%, p= 0.007) after declining a kidney offer compared to those less sensitised. Older patients (over 65) were more likely to be suspended from the transplant list (45.1 vs 23.8%, p=0.042) with a similar tendency also seen in those waiting over 3.5 years for their first offer (37.0 vs 23.8%, p=0.094).

Conclusion
After declining a deceased-donor kidney offer, around 45% of patients may expect to be transplanted during the following year, whilst around 25% may be suspended from the wait-list. Risk factors for suspension or non-transplantation include older age, longer wait-time and greater HLA sensitisation. These data should be considered by patients and clinicians making kidney offer decisions.

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Developing precise fluid assessment in acute kidney injury– a comparison of clinical assessment versus bioimpedance.

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Background:
Fluid assessment in acute kidney injury (AKI) is challenging, requiring a trained clinician to determine whether signs- of variable utility- are present. Signs to detect hypovolaemia due to fluid or blood loss have limited sensitivity and/or are not widely used. Relative hypovolaemia is not accompanied by overt hypotension (Liu et al., 2009). Similarly, signs of fluid overload lack sensitivity and specificity to detect its early stages.

Methods:
We have recently started to audit clinical fluid balance assessment in comparison to that provided by bioimpedance in AKI stages 2 and 3. Bioimpedance has the advantages of being validated in renal patients and can be readily applied by nursing staff.

Adult inpatients with AKI stage 2 or 3 referred to the renal team within 72 hours of the AKI alert are included. Volume assessment by a Nephrologist includes supine and standing heart rate and blood pressure, jugular venous pressure and abdominojugular reflex, presence of bibasal crepitations and standardised rating of dependent oedema. Bioimpedance is carried out independently by a trained Renal Nurse using the Fresenius Body Composition Monitor (BCM®) on the same day. The Nephrologist is blinded to the bioimpedance result until fluid assessment has taken place. Height and weight are directly measured, or if bedbound we use ulnar length to predict height (https://www.bapen.org.uk/pdfs/nsw/nsw11/ulna-measurement-nsw11.doc), and the procedure of Rabito EI et al., Revista de Nutrição, 2006 to predict weight.

Preliminary Results/ Case Example:
A 44 year old male with a background of advanced lung carcinoma who had received recent chemotherapy (carboplatin and pemtrexed) was admitted generally unwell with reduced oral intake. He was found to be anaemic with a Haemoglobin of 60 g/L. He was referred to the renal team with an AKI stage 3 (creatinine 265 umol/L, baseline 43 umol/L). Clinical assessment using the parameters outlined above deemed the patient to be hypovolaemic. Bioimpedance demonstrated that the patient's fluid balance was positive by 7.4 litres. Reviewing the fluid prescription charts, this patient had received 12.6 litres of fluid, including a blood transfusion.

Preliminary Conclusions:
Data collection is ongoing and summary data will be presented. In the early stages of this audit, our case example demonstrates a significant discrepancy between clinical fluid assessment versus bioimpedance. Given the subjectivity of traditional clinical measures, bioimpedance may potentially be a useful clinical tool for determining fluid balance in AKI patients.

We would like to acknowledge Rani Joseph, Joanne Rhodes and Margaret Carmody who are carrying out the bioimpedance measurements for this audit.

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Aetiological subtypes of TIA and ischaemic stroke in chronic kidney disease: population-based study

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Background And Aims

Chronic kidney disease (CKD) is strongly associated with stroke risk. The mechanisms underlying this association might be subtype-specific, but few studies have reported stroke subtypes in CKD according to established classification systems such as the Trial of ORG 10172 in Acute Stroke Treatment (TOAST) criteria. We aimed to determine which transient ischaemic attack (TIA)/ischaemic stroke TOAST subtypes occur most frequently in CKD.

Methods

In a population-based study (Oxford Vascular Study), all ischaemic TIA/stroke were classified by TOAST subtypes (cardioembolism, large artery, small vessel disease [SVD], undetermined, multiple, other aetiology, or incompletely investigated). Logistic regression was used to determine the relationship between CKD (eGFR<60ml/min/1.73m2) and TIA/stroke subtype.

Results

Of 2969 patients with TIA/ischaemic stroke, 1197 (40.3%) had CKD. Although there was a greater prevalence of cardioembolic (31.8 vs 21.2%; p<0.001) and multiple aetiology (4.3 vs 2.8%; p=0.03) events in CKD, these associations diminished after adjustment for age and hypertension (OR=1.21, 1.00-1.46; p=0.06 and 1.09, 0.70-1.67; p=0.71 for cardioembolic and multiple subtypes, respectively). There was lower prevalence of SVD (8.8 vs 13.6%), undetermined (26.1 vs 39.4%), and other aetiology (1.0 vs 3.6%) subtypes in CKD (all p<0.001) but these associations were also not significant after adjustment (OR=0.84, 0.64-1.10; p=0.21 for SVD, OR=0.84, 0.70-1.01; p=0.06 for undetermined, OR=0.73, 0.37-1.45; p=0.36 for other).

Conclusions

There were few associations between CKD and specific TOAST subtypes after adjustment for age and hypertension, indicating that non-traditional or renal-specific risk factors are unlikely to be important causative factors in the relationship between CKD and stroke.

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Stroke severity, recovery and recurrence in chronic kidney disease: population-based study

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Background And Aims

Chronic kidney disease (CKD) is associated with cerebrovascular disease and related mortality, and with under-utilisation of acute and preventive treatments, but any impact on initial event severity, recovery, and recurrence risk is unclear. We aimed to determine whether CKD is associated with worse initial stroke severity and recovery, and whether CKD is independently predictive of recurrent stroke.

Methods

In a population-based study of all TIA/stroke (Oxford Vascular Study), we studied initial stroke severity and early recovery using the National Institutes of Health Stroke Scale (NIHSS) and modified Rankin scale (mRS), respectively, in relation to CKD (eGFR<60ml/min/1.73m2) in all patients presenting with TIA and ischaemic stroke from 2002-2017. Cox proportional hazard models were used to determine the risk of recurrent stroke.

Results

Among 2969 patients presenting with TIA/ischaemic stroke, 1197 (40.3%) had CKD. CKD was associated with ischaemic stroke vs TIA (adjusted OR=1.31, 95%CI=1.11-1.56; p=0.002) and with greater initial NIHSS (adjusted OR=1.31, 1.07-1.60; p=0.008). Among patients with stroke, CKD was also associated with worse one-month mRS scores (adjusted OR=1.40, 1.13-1.74; p=0.002). The unadjusted HR for recurrent stroke with CKD (HR=1.72, 1.45-2.05; p<0.001) attenuated with adjustment for age (HR=1.36, 1.13-1.64; p=0.001) and with additional adjustment for vascular risk factors (HR=1.28, 1.05-1.55; p=0.012).

Conclusions

CKD is associated with severity of cerebrovascular events (stroke vs TIA; initial NIHSS; 1-month mRS) and is independently predictive of stroke recurrence. Further research should determine to what extent this reflects under-treatment/prevention.

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Major Adverse Cardiovascular Events (MACE) after kidney transplantation: a population-cohort analysis of English transplant centres

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Background. Due to a high burden of cardiovascular disease in end-stage kidney failure, candidates for kidney transplantation must undergo cardiac screening to determine their 'cardiac fitness' to proceed with surgery even when asymptomatic and in the absence of robust evidence. MACE rates within the first year after kidney transplantation in North American centres are reported at between 7.0% and 8.7% but data from an English cohort is lacking. Therefore, the aim of this population-cohort analysis was to determine the MACE rate within the first year after kidney transplantation for all kidney transplant recipients in England.

Methodology. We obtained data from every kidney transplant procedure performed in England between 1st April 2002 and 31st March 2018. Data was extracted from Hospital Episode Statistics using administrative ICD-10 and OPCS-4 codes, with linkage to the national death registry for mortality data (including causality). We excluded age ≤18, repeat transplant in same period, multi-organ transplant and residence outside England. MACE was defined as any hospital admissions with myocardial infarction, stroke, unstable angina, heart failure, any coronary revascularisation procedure and/or any cardiovascular-related death. Univariable and multivariable logistical regression analyses were conducted to investigate the odds for MACE after kidney transplantation.

Results. After exclusions, we had a cohort of 30,325 kidney transplant recipients for analysis. MACE events occurred in 781 kidney transplant recipients within the first-year post-transplantation (2.6% of all kidney transplant procedures). Of these 781 MACE events, 201 occurred during the index admission for kidney transplantation surgery (representing 25.7% of all first-year MACE events and 0.7% of all kidney transplant procedures). Predictors of long-term mortality on Cox regression include; age, non-White ethnicity, socio-economic deprivation, deceased donor, pre-existing diabetes, increased Charlson score, previous cardiac history and MACE within the first year (HR 2.59; 95% CI 2.34-2.88, p<0.001). Kidney transplant recipients who suffered a non-fatal MACE within the first year had 1-, 3-, 5- and 10-year patient survival of 80.5%, 70.2%, 54.5% and 38.6%, compared to 97.4%, 94.4%, 90.7% and 78.4% for kidney transplant recipients not developing MACE within the first year post-transplant (p<0.001). Kidney transplant recipients having MACE events during the index admission compared to subsequent admissions were differentiated by age, sex and previous cardiac history but had similar patient survival (p=0.283).

Discussion. MACE events within the first year after kidney transplantation are associated with increased mortality risk in England but MACE rates are significantly lower at 2.6% than those reported in North America. This is despite similar cardiac screening strategies, which may reflect different patient demographics and kidney failure care. In the context of the increased debate concerning the utility of cardiac screening asymptomatic kidney transplant candidates, understanding baseline MACE rates can shape the design of clinical trials exploring non-inferiority of cardiac screening versus non-screening before joining the waiting list (which differs methodologically from the CARSK study). However, renal physicians and surgeons will need to determine the upper boundary of the 95% confidence interval for the hazard ratio of MACE risk in any future clinical trial.

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Pregnancy and Preconception Checks in Women with Renal disease) - An Audit

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Introduction: Pregnancy presents a number of challenges for women with renal disease. Early intervention and specialist care are fundamental to ensuring the best possible care for female patients of childbearing age..
Methods: We utilised our database of female patients of childbearing age in a tertiary renal centre to investigate whether certain features of their care, which were key to improving their fertility as well as their renal and pregnancy outcomes, were being assessed in clinic. These included:
- whether family planning, including contraception, was discussed in clinic
- whether the patient was taking folate if they were planning a pregnancy
- whether they were taking any teratogens, and if so whether a plan was in place for pregnancy
- whether there was documentation of their last smear
- whether they have active blood-borne viraemia
- whether their VZV and rubella statuses were tested
- whether or not they are taking aspirin if appropriate
- whether or not their periods were irregular, and if so whether they were referred to fertility services
- for patients with Systemic Lupus Erythematosus who were Ro antibody positive, whether they were referred for foetal echocardiography
- whether they had been referred to pre-pregnancy counseling or were followed up by a specialist clinic during pregnancy
The results were then presented to a group of local experts and strategies for improving outcomes were discussed.
Results: We found that, of the 92 patients audited, there was a documented discussion about at least some of these points in many of these patients, though all points were covered in very few cases. These fortunate few had all been seen in the renal obstetric clinic.
Conclusions: There a number of features of the care of women of childbearing age with renal disease that need to be addressed consistently. We are currently developing an information poster and are expecting that recent changes in staffing may help to improve our care. We will re-audit in the months to come.

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Dietary and physical activity/exercise behavioural interventions for weight loss in adults with chronic kidney disease: a systematic review

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Introduction

Overweight/obesity are risk factors for developing chronic kidney disease (CKD), increasing progression to dialysis, and limiting suitability for, and adversely affecting outcomes after, kidney transplant. Little is known about how clinical teams should support adults with CKD to achieve and maintain weight loss using diet and physical activity (PA)/exercise.

We conducted a systematic review of randomised controlled trials (RCTs) to establish the effect of dietary or PA/exercise behavioural interventions on body weight (primary outcome) and other anthropometric outcomes (body mass index, waist circumference, waist-hip ratio, body fat percentage). Safety of interventions was assessed by estimated glomerular filtration rate (eGFR) and serum creatinine.

Methods

Six bibliographic databases (plus hand and citation searching) were searched to identify RCTs of dietary or PA/exercise behavioural interventions in adults with CKD (pre-dialysis, dialysis and post-transplant). Articles were independently assessed for inclusion by two reviewers. Study characteristics, methodological quality, practical strategies for changing dietary and PA/exercise behaviour (taxonomy of theory-linked behaviour change techniques [BCTs]), and treatment fidelity strategies were captured using a structured data extraction form. Meta-analyses were conducted separately for pre-dialysis, dialysis and renal transplant studies to establish overall effects on outcomes for four types of comparisons (i) diet versus usual care; (ii) PA/exercise versus usual care; (iii) PA/exercise and diet combined versus usual care; and (iv) diet versus diet and PA/exercise combined. Active ingredients (behavioural theories/models, BCTs, intensity, duration and other features such as mode of delivery) of interventions associated with clinically significant improvements in outcomes were identified by calculating a ‘promise’ ratio.

Results

Twenty-one RCTs, with a combined sample size of 1,990 patients were identified: n=14 (pre-dialysis); n=2 (dialysis); and n=5 (transplant). PA/exercise interventions (versus usual care) for pre-dialysis patients produced a statistically significant reduction in body weight (standardised mean difference [SMD] -0.86 Kg, 95% CI [-1.63, -0.08] based on data from two studies. Meta-analyses for dialysis studies showed no statistically significant effects of PA or diet (or combinations) on outcomes of interest. PA/exercise and dietary combined interventions (versus usual care) for kidney transplant patients produced a statistically significant reduction in body mass index (SMD - 0.57 Kg/m2, 95% CI [-1.12, -0.03] based on data from two studies. Only one study reported a statistically significant decrease in eGFR. Fifteen BCTs were associated with promising interventions for pre-dialysis studies (e.g. instruction on how to perform a behaviour, and self-monitoring of behaviour). Promising features of pre-dialysis interventions were low-fat diets, aerobic PA/exercise, high intensity (≥ 21 contacts), interventions delivered via one-to-one and group sessions, and those with a supervised component.

Discussion

Dietary and PA/exercise interventions for pre-dialysis and kidney transplant patients are feasible, safe and can lead to improved anthropometric outcomes in adults with CKD. There is a pressing need for more research on behavioural interventions for dialysis patients. Future studies should aim to identify which

combinations of BCTs and other promising intervention features are most acceptable to patients at pre-dialysis, dialysis and transplant stages of CKD to inform intervention design, alongside implementation of treatment fidelity strategies to maximise outcomes.

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Managing a Pneumocystis jirovecii pneumonia outbreak in a renal transplant population: Challenges and opportunities

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Introduction
There are reports in the literature of outbreaks of pneumocystis jirovecii pneumonia (PCP/PJP) in renal transplant populations. Nevertheless, guidance and experience in managing such outbreaks remains limited. Here, we will highlight how we dealt with a recent PCP/PJP outbreak to minimise transmission between patients as well as the challenges and lessons learnt.

Methods
Once the PCP/PJP outbreak was declared, the transplant lead contacted other units in which there were a PCP/PJP outbreak to draw from their experiences, as well as conducting an extensive literature review and identifying any relevant guidelines.

The following actions were instigated:
- Regular meetings between microbiology team, infection prevention nurses, infectious diseases consultants, out-patient co-ordinators, representatives from estates, renal consultants, public health, CCGs and transplant nurses.
- Re-establishing PCP/PJP prophylaxis, with appropriate blood test monitoring, for all 420 renal transplant patients
- We used co-trimoxazole as first line (480mg od for patients at low risk of complications and 480mg od if high risk), atovaquone as second line and dapsone as third line.
- CCGs agreed to support co-trimoxazole prescribing and monitoring in patients at low risk of complications
- Patients were offered face masks when attending clinics.
- Patients were given the opportunity to have a telephone consultation instead of attending clinic.
- Microbiology team processed samples more quickly, and we started using Beta-D-Glucan as a screening test.

Results
Over 50 hours of consultant time was spent managing the outbreak including screening all patients records to determine the prophylaxis regime. Secretarial staff and health care assistants co-ordinated sending letters to patients and GPs. The nurses maintained a database of blood test dates and co-ordinated reviewing results in accordance with consultant agreed parameters.

The average number of daily phone calls from transplant patients to the transplant nurses increased from an average of 10 phone calls to 30 phone calls per day.

24 patients contacted the transplant team to report symptoms of shortness of breath, dry cough and sore throat within a few days of the outbreak being declared of which only 1 patient was found to be positive for PCP/PJP.

No patient who had been started on prophylaxis went on to develop PCP/PJP. There were no further mortalities in cases presenting after the outbreak was declared. Patients were advised to remain on prophylaxis until 3 months after the last case was diagnosed.

As the literature is unclear on optimal co-trimoxazole dose we had used the two-tiered approach. However there were significant side effects, blood test changes and need for dose adjustments (data being analysed). During the outbreak we spent over £30,000 on atovaquone.

Conclusion

If we have a future outbreak we plan to use a prophylactic dose of co-trimoxazole 480mg alternate days in all patients to minimise morbidity and to use of a different second line agent.

Co-ordinating care during this outbreak involved all members on the multi-professional MDT both in secondary and primary care. Staff in all areas went above and beyond and often worked considerably over their normal hours to keep patients safe.

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Outcomes of a Pneumocystis jirovecii pneumonia outbreak in a renal transplant population of 420 prevalent patients

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Introduction
Pneumocystis jirovecii pneumonia (PCP/PJP) remains a substantial cause of morbidity and mortality in immunocompromised patients. Description of an outbreak of PCP/PJP outbreak in a transplant population attending the same renal clinic showed possibility of inter-human transmission on multiple occasions. In this presentation we describe our response to this outbreak and the outcomes of the patients affected.
Methods
From mid-November 2018 to early February 2019 we had 6 suspected patients with PCP/PJP- 4 confirmed cases, 1 case not confirmed with BAL, 1 case in which diagnosis was established post-mortem. The attendance to the transplant clinic of patients with suspected PCP/PJP was mapped from 3 to 4 months prior to the diagnosis of the index case and it confirmed that the affected patients had simultaneously attended the transplant clinic with the index case or another infected patient.
Results
By the end of the outbreak there were 12 confirmed cases of PCP/PJP (1 at postmortem). 11 cases were renal transplant patients, with 1 patient being on immunosuppression for treatment of SLE and lived in the same household as 1 of the confirmed PCP/PJP cases. The mortality in our cluster was 17% or 2 out of our 12 patients. The standard treatment used has high dose intravenous or oral co-trimoxazole plus high dose steroids depending on the severity of the illness.5 out of the 12 patients diagnosed with PCP/PJP required renal replacement therapy – 1 patient had advanced CKD Category 5 at time of diagnosis; 2 patients required renal replacement therapy because of hyperkalaemia and 2 patients had multi-organ failure on critical care. 33% of patients (4/12) had their treatment changed to primaquine/clindamycin or another agent in view of AKI. 2 patients were treated with only a prophylactic dose because it was felt they were only colonized not actively infected. Among the patients with suspected PCP/PJP (23 patients), 1 patient developed methaemoglobinaemia secondary to primaquine, 1 patient was found to have a pulmonary embolus showing the importance of keeping an open mind to other diagnoses in an outbreak. When high dose co-trimoxazole was used pending the confirmation of PCP/PJP a high rate of acute kidney injury was noted. The last positive case identified 25th March 2019; as the incubation period of PCP /PJP is 3 months the outbreak was declared close in late June 2019.
Conclusion
Pnuemocystits jirovecii pneumonia and its treatment carries a risk of mortality and high morbidity in renal transplant patients. Vigilance is important to recognise an above average rate of infection in the renal transplant population. In our outbreak the index case was initially missed as the patient passed away on critical care and the renal transplant team was unaware of this diagnosis. This highlights the importance of close liaison between the microbiology team and the renal transplant team to identify such clusters as early as possible.

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Biopsy-proven acute interstitial nephritis, 2005-2017: a case series.

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INTRODUCTION:
Acute interstitial nephritis remains a common cause of AKI which occasionally can be severe enough to need renal replacement therapy. The causes and outcomes of AIN have been changing over the years especially with the introduction of newer medications including newer antibiotic families. We, therefore, undertook a retrospective review of biopsy-proven acute interstitial nephritis between the years 2005 to 2017 to ascertain the changing profile; if any of this important diagnosis.

METHODS:
Single-center case series of all the biopsy-proven acute interstitial nephritis patients presenting between 2005 to 2017. Patients' data was examined to look for the etiology of AIN, treatment provided and degree of renal recovery.

RESULTS:
A total of 82 patients were found to have Acute interstitial nephritis on renal biopsy. The mean age at the diagnosis was 64.7 +/- 13.9. Female to male ratio was 1:1.5.
Out of 82 patients, the cause remained unknown in 35 (42.7%) patients.

Overall 41(50%) cases were linked to a drug. Omeprazole was identified as causative agent in 18 (22%) cases followed by NSAIDs (n 6; 7.3%), Amoxicillin (n 5; 6.1%) and Flucloxacillin (n 3; 3.7%).

Paraproteinemia was associated with 3 cases, 2 were linked to systemic infection. 1 case was attributed to an autoimmune disorder (Sjogren syndrome) and 1 to Sarcoidosis.

36(44%) patients had complete renal recovery while 41(50%) regained partial function. 16 patients required dialysis however, only 5(6%) patients failed to recover and remained on dialysis at the end of treatment.

76(92%) patients were treated with corticosteroids for an average of 12 weeks.

CONCLUSIONS:
Omeprazole and NSAIDS remain the commonest identifiable causes of drug-induced AIN in keeping with prior case series reviews. However, we acknowledge that it was impossible to identify the cause of AIN in a significant proportion of patients in this study. Despite the use of corticosteroid therapy, less than half of the patients achieved a complete renal recovery.

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Kidney single-cell atlas reveals myeloid heterogeneity in progression and regression of kidney disease

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Introduction
The kidney has a limited capacity to repair following injury however the endogenous reparative pathways involved in this process are not well understood. The innate immune system has been implicated in both progression and regression of fibrosis in multiple organs including the kidney . This may be via macrophage mediated tissue remodeling or through recruitment of both pro-inflammatory and patrolling monocytes to the injured kidney, exacerbating tissue damage through the release of pro-inflammatory factors and by activating myofibroblasts.
Methods
To characterise the myeloid cell phenotypes observed in renal injury and repair, we utilised the murine model of reversible unilateral ureteric obstruction (R-UUO) in which injury and fibrosis are rapidly induced by ureteric obstruction before regressing following reversal of the obstruction. We then combined complementary technologies, including plate and droplet-based single cell RNA-seq, flow cytometry and paired blood exchange to identified novel subsets of myeloid cells which may offer therapeutic targets to inhibit progression and enhance resolution of kidney disease. To determine whether myeloid cell phenotypes that we identified in murine obstructive nephropathy are also observed in human kidney disease, we assessed whether antibodies against myeloid cluster-specific markers bound to immune cells in the kidney using the Human Protein Atlas.
Results
Using single cell RNAseq analysis of ~17,500 individual transcriptomes from renal cortex we characterize myeloid cell heterogeneity, identifying novel monocyte, macrophage and dendritic cell subsets associated specifically with either injury or repair. By integrating this transcriptomic data with antibody florescence intensity recorded during FACS index sorting, we demonstrate that many of our clusters would not be identifiable through conventional flow cytometry.
We describe early accumulation of Ly6c2+ and Arg1+ monocytes following ureteric obstruction, as well as 5 distinct subtypes of macrophage which emerge at different phases during injury and resolution.
Intriguingly, a novel macrophage cluster was observed solely in kidneys from mice that had undergone R-UUO and was characterised by expression of Mmp12, a macrophage-specific metalloproteinase, suggesting that these cells may be involved in matrix remodeling. We demonstrate that such subsets are also observed in human kidney disease.
Using paired blood exchange to track circulating immune cells, we determine that monocytes are recruited to the kidney early after injury and are the source of Ccr2+ macrophages that accumulate in late injury.
Finally, myeloid cell subsets correlate with fibrosis in human kidney disease. We demonstrate the presence of a number of myeloid markers such as F13A1, DOK2, ITGAL,CD68, Mannose receptor and CCR2 which are spatially and quantitatively correlated to injury and fibrosis in the human kidney as our data predicts, suggesting that these key myeloid cells we describe may be implicated in the pathogenesis of human kidney disease.

Discussion

Our data demonstrate the utility of complementary technologies to identify novel myeloid subtypes. These cells and pathways may represent therapeutic targets to inhibit progression or promote regression of kidney disease.

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What patients preferred as RRT modality and what they received? A retrospective cohort study from a single center in the UK

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BACKGROUND:
Peritoneal dialysis is equivalent to hemodialysis in terms of patient outcomes. A considerable number of patients opt for peritoneal dialysis however it is noted that many patients who choose peritoneal dialysis as their modality of choice do not end up on it or are switched to hemodialysis after initiation. This study aims to look at the factors responsible for this mismatch.

METHODS:
A retrospective cohort study of all patients commencing chronic dialysis between June 2009 to June 2019 to discern the difference between chosen and initiated dialysis modality and thereafter at 3, 6 and 12 months after starting dialysis.

RESULTS:
Of the 448 patients receiving pre-dialysis education, 210 decided to have peritoneal dialysis as their preferred modality of renal replacement therapy, 206 selected hospital hemodialysis, 8 planned for home hemodialysis, 20 remained undecided and 4 opted for conservative management.

At the time of initiation of renal replacement therapy, 155 patients received peritoneal dialysis, 270 commenced on hospital hemodialysis out of which 83 had acute unplanned hemodialysis while 187 were elective starters. 18 patients had a preemptive renal transplant and only 2 were established on home hemodialysis.

Out of the 155 patients starting on peritoneal dialysis, 98% continued on it in the next 3 months. However, this figure reduced to 87% and 80% at 6 months and 12 months, respectively.

The most common reason for failure to start on peritoneal dialysis despite choosing it was change of mind (37.5%) followed by surgical contraindication (15%) and acute illness (12.5%).

The commonest reason for discontinuation of peritoneal dialysis within the first year of initiation was PD peritonitis (45%) followed by poor clearance (16%).

CONCLUSIONS:
Although the majority of patients received the renal replacement therapy of their choice, a quarter of patients choosing peritoneal dialysis could not. While the main reason for not starting peritoneal dialysis was the patients changing their preference, the commonest cause of discontinuation after being established on peritoneal dialysis was noted to be PD peritonitis. More work needs to be done about the patients changing their minds by interventions such as peer education and support by dialysis staff.

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Alternative phosphorylation states of protein tyrosine kinases SHP-1 as a biomarker for renal activity in lupus nephritis patients

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Background: The management of lupus nephritis (LN) is significantly hampered by our reliance on clinical biomarkers that poorly reflect inflammation occurring in the kidney. Protein tyrosine kinases (PTKs) are enzymes responsible for the phosphorylation of tyrosine residues in critical cell signaling molecules, that are switched on prior to cell activation. Recent data (Mkaddem et al., 2017) has suggested that unique PTK signatures in peripheral leukocytes are associated with active lupus nephritis. However, it is unknown if these signatures change with disease activity and could be used as clinical biomarkers. We hypothesised that active and refractory patients with LN have a different PTK profile, with lower expression of pSHP1-Y536 and greater expression of pSHP1-S591, in comparison to remission patients and healthy controls. In addition, longitudinal measurement of these profiles may better inform management decisions resulting in improved outcomes.

Methods: Peripheral blood mononuclear cells (PBMC) were isolated by density centrifugation of whole blood venesected from patients with LN or healthy age matched controls. Western blotting of PBMC lysates for SHP1-phospho-S591 and-Y536 was performed. Densitometry of bands was carried out and a ratio of S591:Y536 expression calculated (both normalized to actin).

Results: We tested 14 healthy controls (50% female; median age 34.5 years; interquartile range [IQR] 31-38 years) and 10 LN patients (70% female; median age 36 years; IQR 31-40 years), two with clinically active disease and eight considered to be in remission. LN patients had a median eGFR 90ml/min/1.73m2 (IQR 86-90 ml/min/1.73m2) and a proliferative class (III or IV) in 80% of the renal biopsies. The median relative protein expression of SHP1-pS591:pY536 in PBMC was similar between remission patients and healthy controls (p=0.13). However, clinically active/refractory patients had significantly higher ratios than remission patients (Figure 1). Interestingly the overall ratio in patients was strongly correlated to proteinuria (r=0.74, 95% CI=0.21-0.93, p=0.014), but not levels of C3, C4 or dsDNA.

Conclusion: We show for the first time that the ratio of PBMC phospho-SHP1 expression (pS591: pY536) normalizes during disease remission, and could identify patients with active disease or at risk for worse renal outcomes. Longitudinal follow up and correlation with biopsy features may help define if this is a better marker of ongoing disease rather than proteinuria which may reflect inflammation or scarring. We are currently testing a clinically applicable flow cytometry based method to assess these markers.

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Alternative phosphorylation states of protein tyrosine kinases SHP-1 as a biomarker for renal activity in lupus nephritis patients

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Hepato-pulmonary-renal presentation with pericardial haemorrhage in a returning traveller: a severe case of leptospirosis.

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Leptospirosis is an uncommon zoonotic infection that has a broad spectrum of presentation from mild asymptomatic illness to severe multi-organ damage, known as Weil's disease. We are presenting a particularly rare case of fulminant leptospirosis with severe multiple organ involvement. A middle-aged gentleman who gave a history of travel to a Caribbean island was admitted with myalgia, tiredness, and rigors. On initial assessment, he was found to have yellow sclerae and high temperature. Urgent blood panel showed stage 3 acute kidney injury, deranged liver function tests, and thrombocytopenia. Based on the coexistence of both organs' dysfunction, a clinical diagnosis of hepatorenal syndrome was made by the admitting team. He received specialist review with alternative diagnoses considered and was transferred to the regional renal centre receiving two sessions of haemodialysis. His illness was further complicated by pulmonary haemorrhage which added further complexity to the working diagnosis. Initially requested serology tests did confirm suspected leptospira infection and the patient was treated with appropriate antibiotics. Later in the course of illness, when independent of dialysis with improving renal function after hospital discharge, he presented with marked shortness of breath and was found to have a large hemorrhagic pericardial effusion which was drained successfully with rapid improvement of breathlessness. He continued to show clinical and functional improvement on subsequent clinic visits. His renal function normalised and he returned to his normal job. This case highlights the rarely encountered but potentially life threatening complications of Leptospirosis – particularly the late presentation with hemorrhagic pericarditis. It also serves as a reminder of the importance of ensuring hepatorenal syndrome remains a diagnosis of exclusion and that detailed travel history can provide the correct diagnosis before serological confirmation.

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Twice-daily assisted CAPD: innovating dialysis delivery for the frail elderly

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Introduction: Many countries including the UK have seen a dramatic increase in frail and elderly people with advanced kidney disease. Although some will choose conservative care, many start on dialysis either through their own decision making or from family or healthcare team pressures. In-centre haemodialysis (HD) has evolved to be the current standard of care as the majority are unable to perform dialysis at home. There is increasing awareness of the significant disadvantages of HD for people with complex health and social care needs particularly related to transport requirements and deterioration in physical and cognitive function.

With the aim of minimising dialysis burden and improving quality of life, we have developed a programme of assisted CAPD (aCAPD) with only 2 exchanges/day for 5-6 days/week, for symptomatic older people with residual kidney function. Patients choose aCAPD during discussions in predialysis care which include the choice of conservative care. At three months, patients have a discussion about benefit and burden of dialysis; as part of broader advanced care planning this includes an explicit decision about whether to continue aCAPD or convert to conservative care.

Methods: This is a retrospective observational cohort study using clinical records, of all patients on aCAPD until January 2020.

Results: Since 2014, 32 patients (22 male) started on aCAPD with GFR 7 ±2 ml/min (mean ±sd); all were symptomatic. Mean age at commencement of dialysis was 83 years (range 77 - 89), with mean Karnofsky Performance Status 59 (range 40 - 70). For all patients, of the two exchanges, at least one exchange consisted of icodextrin, with 6/32 patients requiring a second icodextrin exchange on a regular basis.

Follow-up duration ranged from 14 to 1030 days from the start of aCAPD. At 90 days following dialysis start 28/30 (93%) patients were still on aCAPD, two having withdrawn from dialysis. At 12 months, 15/26 continued on aCAPD (58%), 10/26 patients had died, whilst one had converted to conservative care and was still alive. During the whole follow-up period a total 13/32 patients have died, only 3/13 dying in hospital, the remainder doing so either at home or in a nursing home.

The peritonitis rate was 0.32 episodes/patient year and comparable to our centre rate; 22/32 patients never experienced an episode of peritonitis. The majority of patients reported an improvement in symptom burden. Excluding the two patients that withdrew early, 22/28 patients reported tiredness or anorexia at dialysis start, reducing to 4/28 at three months; dyspnoea or symptomatic oedema reduced from 13/28 to 7/28 at three months.

Conclusion: Assisted CAPD is a deliverable and effective dialysis option in frail, elderly people with residual kidney function, whilst supporting care at home. It is safe, with good outcomes in relation to mortality, peritonitis, and reduction in symptom burden. Longitudinal studies assessing patient-related outcomes will help define the role for aCAPD in the care of the multimorbid elderly patient.

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Effect of PD catheter length on mechanical complications in patients on peritoneal dialysis

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Introduction

Catheter malfunction and pain during fluid drainage contribute to significant morbidity in patients undergoing peritoneal dialysis (PD). Guidelines suggested that the location of the catheter tip and exit site has an impact on various PD complications including flow dysfunction, flow pain, and risk of infections. The recommendation is to have catheter tip ideally located in the pelvis for optimal hydraulic function, without being wedged between the rectum and the bladder or uterus, thus for coiled-tip catheters, the upper border of the coil should be aligned with the upper border of the pubic symphysis.

Aim

Our center uses single length coiled tip PD catheter for all patients, irrespective of the distance from the symphysis pubis to the insertion site, height or BMI of the patient. Distance between the proximal cuff and the upper end of the coil of PD catheter is 10cm. Aim of this single-center retrospective observational study was to analyse the effect of catheter length in comparison to the patient size on catheter-related outcomes of poor flow, pain, and excessive machine alarms or lost dwell time.

Results

- Number of patients observed - 27
- 14 males and 13 females.
- Average Age – 62.5 years (38 – 88)
- Average distance between the proximal cuff and symphysis pubis (D) – 12.2cm (9 – 20)
- 6 had a D ≤ 10cm.

Outcomes:

- 1 Failure
- 6 reported pain
- 4 had issues with repeated alarms
- 5 had significant lost dwell

Table 1. Mechanical complications by the difference in distance from the insertion site to symphysis pubis (D).

Conclusion

Guidelines for PD access recommend choosing catheter size according to the patient. Although this is a logical suggestion based on the anthropometric assumptions, there is no clinical data to validate this approach. This single-center study suggests that the variation in the length of the catheter in comparison to the patient anthropometric parameters does not contribute to increased mechanical complications. This observation would need to be evaluated further with a prospective randomised study to verify this conclusion.

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Renal epithelial senescence drives post injury fibrosis

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Introduction

Senescent cells (SC) accumulate in multiple organs, including kidneys with increasing age and disease where they have been associated with worse clinical outcomes. Tubular epithelial cells are noted to be the major SC in kidneys. The mechanism through which SC exert a detrimental effect on tissue is incompletely understood and the role of senolytic therapy during post-injury repair is undefined.

Here we perform the first characterisation and exploration of the in-vivo renal epithelial SC transcriptome at a single-cell resolution. We find conserved SC gene expression in cirrhotic human livers and human renal allografts during rejection. We propose markers of renal SC and describe secreted ligands which may activate mesenchymal cells and induce fibrosis. Finally, in a murine model of renal injury we deplete SC using ABT-263 (a senolytic compound licenced in humans) and demonstrate attenuated renal fibrosis.

Methods

To characterise SC at a single cell level we utilised the murine model of reversible unilateral ureteric obstruction (R-UUO) where injury and fibrosis are rapidly induced by ureteric obstruction before regression following reversal of the obstruction . We performed droplet-based single cell RNA-seq at multiple timepoints to allow us to explore the changing role of SC during injury and resolution(fig A). Our data were compared to recently published and publicly available human single cell datasets of cirrhotic livers and rejecting renal allografts. We then measured activation of human renal fibroblasts in vitro following exposure to candidate molecules. Finally, murine R-UUO was performed and SC were depleted using ABT-263. Senescence and fibrosis were quantified by histology, qPCR and RNA-SEQ.

Results

Beginning within ~17,500 individual transcriptomes from renal cortex we identified 7958 epithelial cells of which 320 were senescent (fig B,C). We perform the first characterisation in vivo of the renal SC transcriptome at single-cell resolution. We propose several markers for renal SC and describe a trajectory of epithelial to senescent transition (fig D,E).

We then identify novel ligands through which SC may communicate with the mesenchymal compartment to exert their pro-fibrotic effect on tissue. We show a number of these ligands are conserved across species and organs - found in human single cell data of a kidney allograft undergoing rejection and livers of patients with cirrhosis. The conservation of these genes suggests they may have a central role the fibrotic effect of SC on tissue (fig F).

Next, we confirmed the function of these conserved ligands and demonstrate a number of these molecules activate human renal fibroblasts in vitro.

Finally, following R-UUO, mice treated with the senolytic ABT-263 had less SC as detected by immunohistochemistry, qPCR and RNA-SEQ as well as decreased expression of several key senescence associated factors. Additionally, these mice had less renal cortical fibrosis than mice treated with vehicle (fig G).

Discussion

SC communicate with the mesenchymal cells during repair following renal injury and their depletion decreases renal fibrosis. These cells and pathways present novel targets to improve post injury repair and may potentially have a broader therapeutic role such as attenuating the progressive fibrosis of CKD.

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Abandoning the 'One-Size-Fits-All' Dialysis Prescription: Substantial Numbers of Patients Likely to Benefit?

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The 2019 Renal Association Clinical Practice Guidelines for Haemodialysis recognise the importance of residual kidney function (RKF) in determining outcomes (Fig 1). Hitherto, the most common approach to administering HD in the UK is the prescription of 3x weekly dialysis with sessional times between 3.5 and 4 hours while ignoring residual kidney function (RKF). Some dialysis providers employ the prescription of 3x4 hrs as a key performance indicator (KPI).

Rigid adherence to this one-size-fits-all approach does not recognise:

- the contribution of residual renal function (RRF) to volume control
- the contribution of RRF to solute removal
- the need to preserve residual kidney function
- that, for some, the goal of treatment is QoL not longevity

The Renal Association now supports a more nuanced approach whereby the duration of a dialysis session can be individualised around RKF. The aim is to exceed the minimum target level of small solute clearance using a composite of dialyser and native kidney clearances.

In 2009 our unit published a 19 yr. experience with incremental dialysis reporting that residual kidney function was an important determinant of survival (Ref 1). Our research team has recently reported shorter post-dialysis recovery times and improved short-term survival in centres practicing incremental vs conventional approaches to HD delivery (Ref 2). While monthly measurement of urea clearance in HD patients passing urine is expensive in terms of pathology costs and nursing time we have continued with this practice because our patients tell us they appreciate dialysing for a safe minimum time.

When the RA Guideline was published we decided to ascertain how many patients in a typical average size 'stand-alone' satellite facility had RKF sufficient to impact on their dialysis prescription i.e. in whom dialysis duration could be reduced while target eKt/V (combined dialysis + RKF) was still achieved. We thought this exercise may be instructive for facilities contemplating movement to an incremental approach. The QA results in a single month were reviewed.

Among the 90 patients in our facility 40 (44%) were anuric. 50 patients (56%) had residual kidney function (RKF), 34 pts having a urine urea clearance (KrU) >1 ml/min. 16 patients had a KrU > 2ml/min.
In patients passing urine, dialysis time (Td) ranged from 180 to 240 mins (mean 214 mins); inter-dialytic weight gain (IDWG) averaged 0.6 Kg. In anuric patients Td ranged from 180 to 270 min (mean 234 mins); mean IDWG was 1.7 Kg.

Our data suggests, in a typical satellite unit, tailoring dialysis dose to residual kidney function will likely allow at least half of patients to reduce dialysis time safely while still achieving recommended adequacy targets.

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Infective endocarditis in patients receiving haemodialysis: epidemiology in a single centre

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Introduction
Infective endocarditis (IE) is a serious infective complication that usually results in prolonged hospitalisation and is associated with a high morbidity and mortality. Patients with end-stage renal disease receiving haemodialysis are at high risk of developing IE for various reasons including complex comorbidities and intra-vascular catheters. This study aimed to investigate the characteristics and outcomes of haemodialysis patients with infective endocarditis.

Methodology
This single centre observational study was conducted on all patients receiving haemodialysis at our centre who were diagnosed with IE between 2005 and 2018. The list of patients was obtained from a data search of electronic patient records (EPR) . Data including demographics, organisms from blood culture, vascular access history, echocardiogram reports and patient outcomes were collected from EPR. Descriptive analysis of the data was conducted using Microsoft excel.

Results
Over the period of 14 years, 35 episodes of infective endocarditis in 34 haemodialysis patients were recorded. The male to female ratio was 3:2 (21 male and 14 female) and the mean age was 62 years. 63% of patients were hypertensive and 45% had a history of diabetes mellitus. Staphylococcus was the most common organism isolated in blood cultures (19 out of 35) with a total of 7 negative culture results (Table 1). Left-sided IE was more commonly encountered (23 episodes). Regarding haemodialysis access, 27 patients had cuffed tunnelled lines at the time of diagnosis and 8 had arteriovenous fistulas. Of the patients with tunnelled lines, 15 developed IE within 6 months of catheter insertion. Mean duration of hospital stay was 59 days. 18 of the 35 patients died during their acute admission (mortality rate 53%).

Conclusion
Our observational study demonstrates that haemodialysis patients with IE had a prolonged hospital stay and high mortality rate. Risk factors for IE that were identified in this study include staphylococcus infection and the presence of indwelling dialysis catheters, with the majority of IE developing within 6 months of catheter insertion. Further studies comparing bacteraemia patients with and without IE may help to determine risk factors for developing IE.

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AKI episodes – do episode definitions impact outcomes reported?

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Background:
Acute Kidney Injury (AKI) is a common condition associated with significant morbidity and mortality(1). There is growing interest into the impact of recurrent AKI events on outcomes, however there is no consensus as to when an AKI episode ends and therefore how to count events and their effects(2-4).

Aim:
To describe four different definitions of an AKI episode and compare the effect these definitions have on outcomes.

Method:
This study used an anonymised data linkage databank containing biochemical data for our region (population ~430,000 adults). Using serum creatinine (SCr) results we replicated the NHS England electronic AKI alerts algorithm, then by linking with our dialysis and transplant dataset we were able to create an AKI cohort. A patients' initial AKI alert in 2011 was used to mark the start of the first AKI episode and it ended when each of the 4 different definitions below were met respectively, or if no further testing, 90 days had passed.
The definitions were that the episode continued until:

(i) the SCr is <20% above the baseline (<1.2 rule),
(ii) the SCr is <50% above the baseline (<1.5 rule),
(iii) 90 days after the first alert (90 day rule),
(iv) the SCr no longer triggers an alert (Alerts rule),

After this a second episode could start and similarly finish using the same definitions, and subsequently third episode and so on. These definitions were applied to SCr tests until the end of 2013.
The differently defined episodes were linked to hospital episode, dialysis, critical care and mortality datasets to allow for morbidity and mortality comparisons.

Results:
There were 1,776,101 SCr test in 316,955 adults between 2011 and 2013, with 581,346 tests in 194,886 people in 2011. In 2011 there were 24,478 alerts in 8,333 patients with 81,948 alerts (21,979 patients) from 2011 to 2013. Over the 3 years, amongst the 21,979 patients who had at least one alert, there were 31,505, 33,759, 26,657, or 34,904 AKI episodes using the <1.2, <1.5, 90 Days and alerts episodes definitions respectively. In those with an AKI alert, 7,792 (35.5%) were dead within a year of their first alert. Higher numbers of AKI episodes within a year correlated with an increased 1 year mortality in all groups except the 90 day definition (table). The Likelihood of dialysis within 1 year increases with number of episodes of AKI across the 4 definitions.

Conclusion:
There is a consensus definition for the beginning of AKI, but when it ends is not well described. In categorising AKI into discreet episodes based on different end points we observe a variation in the number

of overall episodes in our cohort. The mortality and dialysis requirements at one year varied between the different episode definitions when multiple episodes were compared. If researchers use different definitions of an AKI episode, then comparison of outcomes may not be accurate. A consensus approach for the definition of the duration of an AKI episode is needed to standardise the approach.

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The costs and harms of institutional transport for haemodialysis

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Background
Institutional transport for haemodialysis is expensive and a frequent source of patient dissatisfaction. Vehicle entry and exit accidents are not uncommon, and cross-infection often suspected, but the overall influence of transport on clinical outcomes is unknown.

Methods
In a cohort of stable haemodialysis patients at a single renal centre, administrative data were collected on institutional transport provided during January 2011. Clinical and financial aspects of these data were analysed along with subsequent patient survival.

Results
Out of 1173 patients, transport was provided for 685 (58.4%), with patients receiving an average of 21.0 journeys, of 4.8 miles per journey, during the index-month. The average cost of these journeys was £6.49 per patient-mile, representing a total institutional cost of £341,047.14 for haemodialysis transport for one month.

Patients receiving transport were older than those making their own journeys (67.4+/-13.7 vs 58.9+/-14.6, $p<0.001$), but there was no significant difference in major medical comorbidity.

Over a mean observation period of 4.8 years (5,630 patient-years) there were 699 deaths (59.6%), with institutional transport associated with shortened survival (4.3 vs 5.8 years, $p<0.001$). In a Cox proportional hazards model, age, previous vascular events and institutional transport were all independently predictive of survival (HR 1.44 for transport, $p<0.001$).

The association between transport and survival was analysed at unit level, using the centre's nine separate dialysis satellite units to reduce bias by indication (with unit functioning like an instrumental variable). Dialysis unit was strongly predictive of survival ($p<0.001$) and a strong negative correlation between the proportion receiving transport at the unit, and 7-year survival was observed ($R=0.878$, $p=0.002$).

Conclusion
Independent of age and comorbidity, institutional transport is associated with reduced survival in haemodialysis patients, with instrumental variable analysis suggesting a genuinely causal association. Along with cost and poor patient experience, these data argue for a rethink of haemodialysis transport policies.

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Rethinking Access for Dialysis in Older People: Proposed Study Design

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Background
The arteriovenous fistula is widely regarded as the best long-term haemodialysis access, due to fewer complications and longer patency, whereas tunnelled catheters have traditionally provided temporary access when emergency dialysis is required, or when a fistula has not been successful. However, the dialysis access landscape has changed with older and more comorbid patients making up a greater proportion. These patients have both poorer fistula outcomes and shorter life expectancy, and whilst fistula formation is still desirable it may be less tolerable. Catheters are increasingly advocated as a long-term access option for some older and more comorbid patients. A randomised controlled trial has never been carried out comparing a fistula to a tunnelled dialysis catheter in the older haemodialysis population.

Research Question
What is the optimal design for a randomised study comparing different vascular access strategies (catheters vs. arteriovenous fistulae) in elderly patients expecting to start haemodialysis?

Aims & Objectives
By performing a pilot randomised controlled trial we aim to meet the following objectives:
1. Optimise study design by establishing the willingness of patients to participate and the protocol drop-out rates in the two treatment arms.
2. Determine the best validated questionnaires to measure differences in quality of life between the two treatment arms.
3. Assess staff acceptability and provide reassuring early data for the wider community.

Research Design
This study is an open label randomised controlled trial with a short follow-up period, intended as a pilot for a subsequent larger study, to answer key design issues.

We will include patients aged over 70, with declining kidney function and expecting to start haemodialysis within 6 to 12 months. Patients will be randomised in a 1:1 ratio to the fistula or catheter treatment group: the fistula group will be referred for fistula formation within 3 months of randomisation and the catheter group will have a line inserted when dialysis is required. We aim to recruit 52 patients, 26 in each treatment arm, over an 8-month period.

Data & Analysis
Patients will be followed for a minimum of 12 months. The primary outcomes will be
1. The willingness of patients to be randomised to either a fistula or a catheter.
2. The study drop-out rate as defined in the fistula group as failure to achieve a fistula attempt within 3 months of randomisation.
The secondary outcomes to be observed in this study include mortality, unplanned admissions, quality of life measurements and dialysis initiation. Data collection will be performed using electronic patient records and clinical correspondence.

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Treatment of adult patients with relapsing Minimal Change Disease with targeted B cell depletion

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Introduction/Methods

There are no published Randomised Controlled Trials of the use of rituximab in adults with relapsing Minimal Change Disease (MCD), although case series suggest that it is effective in maintaining remission. In a previous study of 26 patients treated with rituximab for relapsing MCD we reported that although rituximab increased the time in remission, the majority of patients did eventually have further relapses. We therefore studied the efficacy of treating patients with repeated doses of rituximab for 2 years to prevent relapse of MCD.

Results

13 patients (6 female, 7 male) started maintenance rituximab for up to 2 years with targeted B cell depletion to maintain clinical remission. Immunosuppression previously used in these patients included Tacrolimus (13), Steroids (9), Rituximab (9), Cyclophosphamide (1) and Mycophenolate Mofetil (1). 11/13 were on either; tacrolimus (5) steroids (3), or steroids and tacrolimus (3) at start of the maintenance period, stopped at a mean of 8.5 months (range 2-15 months). Patients were regularly monitored for lymphocyte depletion (total B-lymphocytes <10). 12 of 13 patients were re-dosed with rituximab after B lymphocyte reconstitution was noted to have occurred. 1 patient was re-dosed with rituximab every 6 months, without waiting for lymphocyte reconstitution, due to a history of rapidly relapsing disease, (having had a previous B cell replete relapse, 3 weeks after being noted to be B cell deplete).

All patients achieved lymphocyte depletion post rituximab. The mean total B lymphocytes at the time of re-dosing with rituximab was 112 (Range 1 to 433). To date 6 /13 patients have completed 2 years of maintenance treatment with a mean treatment period for all 13 patients of 21 months (range 8 to 24 months). 12/13 have remained relapse free during the 2 year maintenance period. 1/13 patients relapsed during the maintenance treatment period despite remaining B cell deplete; this patient had received rituximab 4 months prior to relapse, lymphocyte count at relapse was 1. Of the 6 patients who have completed 2year maintenance therapy, mean follow up is 4 months (range 1 to 8). 2/6 have relapsed at mean time of 4.5 months, B cells were replete in both at time of relapse. Both received further rituximab to achieve remission, 1 with additional steroids.

Rituximab therapy was generally well tolerated. 1 patient required a hospital admission due to a lower respiratory tract infection. No patients developed significant hypogammaglobinaemia.

Conclusions
Repeated rituximab dosing, using targeted B cell depletion, is effective therapy for maintaining clinical remission. However, frequent monitoring of lymphocyte subsets is required to ensure early retreatment when reconstitution has occurred. An alternative strategy is pre-emptive dosing with rituximab at fixed intervals to maintain lymphocyte depletion, although this risks incurring increased expense and side effects from more frequent rituximab dosing. After 2 years of maintenance therapy, B cell repletion is still

associated with relapse. Further work is needed to compare maintenance strategies and to determine the optimal total length of time of maintenance treatment with rituximab.

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Frailty Predicts Mortality and Emergency Admissions in Prevalent Haemodialysis Recipients: A Comparison of Commonly Used Frailty Scores in a Large Prospective UK Haemodialysis Cohort

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Background:
Frailty, a clinical syndrome of accelerated ageing with increased vulnerability to stressors, is prevalent among dialysis populations and associated with poor outcomes. However, no gold standard definition for frailty screening exists and this translates into heterogeneously reported epidemiology. Most published studies are from US cohorts, which may not translate to UK cohorts. The aim of the FITNESS study was to compare commonly cited frailty scores in their predictive capacity for adverse events.

Method:
Prevalent (>3-months) adult haemodialysis patients were recruited into this prospective cohort component of the FITNESS study after informed consent between January 2018 and April 2019. Exclusion criteria included any inpatient admission within the previous 4-weeks. Prospective data collection at recruitment included calculation of the Frailty Index (FI), Fried Frailty Phenotype (FP), Clinical Frailty Scale (CFS) and Edmonton Frailty Scale (EFS), alongside comprehensive medical and social history. FI, FP and EFS were obtained through a combination of physical performance testing and patient questionnaires; the CFS was obtained by MDT discussion led by patients' lead nephrologist. Follow-up data on hospitalisation and mortality were collected from national datasets including hospital episodes statistics and civil registration data respectively (up to 31st August 2019). Univariate and Multivariate Hazard ratios were obtained using Cox regression analyses.

Results:
486 participants gave informed consent and were followed-up over a median of 55 weeks. There were 726 emergency and 219 elective hospital admissions, with 46 (9.47%) participant deaths. Frailty prevalence was heterogenous based upon definition criteria; highest using FI (63.2%), lowest with CFS (26.5%) and FP (41.8%) and EFS (50.2%) in between. On univariate analysis, hazard ratios (HRs) for mortality were 4.25 for frailty defined by FI (p=0.001), 2.96 defined by CFS (p=0.001), 2.50 defined by FP (p=0.003) and 1.88 defined by EFS (p=0.040). After adjustment for age, gender, previous admission and Charlson Comorbidity Score, HRs for mortality were 4.45 for frailty defined by FI (p=0.001), 3.05 defined by CFS (p=0.002), 2.48 defined by FP (p=0.004), and 2.07 defined by EFS (p=0.019). After adjustment for age, gender, Charlson score and previous admissions, adjusted HRs for death/emergency admission were 1.62 for frailty defined by FI (p<0.001), 1.54 defined by CFS (p=0.001), 1.55 defined by FP (p<0.001) and 1.62 defined by EFS (p<0.001).

Conclusion:
Frailty was prevalent in this cohort regardless of the measure used, however there was wide variation in the prevalence of frailty by different scores. All frailty scores demonstrated predictive ability for mortality and hospitalisation on adjusted analyses. The FI demonstrated superior prediction of mortality to other scores, but identified the greatest proportion of participants as frail, and is the most time-consuming of the scores to implement. These limitations may impact routine clinical use. The subjective CFS is more selective at identifying frailty (with lowest reported prevalence) and demonstrates comparable predictive power to

more detailed and time-consuming objective frailty tools. Considering the simplicity and predictive ability of CFS, it may prove attractive for frailty screening for healthcare professionals. Further work must focus on whether frailty can be intervened to improve observed adverse outcomes.

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Single Cell RNA Sequencing of Immune Cells in Models of Acute Kidney Injury and Chronic Renal Fibrosis

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Introduction
Innate and adaptive immune responses help determine outcome following acute kidney injury (AKI) and in Chronic Kidney Disease (CKD) progression. AKI is a well-recognised risk factor for Chronic Kidney Disease (CKD, but the mechanism remains unknown. Single Cell RNA Sequencing (scRNAseq) provides an unparalleled opportunity to uncover heterogeneity in immune response and provide new mechanistic understanding in AKI and CKD. We have performed scRNAseq of immune cells at specific timepoints mimicking human disease pathology in models of AKI and chronic renal fibrosis.

Methods
Kidneys were harvested from three mice at each time point (Figure 1) mimicking AKI and CKD. Using a cell sorting strategy, CD45+ve 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 was carried out using the R package, Seurat.

Results
21,734 CD45+ve Cells were sequenced in total. Analysis of gene expression profiles delineated transcriptomic profiles in distinct sub-clusters of macrophages, dendritic cells, T cells, natural killer cells, neutrophils and B cells. Comparison of immune clusters across time points and disease states demonstrated dynamic changes in immune cell compositions, recruitment and patterns of gene expression, in line with an immune response, to AKI, recovery and chronic fibrosis.

Conclusion
ScRNASeq has enabled unbiased profiling of gene expression in AKI-CKD at single cell resolution. This is the first data of its kind with a focus on dynamic shifts in gene expression of immune cells in an AKI-CKD model. We have identified several novel mechanistic targets which we are currently analysing further, using receptor ligand and pathway analysis of gene expression. This presents an exciting opportunity to expand our understanding of the pathophysiology of renal fibrosis following AKI.

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Patient values towards vascular access across differing age groups

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Current guidance strongly supports the arteriovenous fistula over a catheter in all patients regardless of age. However, an increasing proportion of the prevalent haemodialysis population is now made up of older and comorbid patients who may require a greater healthcare burden to achieve a fistula. It has been demonstrated in other areas of healthcare that this patient group have distinct healthcare values, defined as fixed general preferences regarding treatment goals, when compared to younger patients. The role of values in vascular access preference has not been studied.

METHODS

Structured interviews were conducted in a group of prevalent haemodialysis patients, all unaware of the purpose of the study. Questionnaires described a set of non-renal healthcare scenarios, with patients asked to make a trade-off decision for each. Priority scores for four treatment goals were determined by weighted analysis of the decisions. The treatment goals were: longevity, comfort, aesthetics and convenience.

RESULTS

From 106 patients enrolled across 4 dialysis satellites, 104 patients (aged 16-94, 56% male) completed interviews for analysis. Questionnaires revealed the most important values in order of descending priority score (mean+/-se): convenience 3.7+/-0.8, comfort 2.6+/-0.7, aesthetics -1.2+/-0.7, and longevity -5.0+/-0.8.

Compared to those under 55, older patients (over 70) unconsciously assigned higher priority scores to convenience (7.9 vs -1.3, $p<0.001$) and comfort (6.5 vs -2.9, $p<0.001$), and lower priority scores to aesthetics (-5.2 vs 4.6, $p<0.001$) and longevity (-9.2 vs -0.4, $p<0.001$).

Access choices similarly predicted priorities: compared to those with a fistula, patients dialysing via catheter assigned higher priority scores to convenience (4.8 vs -0.3, $p=0.007$) and comfort (4.6 vs -4.2, $p<0.001$), and lower priority scores to aesthetics (-2.7 vs 3.7, $p<0.001$) and longevity (-6.7 vs -0.8, $p<0.001$). In a matched group analysis the effect of age and access on healthcare priorities were independent.

CONCLUSIONS

Unconsciously assigned priorities show that amongst older patients, convenience and comfort are more important than longevity and aesthetics, and access choices appear to depend on similar values. Healthcare values should be understood when making access decisions with patients, particularly in older age groups.

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Incidence and outcomes of gram-negative bacteraemias in haemodialysis patients – 12 year single-centre experience

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Introduction:

Patients on haemodialysis (HD) are at increased risk of contracting infections. Gram-negative bacteraemia in HD patients is associated with early mortality (1). In our HD population, we looked at the incidence and clinical outcomes of gram-negative bacteraemias over 12 years.

Methods:

Data were collected from clinical records and the hospital's microbiology database of all confirmed bacteraemias in HD patients between 2007 and 2018.

Results:

283 episodes of gram-negative bacteraemia occurred in 1361 patients over the study period. 166 (58.7%) were male. The median age was 71 years (range 26-95).

The dialysis population grew from 810 to 1244 patients between 2007 and 2018. In spite of this, the proportion of gram-negative bacteraemias fell significantly between 2007 and 2010 and appears to have plateaued since then (Figure 1).

90 (31.8%) had arteriovenous fistulae (AVF) or grafts, the remainder had dialysis lines in place, of which 41 (21.2%) had dual access (AVF or graft + line), with the AVF or graft not yet in use.

The bacteraemias were deemed to be related to the dialysis access in 89 events (31.4%). Of these, 73 (82.0%) were related to the dialysis lines, 16 (18.0%) were related to AVF or graft. 190 (67.1%) were from other sources, of which the most predominant sources identified were urinary tract 18.4% (n=52), hepatobiliary 7.8% (n=22), chest 7.8% (n=22), gastro-intestinal 6.0% (n=17) and skin/soft tissue in 4.9% (n=14). There was no information on 4 patients (1.5%).

Complications of the bacteraemias included: discitis (6, 2.1%); osteomyelitis (5, 1.8%); endocarditis (2, 0.7%); septic arthritis (2, 0.7%); and death (34, 12.0%). Of the patients with complications, 17 (34.7%) had an AVF or graft; 25 (51.0%) had dialysis lines; and 6 (12.2%) had dual access.

Discussion/Conclusion:

The incidence in gram-negative bacteraemias in our cohort appears to have plateaued, with bacteraemias originating from other sources such as the urinary tract and intra-abdominal accounting for a greater proportion of gram-negative bacteraemias in our cohort - a trend reflected in other similar observational studies in HD populations (2, 3).

Our data also show that dialysis lines remain a significant risk factor for bacteraemia, lending further weight to the importance of establishing early definitive vascular access in these patients. The increased incidence of pathogens from non-access related sources however, highlights the fact that our HD populations are exposed to both community and healthcare associated infections, and ongoing surveillance and strategies to reduce the burden of blood-stream infections in this at-risk cohort remains imperative not just in the dialysis centres, but also in the community.

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Recommending renal diet related mobile applications : Where do we start?

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BACKGROUND: The provision of dietary advice is evolving with a greater emphasis on the potential benefits of digital technology. Renal diet related mobile applications (apps) have great potential for engaging patients in their nutritional needs and could assist with the monitoring of food intake, provision of dietary information or adherence to dietary changes. Health professionals need trustworthy, evidence based, good quality renal diet apps to recommend to patients with chronic kidney disease (CKD). The aim of this work was to evaluate renal diet apps using a validated scoring tool and clinical judgement in order to develop a resource directing patients with CKD to good quality apps relevant to their needs.
METHODS: Literature searches were conducted to find research related to mobile apps and technology enabled care in relation to kidney disease and diet. These articles were then evaluated using critical appraisal tools appropriate to study design. Tools designed for evaluating mobile health apps were identified through this search, including the Silberg Scale, the Mobile App Rating Scale (MARS) and The App quality (AQEL) tool. These were all reviewed for potential use, and the AQEL tool was chosen to evaluate the apps due to its relevance to dietary education and behaviour change. Apple Store and Google Play were used to search for apps during a two week period in 2019. Multiple terms relating to renal nutrition were used and exclusion criteria were applied prior to appraising the apps using the chosen tool. Both free and costed apps were appraised independently by two specialist renal dietitians. Apps were thoroughly inspected and judged on their ability to support behaviour change, knowledge acquisition, skill development as well as ease of use, age appropriateness and purpose. Scores were compared and comments made on quality and suitability of the apps for renal patients.
RESULTS: The search of both Google Play and Apple Store identified 65 apps of which 10 were excluded as inappropriate prior to evaluation; reasons for this included: apps being textbooks, not in English or not been updated for 5 or more years. Apps were classified into 'Recommended' and 'Not Recommended' based on AQEL score and clinical judgement. This is an ongoing project, but of the apps evaluated to date, 5 have the potential to be recommended after final appraisal. Reasons for not recommending include non-evidence based, misleading content and foods listed not readily available in the UK.
CONCLUSION: This is an ongoing project, and we hope to collect more information over the next few months. We will then compile a list of recommended apps and seek patient feedback on these. A resource will then be developed for CKD patients and their health care professionals indicating useful apps. Consideration will need to be made of how to keep this up-to-date in this rapidly moving field. The project may reveal the need for dietetic-led development of a renal specific dietary app to meet the needs of this patient group.

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Virtual Kidney Clinics are Cost-effective to the System

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Introduction

Rising NHS demand and an annual NHS settlement below health inflation has seen urgent care prioritised over elective. Out-patient waiting times are long, clinic processes wasteful and duplicative, and health care value low.

The Long Term Plan recommends using technology to improve care integration, waiting times and clinical outcomes. Four local CCG's introduced a virtual CKD (vCKD) Service with our inner city Trust to improve equality of access, access times for specialist opinion, patient education and case-finding for progressive CKD.

We here examine the financial consequences of a traditional and our new model of care.

Methods
A comparative costing exercise of face-to-face (F2F) CKD clinics versus vCKD looking at different models of provider reimbursement on provider finances. A bottom-up costing exercise obtained direct, indirect and overhead costs for first F2F and virtual Nephrology appointments. Reimbursement was calculated using the national tariff (TFC 361 for first attendance F2F, non-F2F, and an existing Trust block contract) and applying the local market forces factor (MFF).

Results
Total costs per first F2F appointment in general nephrology were calculated at £134.62 per patient (Table 1). The national 18/19 tariff for a consultant-led first F2F appointment was £248, with Trust MFF (1.2128) resulting in total income per patient of £307.77, generating a surplus per attendance of £173.15.

Bottom-up first non-F2F costs per patient were calculated at £37.92 per patient (Table 1). The 19/20 first non-F2F national tariff was £84, with MFF income per patient was £101.88, generating a surplus per attendance of £63.96.

There is a commissioner saving of £205.89 per non-F2F (virtual) patient, with an associated provider loss of £109.19 per patient. The system cost saving is £96.70 per patient.

Our virtual programme is currently funded under block contract. Using total contract value (first attendance and follow up virtual appointments) we calculate a first virtual appointment income of £182.22 and follow up income of £91.11 on average.

The under consultation 20/21 TFC 361 first attendance tariff is set at £168 for F2F, suggesting (for fixed costs) our provider surplus for traditional clinic models will fall to £69.13, now comparable to F2F, so incentivising a switch to non-F2F (Table 1).

Conclusions

Virtual clinics are associated with significant system cost savings, potentially allowing unmet need to be better served (increased demand tolerated within a given cost envelope), or commissioner opportunity to invest elsewhere in the kidney care pathway.

With the coming establishment of integrated care systems, we would expect system value to drive the move to non-F2F models. We emphasise the need for Nephrology providers to undertake true costing exercises to explore their specific models of care in this environment. We cannot cost the benefit to patients of earlier review, a reduction in inequality and duplication of investigation, and wasted patient and clinician time.

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Plasma biomarkers to identify patients at increased risk of chronic kidney disease (CKD) progression following an episode of acute kidney injury (AKI)

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Introduction
The long-term effects of acute kidney injury (AKI) on renal function and mortality are well documented. However, prospective studies are needed to develop strategies to identify patients at risk of developing subsequent chronic kidney disease (CKD) or progression of pre-existing CKD. We performed a study to test whether biomarkers predict CKD risk in people who have sustained AKI.

Methods
Participants who had sustained AKI during a hospital admission were recruited to a prospective cohort study. Participants had plasma samples collected at 3 months after hospitalisation and a panel of 14 biomarkers were measured using multiplex biochip array (Randox Teoranta, Donegal, Ireland). Renal function, proteinuria and survival were assessed at 1 and 3 years. CKD progression was defined as ≥25% decline in eGFR from baseline (pre-AKI) with a decline in CKD stage.

Results
A total of 500 people who had sustained AKI and had samples available for biomarker assessment were studied. Median age was 70 years (IQR 13), AKI episodes were predominantly stage 1 with median duration 3 days (IQR 3) and 29% had pre-existing CKD. The number of participants who were still alive after three years without CKD progression was 266 (53%), 176 (35%) experienced CKD progression, and 46 (9%) died without pre-morbid CKD progression. Follow up data were unavailable for 12 (2%). Clinical factors associated with CKD progression included eGFR at 3months, albuminuria, AKI severity (stage) and duration of AKI.
A number of individual markers were associated with CKD progression at year 3. Multiplexed models were developed, and a model containing soluble tumour necrosis factor receptors (sTNFR) 1 and 2, cystatin C and creatinine had an AUC of 0.79 (95% CI 0.74-0.83) to discriminate participants who had CKD progression three years after AKI. Notably, the negative predictive value (NPV) of this model was 92% (95% CI 87-97%); corresponding sensitivity was 95%, specificity 39%, and positive predictive value 50%. Internal validation of this model with bootstrapping produced similar AUC values, suggesting minimal overfitting. Clinical data and biomarkers were then combined by constructing multiple decision trees that allowed selection and ranking of the variables that were most strongly associated with CKD progression at year 3. These analyses identified similar biomarkers (sTNFR 1 and 2 and cystatin C, plus NGAL) together three-month eGFR and urine albumin:creatinine ratio, all of which were more important than clinical variables describing AKI severity or duration (Figure 1).

Conclusions
A decline in renal function is common following AKI, even in a general hospital population with predominantly AKI stage 1. A biomarker model incorporating sTNFR1, sTNFR2 and cystatin C demonstrated utility in assessing AKI patients, 3 months after hospital discharge, for long-term CKD risk. Its high NPV

suggests potential clinical utility as a ‘rule-out’ test, to identify AKI patients who are at very low risk of subsequent CKD and who do not need additional follow up.

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Improvements in peritonitis rates in London over 16 years

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Introduction

There is good evidence that while peritonitis incidence is associated with patient and centre-level effects, addressing centre effects leads to improved outcomes in all participating centres. Early evidence of the effect of centre size arose from a pan-Thames audit of peritonitis in 2002-2003 reporting peritonitis outcomes from 12 participating units with a rate of 0.81 events/year (CAPD) and 0.66 events/year (APD). We set out to address whether there had been a change in incidence in peritonitis in the intervening 16 years as part of a collaborative approach to quality improvement.

Methods

We retrospectively collected all episodes of peritonitis in PD patients attending 3 PD units in the original pan-Thames area in 2017 to 2018. These 3 units arose from the consolidation of 6 of the 12 original participating units. 412 patients were on peritoneal dialysis across these units at the end of audit period.

Results

182 patients with a mean age 62 years (s.d. 15 years) experienced 251 episodes of peritonitis during the 2-year period of which 20 were recurrent episodes. The overall peritonitis rate was 0.38 events/year for all modalities, with variation between the units from 0.21 to 0.47 events/year. Overall cure rate was 74.9% with 50 catheters removed due to peritonitis. Culture negative events formed 27% of all episodes. Despite only one centre using fluconazole prophylaxis, only 5 episodes of fungal peritonitis were distributed across all centres.

Conclusions

Peritonitis continues to remain a challenge for the care of patients on PD. However, rates within the pan-Thames region have approximately halved in the last 16 years but there remains significant centre-level variability. Data collection to support quality improvement work will require logistical support. Standardising approaches to peritonitis care within a region may lead to further improvements in patient outcomes.

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The spectrum of disease in children with end-stage kidney disease using registry and linked electronic health record data.

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Background: Children with end-stage kidney disease (ESKD) may have additional medical conditions that can impact upon care and outcomes for their kidney disease. This data is often not collected as part of a core dataset by renal registries, resulting in data capture of variable completeness and accuracy which limits adjustment for case-mix in renal research [1]. The aim of this study was to audit data on coexisting disease held by the UK Renal Registry (UKRR) against national electronic health record (EHR) data using Hospital Episode Statistics (HES) in England and Patient Episode Database for Wales (PEDW).

Methods: This study included children aged <18 years receiving RRT for >90 days in England and Wales on 31/12/2016. Prevalent disease data held by the UKRR, not including primary diagnosis, was reported and compared where possible, to HES and PEDW data, using disease groupings based upon the International Classification of Diseases, 10th revision.

Results: As of 31/12/2016, 1001 children in England and Wales were receiving RRT for ESKD (62.1% male). The median age as of 31/12/2016 was 12.1 years (IQR 7.8-15.3). Linked HES/PEDW data was available in 833 children (83.2%). Using UKRR data, 24.8% of children had no reported additional diagnoses, although about 25% of data were missing; the most commonly reported were congenital anomaly (n=323, 45.6%), followed by developmental delay (n=152, 24.2%), prematurity (n=138, 23.6%) and syndromic diagnosis (n=159, 22.6%). All children bar one with linked HES/PEDW data had at least one non-renal disease code listed. The most commonly reported disease groupings were factors influencing health status and contact with health services (n=772, 92.7%) abnormal clinical findings not otherwise classified (n=715, 85.8%), genetic, congenital or chromosomal conditions (n=596, 71.6%), certain infectious and parasitic diseases (n=539, 64.7%) and endocrine, nutritional and metabolic diseases (n=535, 64.2%). Some gender differences were noted by disease group: using HES data (figure 1), a strong male preponderance was noted among gastrointestinal, genetic, respiratory, perinatal diseases and factors influencing health status categories ($p \leq 0.02$). UKRR submitted data showed a female predominance for malignancy (65.4%, $p=0.002$) and chromosomal anomalies (55.2%, $p=0.03$) while prematurity, congenital anomalies and congenital heart disease affected males more frequently (73.2% $p=0.02$ and 72.8% $p<0.01$, respectively).

Conclusion: This is the first study to report the spectrum of disease for UK children with ESKD receiving RRT using both registry and EHR data. Using EHR-linkage, a substantial burden is seen, with almost all patients identified as having one or more additional disease codes. A high proportion of congenital and genetic anomalies as well as early life disease is seen using both UKRR and HES data, which predominantly affects males. The fact that much of this disease manifests in early life needs to be recognised by clinicians preparing children and their families for RRT, to ensure this does not limit access to optimal kidney disease care.

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Outcomes Amongst Jehovah's Witnesses in a Tertiary Renal Centre

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Introduction

The religious ideology amongst the Jehovah's Witness population, often culminating in blood product refusal, is well recognised amongst the medical profession. Haematological manifestations of renal disease, frequent requirement for invasive procedures, and potential for surgery, including transplantation, make this patient cohort particularly challenging for renal physicians.

Despite this, scarce literature exists documenting their long-term outcomes. Therefore, we aimed to investigate prevalence of Jehovah's Witnesses amongst our renal unit and obtain further insight regarding their clinical trajectory.

Methods

Jehovah's Witnesses registered to our services were identified from our renal database. Patient data was obtained retrospectively through electronic patient records, including demographics, primary renal disease, co-morbidities, modality, previous renal replacement therapy (RRT), all available previous haemoglobin (Hb) and ferritin/iron studies results, and previous iron and erythropoietin-stimulating agent (ESA) prescriptions.

Results

47 patients were identified, (mean age 63.8 years), with 76.6% (n=36) female. 66.0% (n=31) were Black African or Black Caribbean, 12.8% (n=6) White British, 4.3% (n=2) Asian, and the remainder unknown ethnicity. Mean eGFR was 29.3mls/min with 48.9% (n=23) chronic kidney disease (CKD) stage 5. 14 patients (29.8%) were deceased.

Hypertensive and/or diabetic nephropathy was the commonest primary renal pathology in 46.8% (n=22), although only 14.9% (n=7) underwent renal biopsy. 19 patients overall received RRT (40.4%), 7 requiring this within first year of presentation to renal services (14.9%). Mean time from first presentation to initiating dialysis was 49.9 months. Amongst alive CKD5 patients (n=15), 4 receive haemodialysis, 1 peritoneal dialysis, 7 received transplants, with the remaining 3 low clearance patients.

Mean overall Hb was 104.2g/L. 17% (n=8) had a current Hb <75g/L and 29.8% (n=14) a mean Hb<100g/L. Iron depletion (i.e. ferritin levels <100ug/L) was observed in 38.3% (n=18) at initial presentation, and 20.9% (n=9) based on current bloods. 57.4% (n=27) received iron replacement, however only 42.6% (n=20) had additional iron indices measured. Of the 51.1% (n=24) prescribed ESA's, 29.2% (n=7) had current Hb between 100-120g/L.

Mean age of death was 63.4 years, with 50% (n=7) on RRT at time of death. Mean time from presentation to dialysis was 24.7 months amongst this deceased cohort, with mean time from commencing dialysis to death 25.6 months. Mean Hb at death was 73.2g/L.

Discussion and Conclusions

A high proportion of the cohort were CKD5 therefore at highest risk of becoming anaemic and requiring procedural interventions. 7 patients were transplanted, reiterating transplantation amongst Jehovah's Witnesses can be achieved despite concern regarding the surgical and peri-operative period.

Given the strikingly lower than expected survival time on dialysis demonstrated, and a mean age of death below national averages for those with ESRF, this retrospective audit suggests there may be adverse prognostic outcomes associated with this population.

We have demonstrated greater focus on anaemia and iron management is required amongst this cohort - nearly 30% having mean Hb<100g/L and over 20% iron deplete on their most recent bloods.

Ultimately this retrospective study provides insight into outcomes of Jehovah's Witnesses within a London tertiary centre. Nationwide data is warranted for comparison to provide clarity on optimising their care.

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Advancing Patient-Centered Tolerability Assessment among Kidney Transplant Recipients

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Introduction: Post-kidney transplant (KT) outcomes are excellent, with graft and patient survival approaching 100% among recipients of living donor kidneys. Yet, all KT recipients must take an extensive regimen of immunosuppression medications that cause burdensome neuro-cognitive, gastrointestinal (GI), fatigue, and other side effects. As calls for a more patient-centered approach to medication tolerability emerge, increasing attention has been paid from regulators to a single question from the Functional Assessment of Cancer Therapy (FACT-G): "I am bothered by side effects of treatment" (GP5). Though this question has gained visibility for tolerability assessment in cancer, it is generically-worded and may be useful in other clinical areas. The objective of this study was to examine the GP5's validity among KT recipients.

Methods: At a large, academic transplant center, we examined post-KT side effect bother among 404 recipients of living donor KT between 11/2007 and 08/2016. GP5 was assessed at 3 and 12 months post-KT. We compared the frequency at which patients experienced multiple symptoms post-KT between patients reporting high side effect bother (defined as a response of "very much"/"quite a bit" on GP5), moderate side effect bother (defined as a response of "somewhat"/"a little bit"), and no side effect bother ("not at all"). Symptoms were drawn from the Kidney Disease Quality of Life – Short Form (KDQOL-SF), which includes the SF-36, and the Functional Assessment of Cancer Therapy- Kidney Symptom Index (FKSI). Then, we compared mean scores of several health-related quality of life (HRQOL) domains from the KDQOL-SF across GP5 groups using ANOVA. Each KDQOL-SF measure is scored on a 0-100 scale, with higher scores indicating better HRQOL.

Results: Overall, at both 3 and 12 months, a minority of patients (6-7%) reported high side effect bother, while 25-32% reported moderate bother. Symptom frequency was comparable at 3 months and 12 months post-KT, so we report only 3 month comparisons here. All symptoms varied significantly across GP5 groups, usually in the expected direction, with patients who reported higher side effect bother more likely to experience each symptom. (Table) Similarly, each KDQOL-SF scale score varied significantly (for all, $p<0.001$) between GP5 groups such that patients who reported higher side effect bother had lower KDQOL-SF scores.

Discussion: The GP5 distinguished between patients with greater symptom burden and worse HRQOL. In the case of GI symptoms, fatigue, and shortness of breath, there was a monotonic relationship between GP5 categories and proportions of patients reporting symptoms; the "high" GP5 category had the highest proportion of patients reporting symptoms, the middle GP5 category had the second highest proportion reporting symptoms, and the low GP5 category had the lowest proportion reporting symptoms. The GP5 is an efficient, patient-reported measure of side effect bother and may be an appropriate indicator of post-KT immunosuppression tolerability. New research should examine ways to incorporate the GP5 into patient-reported outcome measure monitoring systems in clinical trials and routine transplant follow-up.

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Contactin-1 is a novel antigen in primary membranous glomerulonephritis (MGN) and in CIDP-associated MGN

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Introduction

Recently a number of antigens have been identified as pathogenic antibody targets in cases of membranous glomerulonephritis(MGN), including for primary MGN phospholipase A2 receptor (PLA2R), thrombospondin type 1 domain containing 7A(THSD7A), and NELL-1, while exostosin is found in secondary (often lupus associated) MGN. However, these do not account for all cases and other as yet undiscovered antigens are thought to exist. Although rare, there is a recognised association between demyelinating neuropathies and nephrotic syndrome. We describe a series of 14 patients, all presenting with chronic inflammatory demyelinating polyneuropathy (CIDP), nephrotic syndrome due to MGN, and with circulating anti-contactin-1 (CNTN1) antibodies. We now demonstrate that contactin-1 is an antigenic target common to both peripheral nerve and kidney, and is a further novel antigen implicated in idiopathic MGN.

Case series

A predominantly male patient cohort (n=14) presented with subacute onset proximal and distal weakness and distal sensory loss. Pain, ataxia and tremor are among the most frequent atypical features observed in individual patients. Serology confirmed high titre antibodies against the paranodal cell adhesion molecule CNTN1 in all cases. All were predominantly of the IgG4 subclass, but other subclasses, notably IgG1, were frequently also represented. Renal biopsy demonstrated membranous glomerulonephritis (MGN), with extensive immunoglobulin and complement deposition. All patients were treated with corticosteroids, with variable response. Most required at least 3 further immuno-suppressive or immuno-modulatory treatments to achieve a good outcome. The onset and resolution of neuropathy and nephropathy had a close temporal relationship in all patients.

MRC GN bank

Given these results, sera from 295 patients with MGN and nephrotic syndrome, from the MRC GN bank, were also tested. In four (1.4%) low titre anti-CNTN1 IgG4 antibodies were also detected; review of their history did not suggest a concurrent neuropathy. These four patients were all PLA2R antibody negative, suggesting CNTN1 is another antigenic target in idiopathic MGN.

We speculated that glomerular CNTN1 expression would explain the association between CNTN1 antibodies and MGN, but CNTN1 protein was not detected by immunohistochemistry using healthy sections of human kidney. However, dense membranous deposits of CNTN1 positive immune complexes were seen in the biopsies of patients from our series and those from MRC GN bank that had positive anti-contactin antibodies (Figure 1). Furthermore, CNTN1 mRNA was detected in whole kidney and cortical fractions,

although not in cultured podocytes (Figure 1), while single cell RNA atlas demonstrates CNTN1 expression in podocytes and tubular capillary endothelial cells.

Discussion

Anti-CNTN1 antibodies are found in 1.4% of primary MGN patients, and are found in all CIDP patients presenting with MGN; Anti-CNTN1 immune complexes are deposited along the capillary loops of kidney sections from patients with circulating anti-contactin antibodies. This makes contactin(CNTN1) a further novel antigen in MGN. Other factors may explain presentation with isolated neurological disease or MGN.

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Simulation Based Learning for Acute Kidney Injury: An effective educational method to improve medical student understanding and confidence?

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Background: An NHS England report highlights Acute Kidney Injury (AKI) and Sepsis as two national clinical priorities, concluding "improving care in these areas would have the biggest potential impact in reducing premature mortality"[1]. Despite national prioritisation healthcare professionals often lack confidence and understanding about AKI and its management[2]. Such shortcomings have contributed to common deficiencies in AKI care, including those highlighted in the 2009 NCEPOD report[3]. AKI complicates acute illness in all clinical areas meaning newly qualified doctors encounter AKI early in their careers. Furthermore these doctors are assigned roles fundamental to AKI recognition and its management, including daily review of medications, fluid balance and blood results. National strategies to promote safe and quality AKI care should thus include medical students (MS), so they are prepared to deliver timely and effective AKI care soon after qualification.

Previously we presented a survey of 50 MS in 2017 which found they felt less well prepared to manage AKI than sepsis[4]; a "comparator syndrome" associated with similar adverse outcomes and national prioritisation. Lecture-based undergraduate teaching has traditionally focused upon "complex" renal diseases, with less emphasis on practical AKI care. Simulation-based learning (SBL) promotes critical thinking, communication and decision-making skills[5] [6], all fundamental to AKI care. Furthermore SBL enables students to experience clinical responsibility and identify learning opportunities in a safe environment[7]. We hypothesized SBL would enable pragmatic and effective AKI training for MS, providing clinical context and addressing areas of low confidence.

Methods: We repeated an anonymised internet-based survey to evaluate AKI knowledge and confidence amongst our current final year MS cohort, prior to and after delivery of a novel AKI-SBL programme. We tailored our AKI-SBL programme to address learning needs highlighted by our 2017 MS cohort. AKI-SBL comprised of 3 scenarios: (1) AKI in the context of diarrhoeal illness and hypotension, (2) AKI in the context of sepsis and multi-organ failure and (3) decompensated heart failure in a patient readmitted to hospital after cardiac medications were stopped during a recent AKI episode.

Results: 48 final year MS completed a pre-SBL survey in December 2019. Results replicated themes reported by our 2017 MS cohort. Compared to sepsis, MS reported less previous training, less self-rated understanding (5.7 v 7.3 / 10) and confidence (4.4 v 5.9 / 10) about AKI. Groups of 6 MS begun completing AKI-SBL sessions in January 2020; post-SBL surveys to date demonstrate improved AKI understanding and confidence. Of note SBL appears effective at addressing topics which both 2017 and 2019 MS cohorts perceived as difficult after conventional renal teaching; "fluid balance" and "drug dosing" during AKI and "indications for renal referral".

Conclusion: We have found SBL an effective educational method to help final year MS feel better prepared to manage AKI. Our evaluation found AKI-tailored SBL was well received by MS and suggests SBL may be

superior to conventional renal teaching at addressing pragmatic topics fundamental to safe and quality AKI care. We plan to share and evaluate impact of our AKI-SBL programme amongst MS at other universities.

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New Initiative. Weight loss support group for patients requiring renal transplant.

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Obesity prevalence is increasing within the general population and also within the renal dialysis and low clearance population.

We were challenged by GIRFT to review our threshold for transplantation and found a significant cohort of high BMI patients who had not lost weight over a number of years.

British Renal Association guidelines state that 'Obese patients (BMI >30 kg/m2) … should be screened rigorously for cardiovascular disease and each case considered individually' and that 'individuals with BMI >40 kg/m2 are less likely to benefit' Whatever the threshold transplant centres use it is agreed that lowering weight will confer less risk but the reality is that patients often do not lose weight with standard approaches.

Although obesity is associated with increased post-operative complications, observational studies suggest that transplantation among obese transplant recipients offers survival advantages compared with unlisted obese transplant candidates on dialysis.

Due to their renal disease and dialysis many patients follow various dietary restrictions and find these often conflict with weight loss principles.

To address this we set up a weight loss monthly support group for patients attempting to lose weight in order to be considered for a renal transplant.

SAMPLE

In total 14 patients were contacted and invited

7 males, 7 females

Modality 7 pre dialysis, 4 Haemodialysis, 3 Peritoneal dialysis

Each patient was sent a letter from the consultant outlining the new initiative and the importance of engagement in the program, they were also given a food diary and asked to bring the information at their

first session. They were also informed that after 6 months weight loss would be reviewed and they would be offered a consultant appointment to determine whether a transplant referral at their current weight was then appropriate.

We then planned sessions incorporating awareness of food portions and also some individual advice to incorporate any other dietary restrictions that were also been followed.

RESULTS

Session 1 =5 participants

(3 pre dialysis, 1 haemodialysis, 1 peritoneal dialysis 1 male 4 females)

session 2 = 2 participant

session 3,4,5 only 1 participant.

Weight loss

Of the 5 that originally attended 2 of the pre dialysis patients have lost 6% and 9 % weight loss and have reported been more aware of portions control

1 HD pt reported more awareness of portion sizes and has lost 3 %

SUMMARY

Although our weight loss group hasn't given us good attendance each session it appears for those who did attend some were able to make positive changes to their diets resulting in positive weight loss.

For those who didn't attend we need to investigate the reasons for this and why only 1/7 men attended.

Looking forward

Although the Dietitian often saw these patients in their modality clinic often more prevalent advice was given ie low potassium or low phosphate etc This was another appointment for them where the main aim was to focus solely on weight loss and make the advice more real and visual using everyday foods. Some patients appeared to engage in this process,

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Increasing uptake of peritoneal dialysis in unplanned starters: A quality improvement project in a large tertiary center

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Introduction
Unplanned initiation of dialysis in ESRD is common (up to 40%) both in "late presenters" (known to renal services < 90 days) and in "early presenters" (known to the renal services > 90 days). Whilst immediate start on peritoneal dialysis (PD) is ideal, patients may undergo a period of hemodialysis (HD) before considering switch to PD. HD can often become the default mode that patients continue as their modality. In 2017, for our unit there was only a small increase in patient numbers with PD as the modality at 3 months from time of initiation of dialysis (22.0 to 24.9% Renal Registry data).
DAYLife is the KQuIP improvement project that was launched across the Midlands in Jan 2019 with the aim of increasing the number of people receiving home dialysis. We took this opportunity to augment the unplanned start pathway and to increase uptake of PD in unplanned starters.

Methods
We implemented an "Unplanned PD start "pathway to facilitate the process of referral system from acute presentation to catheter insertion and establishment on PD. The PD team networked and established links with staff working on the wards and inpatient HD unit. Particular emphasis was made on raising awareness and staff education.

Result
There was an increase in the number of patients starting on PD from 84 in 2018 to 109 in 2019. In 10 months, we received 39 referrals and 23 patients opted for PD. 17 of them started on PD, 3 patients have planned dates for their catheter insertion whilst 2 of them have requested for further counseling. The excellent outcomes of patients starting on PD through this pathway are shown below (Table 1).
Using the KQuiP initiative, we have identified 3 important measures that would help to sustain the pathway in the long term; weekly presence of PD team in ward and inpatient HD meetings, renal trainee involvement and monthly emails that gave updates on individual patients in the pathway.

Conclusion
The DAYLife KQuip project helped us to design a sustainable unplanned start pathway that has been successful in increasing the uptake of PD both in early presenters with sudden decline in renal function and in late presenters. We have demonstrated that it is possible to facilitate early transfer to PD in patients who have started on HD.
Home therapies could be challenging for late presenters and for these psychologically unprepared patients, a multidisciplinary approach that allows flexibility is the key for successful transition to PD.