SCOTTISH RENAL ASSOCIATION

ABSTRACTS 2023

MEDICAL ABSTRACTS

A multi-omics approach to renal epithelial senescence urinary biomarker discovery

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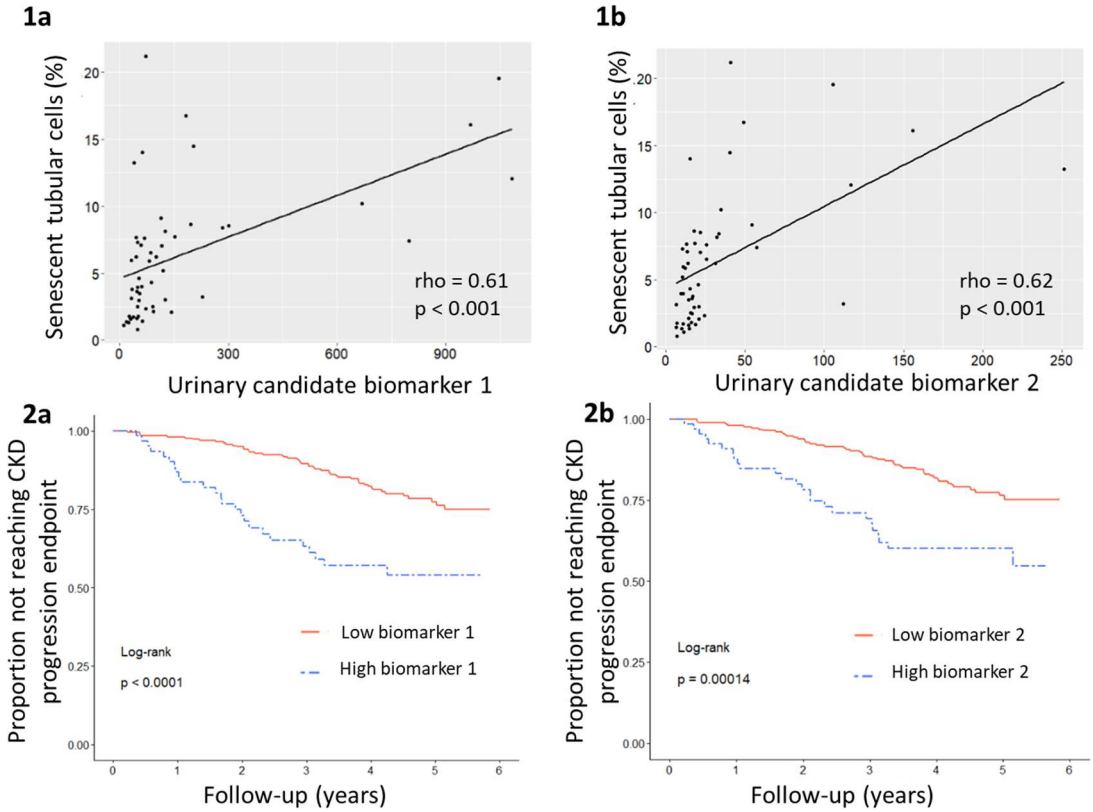
Background:
Cellular senescence is characterised by irreversible cell cycle arrest and altered transcriptional and secretory activity. Renal tubular senescence in response to ageing and injury is proposed as a key driver of kidney fibrosis. Senescent cell depletion in mice improves outcomes in multiple organs including the kidney. There is an unmet need for non-invasive biomarkers or renal senescence. We used samples from patients with kidney disease and cultured human renal proximal tubular epithelial cells (hRPTECs) to identify urinary biomarkers of renal tubular senescence.

Methods:
hRPTEC senescence was induced *in vitro* using 10Gy irradiation. Bulk RNAseq was performed comparing SCs with proliferating controls (n=5/group). Immunofluorescence staining for p21CIP1, Ki67 and tubular markers CD10/CKPAN was performed in human kidney tissue from 131 CKD patients. P21CIP1 (+) / Ki67 (neg) tubular cells were classified as senescent (expressed as percentage of all tubular cells). In subgroup 1 (collected in Edinburgh, n=51), LC-MS studies were performed on matched urine samples. Proteins qualified as candidate biomarkers if they predicted the level of histological senescence in multivariate linear regression models alongside baseline eGFR, age and ACR and were upregulated in senescence in either my *in vitro* transcriptomic data or in other publicly available renal senescence datasets. Candidate biomarkers were validated using ELISAs in subgroup 2 (collected in Glasgow, n=53) with both urine and kidney tissue available. Top performing biomarkers were studied further to determine if they predicted renal progression (defined as reaching end-stage kidney disease or a 40% decline in eGFR from baseline) using urine samples from n = 322 participants with kidney disease (eGFR < 60 mls/min and / or ACR > 30mg/mmol).

Results:
In vitro: Irradiation increased mRNA levels of *CDKN1A* and reduced *LMNB1* and *MKI67* in keeping with senescence induction. *In vivo*: the degree of renal tubular senescence increased with age (rho = 0.58, p<0.001) and inversely with baseline eGFR (rho = -0.48, p<0.001). 331 proteins were detected by LC-MS. 5 candidate biomarkers were identified; 2 of which remained highly correlated with and predictive of histological senescence in multivariate linear regression models in the validation subgroup (biomarker 1 – rho 0.61, p < 0.001, fig. 1a and biomarker 2 – rho 0.62, p < 0.001, fig. 1b) [not named pending patent applications]. During the median follow-up period of 4.2 years, 76 participants reached the CKD progression endpoint. High levels of both top performing urinary senescence biomarkers were associated with an increased rate of CKD progression (log-rank p < 0.001 for both biomarkers, fig. 2a and b) and this remained significant after adjusting for other risk factors such as baseline eGFR, age, ACR and systolic blood pressure in Cox proportional hazards models.

Conclusion:
We have identified and validated 2 urinary biomarkers of senescence. These could aid patient selection for clinical trials of senolytic treatments in kidney disease and act as prognostic biomarkers to identify patients at increased risk of kidney disease progression.



BK screening in kidney transplant recipients in NHS Lothian and NHS Borders

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Background
Reactivation of BK virus following kidney transplantation is known to be associated with potential BK virus associated nephropathy (BKVAN) and graft loss. Screening practice post kidney transplant varies. Since November 2015, routine screening for BK virus by serum PCR testing has been performed in the Royal Infirmary of Edinburgh, in line with KDIGO guidelines. We aimed to review the findings of this screening programme and to assess patient outcomes.

Methods
This was a retrospective cohort study including patients transplanted between November 2015 and July 2020 and followed up in NHS Lothian or NHS Borders. Outcome data were collected from VitalData© and TrakCare© patient records and analysis carried out in RStudio©. Patients received immunosuppression with Tacrolimus, Mycophenolate Mofetil and Prednisolone. **Definitions:** *BK viraemia:* any detectable BK PCR including patients with <500 copies/ml detected, the lowest level of detection on the assay. *Significant BK viraemia:* any detected PCR that had resulted in a change in immunosuppression. *Clearance of BK:* two consecutive BK PCR results of "Not Detected" with the date taken from the first test. *BKVAN:* biopsy proven or documented clinical diagnosis.

Results
Who? There were 192 patients included in the study with a mean follow up time of 3.8 years. Of these patients, 58 (30%) had at least one positive BK PCR and 40 (21%) had significant viraemia. There were no differences in the baseline characteristics of those with significant viraemia vs. those without (40 vs. 152) (Male; 65% (26/40) vs. 63% (95/152) (p = 0.914), Mean age; 53 vs. 55 (p = 0.440), Aged >60; 25% (11/40) vs. 28% (43/152) (p = 0.999), T cell depleting induction agent; 10% (4/40) vs. 6% (9/152) (p = 0.576)). **When?** In those with significant viraemia, BK was detected in the first 24 months post transplant, median time from transplant to detection of 94 days (IQR = 66-179 days). Median initial BK PCR was 1271 copies/ml (IQR 500-5213 copies/ml). Median peak BK PCR was 5323 copies/ml (IQR 1724 – 43744 copies/ml). BK virus was cleared in 90% of patients (n=36) with a median time to clearance of 4.5 months (IQR = 2.9 – 10.8 months). **Graft function:** There was no difference in mean eGFR between those with significant viraemia and the rest of the study population at six months (58 ml/min/1.73m^2 (SD 17.7) vs. 57.7 ml/min/1.73m^2 (SD 20.3) (p = 0.941)) one year (58.8 ml/min/1.73m^2 (SD 16.7) vs. 58.1 ml/min/1.73m^2 (SD 19.7) (p = 0.822)) or two years (57.6 ml/min/1.73m^2 (SD 19.0) vs. 57.2 ml/min/1.73m^2 (SD 18.5) (p = 0.911) post transplant. **BKVAN:** Seven patients developed BKVAN. There was no graft loss secondary to BKVAN within the study period. These patients had BK detected earlier, with a median time to detection of 63 days (IQR 61-77 days) (p = 0.013). The initial detected viral PCR was higher, median 10000 copies/ml (IQR 2129 – 13393 copies/ml) but not statistically significant (p = 0.098). Median peak PCR was 239,913 copies/ml (IQR 59828 – 507556 copies/ml), significantly higher than in patients who did not develop BKVAN (p = 0.0002). BK was cleared by 72% compared to 90% in those with BK viraemia only. The duration of viraemia was longer, median 16 months (IQR 6.9 – 28.5 months) (p = 0.015). **Rejection:** The rate of acute rejection was comparable between those with significant viraemia and the rest of the population (12.5% (5/40) vs. 15.1% (23/152) (p = 0.867)). Two of the five patients who had significant viraemia and developed acute rejection did so after the reduction in immunosuppression, at 53 days (112 days post transplant) and 2.6 years post detection of BK. The three patients who had BK detected following an episode of acute rejection which they had received further immunosuppression for did not develop BKVAN or suffer graft loss. One further patient was found to have developed chronic rejection 1.6 years post BK being initially detected. They had concurrent CMV disease necessitating sustained reduction in immunosuppression and experienced graft loss.

Conclusions
Significant viraemia was detected in 21% of the population as a result of screening. No defined patient population was identified as being more at risk of developing BK viraemia within this relatively small cohort. There was no graft loss as a result of BKVAN within the study period. In patients who develop BKVAN, BK was detected earlier post transplant, they have higher peak PCR results and a more prolonged duration of viraemia. The rate of rejection in patients with significant BK viraemia is comparable to those with no detected BK or non-significant viraemia. Screening appears to enable detection and usually clearance of BK viraemia, while maintaining stable graft function and reduction in immunosuppression does not appear to lead to increased rates of rejection in this population, at least in this small cohort.

PENICILLIN ALLERGY DE-LABELLING IN THE GGC RENAL REPLACEMENT THERAPY POPULATION

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BACKGROUND

Patients with reported penicillin allergies have poorer health outcomes, with avoidance of first-line antibiotics leading to increased adverse events, critical care admissions, longer hospital stays, increased readmission rates and greater risk of antimicrobial resistant and *C. difficile* infections. Patients on RRT are at high risk of developing infections and penicillin allergy is frequently reported. The Scottish Antimicrobial Prescribing Group (SAPG) have published a penicillin allergy screening algorithm and oral challenge toolkit to allow non-allergy specialists to safely de-label immediate type I hypersensitivity reactions to penicillin in those assessed as at very low risk of type I or type IV reactions.

AIMS

To identify all RRT patients in our cohort with a documented penicillin allergy and to initiate an inpatient penicillin allergy de-labelling programme in our centre.

METHODS

In part one of the study, the Scottish Electronic Renal Patient Record (SERPR) was used to identify all patients in the GGC and Forth Valley service on any form of RRT on 1/11/2021. A Further query was run to identify all patients within this group who have a reported allergy to a penicillin antibiotic. The records were reviewed and The SAPG screening algorithm was used to identify the proportion of this cohort who might be suitable for an oral penicillin challenge. In part two of the study, a SERPR query was created to identify any RRT patient with a documented penicillin allergy who were currently inpatients on any of the nephrology wards. The SAPG toolkit was then utilised to begin administering oral challenges to appropriate inpatients. Successful challenges were communicated to GP's and the patient's allergy label was removed on SERPR.

RESULTS

There were 1852 patient on RRT in our patient cohort on 1/11/2021 and 216 (12%) had a documented penicillin allergy. 44 (20%) of these were identified as being safe for de-labelling/testing based on SAPGs screening algorithm. A further 143 (66%) were identified as being potentially safe for testing but required further questioning on the nature of their reaction. Of the 44 patients identified as being safe for de-labelling, 25 patients (57%) had a culture result within the past 3 years where a penicillin antibiotic would have been the first line treatment option. The second query identified that throughout January 2023, 18 patients with a recorded penicillin allergy were admitted to the nephrology wards. So far 10 patients have been successfully de-labelled as penicillin allergic. 12 patients were either too unwell, unable to consent or on alternate antibiotics, but will be approached at a later date. One patient declined allergy testing. Penicillin allergy de-labelling took approximately 2 hours per patient including questioning, consent, administration of challenge and monitoring.

CONCLUSION

Our data demonstrates that the RRT population has the potential to benefit from a formal penicillin de-labelling strategy. Our preliminary data on application of the SAPG de-labelling toolkit indicates that this can be carried out successfully in the nephrology inpatient population.

APELIN REGULATES RENAL PHYSIOLOGY AND OFFERS CARDIOVASCULAR AND RENAL BENEFITS IN CHRONIC KIDNEY DISEASE

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Background
Chronic kidney disease (CKD) affects 10% of the global population and cardiovascular disease is its commonest complication. Despite current treatments, outcomes for patients with CKD remain poor and new therapies are needed. Apelin is an endothelium-dependent vasodilator and inotrope, and a potential novel treatment for CKD. We examined the cardiovascular and renal actions of apelin in healthy subjects and patients with CKD.

Methods
Patients with stable, non-diabetic CKD who were optimised on renin-angiotensin system blockers, and age- and sex-matched healthy subjects were recruited to a randomised, double-blind, placebo-controlled study. Participants attended for two study visits and at each received either pyroglutamated apelin-13 ([Pyr^{1}]apelin-13, 1 nmol/min and 30 nmol/min) or placebo. Regular cardiovascular assessments were performed, including blood pressure, impedance cardiography and pulse wave velocity. Renal clearance studies using iohexol and para-aminohippurate determined glomerular filtration rate (GFR) and effective renal blood flow, respectively. Tubular function was assessed by measurement of urinary electrolyte and free water excretion.

Results
Twelve patients with CKD and 12 healthy volunteers were recruited. Baseline characteristics are below.

	Healthy volunteers	Chronic kidney disease
Age, year	48±4	48±4
Male sex (%)	8 (67)	8 (67)
Mean arterial pressure, mmHg	90±6	95±8
Systemic vascular resistance index, dyn*s*cm^{-5} m^{2}	2,429±87	2,862±180
Pulse wave velocity, m/s	5.7±0.3	6.5±0.3
Effective renal blood flow, mL/min	824±48	313±49
Glomerular filtration rate, mL/min	96±5	41±5
Effective filtration fraction, %	19.5±0.9	20.7±1.2
Protein:creatinine ratio, mg/mmol	0	39(16-144)

Cardiovascular effects
There were no meaningful cardiovascular responses to low dose (1 nmol/min) [Pyr^{1}]apelin-13. Compared to placebo and in both health and CKD, 30 nmol/min [Pyr^{1}]apelin-13 reduced mean arterial pressure by ~3% and systemic vascular resistance index by ~10-15%, and increased cardiac index by ~10-15% ($p<0.05$ for all comparisons). Pulse wave velocity fell in health alone (6.3±0.2 to 5.9±0.2 m/s, $p<0.01$ compared to placebo).

Renal effects
Both 1 nmol/min and 30 nmol/min [Pyr^{1}]apelin-13 had comparable effects on renal endpoints in each group. Effective renal blood flow increased by ~15% in health and CKD ($p<0.01$ compared to placebo in both). In CKD only, GFR fell by ~4 mL/min, filtration fraction by ~3% and proteinuria by ~25% ($p<0.01$ compared to placebo for all). Overall, the actions of apelin were comparable to those of an angiotensin-converting enzyme inhibitor. [Pyr^{1}]apelin-13 led to a ~30% increase in natriuresis and a ~10% increase in free water clearance in health and CKD. If this natriuretic effect were maintained over 24-hours, subjects would excrete an equivalent ~60mmol of sodium, broadly equivalent to a single 25mg dose of spironolactone. Overall, the cardiovascular and renal effects of apelin were prolonged in CKD.

Conclusion
Apelin offers short-term cardiovascular and renal benefits in optimally managed patients with CKD. If maintained longer-term, these effects would be expected to translate to improved cardiovascular and renal outcomes. Clinical trials of long-acting oral apelin analogues are justified in CKD and other conditions with impaired salt and water balance.

OUTCOMES OF ABO-INCOMPATIBLE TRANSPLANTS IN SOUTH-EAST SCOTLAND

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Introduction
The National Living Donor Kidney Sharing Scheme has enabled many patients to receive a living donor kidney transplant. ABO incompatible (ABOi) transplantation following desensitisation remains an important alternative for patients who are not successfully matched. However, concern remains that ABOi transplants are associated with excess mortality and graft loss. We examined the outcomes of ABOi transplants in our centre.

Methods
We performed a single centre, retrospective cohort study of all patients who received ABOi kidney transplants between November 2009 and August 2023. Desensitisation protocols and blood group antibody titres before and after desensitisation were recorded, as were documented surgical complications within the first 45 days of transplant including bleeding, requirement for blood transfusion, return to theatre, urine leak and lymphocoele. Episodes of acute rejection, opportunistic infections (BK polyomavirus, cytomegalovirus (CMV), pneumocystis pneumonia) and severe infections (defined as infection requiring hospitalisation or modification of immunosuppression) were identified. The incidence of each was compared to a cohort of 139 ABO compatible (ABOc) living donor transplants performed in Scotland between 2015-2016. Graft function was examined at 1, 3 and 5 years, where available.

Results
Twenty-eight patients received an ABOi live donor transplant during the study period, with a median follow-up of 57 months (range 1 – 166 months). Recipients had a mean age of 47±13 years and 69% were male. Nine received a pre-emptive transplant and one recipient was highly sensitised. The majority (16/28) received a living unrelated donor kidney. The median starting blood group antibody titre was 1 in 32. Most followed a standard desensitisation protocol with rituximab, plasma exchange and immunosuppression beginning two weeks prior to transplant.

All patients were successfully desensitised pre-operatively, reaching a mean blood group antibody titre of 1 in 2. The incidence of surgical complications was low: one patient had a significant post-operative bleed necessitating return to theatre; two developed haematomas; 3 required blood transfusion. One year outcome data was available for 23 patients. Six patients had an episode of acute rejection, of which one was antibody-mediated, with a median time to rejection of 49 days after transplant. Whilst this was higher than the incidence of rejection in ABOc recipients, this did not reach statistical significance (26% *versus* 14%, respectively; p=0.325). There was no difference in the incidence of BK viraemia in ABOi recipients in comparison to ABOc recipients (17% *versus* 14%, respectively; p=0.953) nor in the incidence of CMV (13% *versus* 19%, respectively; p=0.660). The incidence of hospital admission due to infection in the first year following transplant was high in ABOi recipients (50%), however data were only available for 16 patients.

Graft outcomes at 1 year were similar between ABOi and ABOc recipients, with graft survival of 100% and 96%, respectively, and no significant difference in graft function (mean estimated glomerular filtration rate (eGFR) 62±20 *versus* 56±17 mL/min/1.73m^2, respectively; p=0.183). Mortality at 1 year was also comparable (ABOi recipients 0% *versus* ABOc recipients 4%). Three year follow-up data was available for 20 (71%) ABOi recipients, all of whom had a functioning graft with a mean eGFR of 60 mL/min/1.73m^2.

Conclusions
We have successfully performed 28 ABOi transplants since 2009. Whilst we acknowledge there is a trend to increased acute rejection and a high incidence of severe infection, overall graft outcomes are excellent and comparable to ABOc living donor recipients. Providing there is careful recipient selection, ABOi transplantation is a safe and effective alternative to remaining on the deceased donor waiting list and/or extended time on dialysis.

IgM+ Plasma Cell Tubulointerstitial Nephritis: A Rare and Elusive Cause of Chronic Kidney Disease.

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Case Description:
A female in her early fifties presented to our renal service with stage 3 chronic kidney disease (CKD). A renal biopsy showed tubulointerstitial nephritis (TIN). Omeprazole-induced interstitial nephritis was considered likely, and she received a short course of prednisolone.

Over the subsequent nine years, the patient's renal function continued to deteriorate despite cessation of omeprazole. She developed a primary biliary cholangitis (PBC), which responded to ursodeoxycholic acid therapy, and distal renal tubular acidosis.

In response to elevated serum IgM titres, a repeat renal biopsy showed tubulointerstitial infiltration with IgM+ plasma cells on immunofluorescence. IgM^+ plasma cell TIN (IgM^+PC-TIN) is an extremely rare cause of interstitial kidney disease. Whilst showing some response to immunosuppression, this patient developed side effects from both steroids and mycophenolate. She has recently commenced rituximab therapy, with corresponding improvement in her renal function.

Discussion:
Whilst the relationship between TIN, IgG+ plasma cell infiltration, and extra-renal autoimmune pathologies is well-characterised in literature, only 23 cases of IgM+PC-TIN have previously been reported[1-9]. These cases show disproportionate preponderance to Japanese patient populations and have historically responded well to immunosuppressant therapies[2-9].

To our knowledge this is the first case in reported literature treated with rituximab. We hope that by sharing this case, we can raise awareness of this rare disease beyond Japanese clinical practice and highlight the utility of rituximab as a steroid-sparing agent in this disease, especially where previous immunosuppressants have been poorly tolerated.

Clinical Significance:
As prompt recognition and treatment is key to preserving kidney function, we recommend that IgM^+PC-TIN be regularly considered in middle-aged females presenting with idiopathic TIN, particularly where there is a concomitant PBC diagnosis.

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Joint Renal and Palliative Care Clinic

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There are increasing numbers of patients with advanced chronic kidney disease (CKD) who are frail, have multiple co-morbidities and poor functional status. For these patients, kidney replacement therapy (KRT) may be of limited benefit. Such patients often have a high symptom burden and report poor quality of life. They require holistic and active management of their care needs. Renal supportive care is an approach that aims to maximise patients' quality of life, by providing a support network and addressing their physical, psychological and emotional concerns.

Since July 2022, a monthly joint renal-palliative care clinic (run by two consultant nephrologists and one palliative care consultant) has been run in Aberdeen Royal Infirmary. Suitable patients are invited to attend (those with CKD who have significant symptom burden or those approaching end of life requiring anticipatory care planning (ACP) discussions, vetted by two consultant nephrologists).

Data was collected using an Integrated Palliative care Outcome Scale (IPOS) questionnaire. This is an accredited questionnaire utilising questions scored on a scale of 1-4 to assess a patient's overall physical, social, psychological and spiritual symptoms and concerns (higher score reflects more significant effect).

Patients were invited to complete the questionnaire prior to their initial visit and at all subsequent visits. The aim was to enable the team to identify how to best support the individual, comparing effectiveness of interventions over time. A total of 17 patients have completed an IPOS questionnaire since July 2022. Average IPOS score at initial visit was 28. Six patients have completed the IPOS questionnaire on more than one occasion. Average change was +3.5 (lowest -4, highest +16). 1 patient has completed it 3 times (overall change +1). Symptoms scored highest were weakness or lack or energy (mean 2.35/4), poor mobility (1.95/2), pain (1.57/4) and shortness of breath (1.52/4). Other ways in which patient were commonly affected were feeling unable to share how they were feeling with family and friends as much as they wanted (1.78/4) and feeling that their family and friends were worried/anxious about them (1.82/4).

In addition to IPOS scores, data was collected on patient's resuscitation status, ACP and Key Information Summary (KIS) completion, number of hospitalisations, preferred place of death and prescription of anticipatory medications.

Completion of questionnaires varied, with several not returned/incomplete. Initially questionnaires were posted out to the patient's address with the aim for them to be returned at the clinic appointment, but this was largely unsuccessful. Many of the consultations were carried out over the phone due to patient preference/limitations. Thus, when questionnaires were not returned, they were attempted to be completed during the consultation with help from a Low Clearance specialist nurse.

Given the time between visits and the symptom burden from progressive, advanced CKD, determining the impact of supportive care interventions is challenging. Further quantitative and qualitative data would be useful to determine how this service can be optimised to maximise our patients' quality of life until death. Informal feedback from consultants has been positive in enhancing their knowledge of dealing with complex symptoms. This data will help inform future service planning and development to make a case for funding dedicated supportive care nursing time.

Delivering a pilot national simulation training day for new Scottish renal registrars

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Background

Simulation-based education (SBE) is a well-evidenced teaching modality which encourages human factors learning, procedural skills development and exposure to high-impact clinical scenarios. This has been reflected in recent UK postgraduate renal and internal medicine curriculum updates; all higher specialty trainees training in renal and internal medicine must participate in a minimum of 12 hours of SBE. A network of educators engaged in renal SBE has developed across Scotland, recognising a need to formalise simulation training for renal higher specialty trainees. Expertise from all four Scottish training regions were pooled to design and deliver a pilot national training day focusing on preparing new renal trainees for clinical work within renal medicine.

Method

Trainees commencing Scottish renal training in August 2023 were invited to participate in a one-day training course held in July 2023 at Kirklands Medical Education Centre. Training was delivered by a multi-disciplinary faculty of renal consultants, senior trainees and nurse specialists from across Scotland. Our network of educators collaborated to develop learning objectives aimed at enhancing skills fundamental to practice as a renal trainee. Participants completed a pre-course questionnaire which informed the finalised course content.

During the pilot event a flipped classroom approach was used to focus high-level discussion and appraise non-technical skills. Relevant theoretical learning was delivered by video presentation prior to the course. The course itself comprised three workshops: 1) immersive high acuity clinical scenarios 2) immersive on-call referral phone scenarios with pre-prepared mock electronic patient record files 3) non-tunnelled central venous catheter (NTCVC) insertion mastery. Faculty and participant evaluation on the structure, running and content was sought through anonymous questionnaires after the training day.

Results

Six participants attended the course, with a range of 6-14 months prior experience of renal medicine. Most indicated prior experience of assessing unwell patients with renal disease, including those receiving dialysis and with dialysis access issues. However, only 50% agreed that they felt prepared leading the resuscitation of patients on dialysis in cardiac arrest, and only 25% felt prepared to manage life-threatening dialysis access complications. Prior to the course 50% of participants felt confident providing advice for patients in a remote location and 75% felt confident to assess if patients were medically stable for dialysis and prepared to risk assess unwell patients referred by telephone.

All participants rated the session as extremely relevant in their renal training. After the course, 100% of participants either strongly agreed or agreed that they felt prepared to lead the resuscitation of patients undergoing dialysis in cardiac arrest, manage life-threatening dialysis access complications, provide advice for patients in a remote location, and risk assess unwell patients referred by phone. Eighty percent of participants strongly agreed or agreed they felt confident assessing if patients were medically stable enough to receive dialysis treatment.

All participants rated the immersive high-acuity scenarios as very realistic. Positive comments included the quality of the scenarios, inclusion of a physical dialysis machine, the safe and supportive environment, and the available faculty expertise. All participants rated the on-call phone scenarios as very or somewhat realistic. Positive comments included creation of the high-fidelity on-call phone experience, good non-technical skills/human factor scenarios, and the relevance of SBE for non-emergency clinical scenarios requiring remote assessment.

There were mixed opinions regarding the usefulness of the NTCVC mastery session given some participants were already procedure independent. Suggestions for improvement of the course included extending the time dedicated for the on-call phone simulation and consideration of introducing renal biopsy into the clinical skills mastery session.

Conclusion

The first national renal simulation training day in Scotland has had favourable evaluation which has provided evidence as a ‘proof-of-concept’ that renal specialty specific SBE can be delivered on a national scale and align with training requirements of the Joint Royal Colleges of Physicians Training Board. The next steps require securing reliable recurring funding to ensure the sustainability of this course and allow for up-scaling of SBE to include senior renal registrars and other members of the multidisciplinary team.

Common Variable Immunodeficiency presenting with Dialysis Dependent Acute Kidney Injury

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Introduction

Common variable immunodeficiency (CVID) is a rare condition which normally presents with recurrent infections. Uncommonly, it can present with renal dysfunction secondary to tubulointerstitial nephritis. Presentation in this manner, without recurrent infections, is a diagnostic challenge with a limited evidence base for management. Here we present a case which highlights these diagnostic and therapeutic challenges.

Case Description

A 46 -year-old female patient presented to one of our rural hospitals with an acute history of bloody diarrhoea. On examination she was hypotensive with generalised abdominal tenderness. Bloods revealed a significant acute kidney injury (AKI), with a CT abdomen/pelvis showing pancolitis. Despite IV fluid resuscitation and empirical broad-spectrum antibiotic therapy the patient's condition did not improve and she was transferred to our large district general hospital's intensive care unit for continuous haemofiltration and vasopressor support. When she was haemodynamically stable, she was stepped down to ward level care but there was no improvement in her renal function, and she continued to require intermittent haemodialysis. A renal screen including ANCA, ANA and protein electrophoresis was negative, with normal complement levels and negative blood borne virus screening. Serum immunoglobulin testing revealed a hypogammaglobulinaema with low IgA, IgM and IgG. Multiple stool cultures were negative for infection and flexible sigmoidoscopy and colonoscopy demonstrated appearances in-keeping with ischemic colitis. MRI angiogram revealed no vascular abnormalities to account for the ischemic colitis.

Given the hypogammaglobulinaemia, B-cell subsets were performed which showed low numbers of CD4+ and CD8+ T cells with borderline low natural killer cell numbers. There were normal numbers of circulating B cells, however B cell subpopulations were skewed with low numbers of mature isotype. These results confirmed a diagnosis of CVID. A native kidney biopsy was performed which showed active, chronic tubulointerstitial nephritis, consistent with renal dysfunction which we felt was likely associated with CVID.

The patient was commenced on a weaning course of prednisolone, with an initial dose of 40mg, due to the active nature of the tubulointerstitial nephritis and referred to the regional immunology service. Gradually the patient's urine output improved, with her pre-dialysis creatine improving with time. Sixty-seven days after the initial presentation the patient underwent her last chronic haemodialysis session. She has been left with residual stage 4 chronic kidney disease. Prednisolone has been discontinued.

Given the patient had no history of recurrent infections it was decided there was no benefit of prophylactic antibiotics or intravenous immunoglobulins, which would be the standard treatment for CVID.

Case Discussion

This case highlights the diagnostic and therapeutic challenges of renal dysfunction associated with CVID. A history of recurrent infections should lead clinicians to consider the diagnosis, though in our case this typical history was absent. Hypogammaglobulinaemia should prompt B-cell subset testing to confirm a diagnosis of CVID. Though kidney disease associated with CVID is rare it should be considered, and kidney biopsy typically shows tubulointerstitial nephritis. Management of CVID without infectious complications is difficult due to the lack of an evidence base and requires a multidisciplinary approach and involvement of specialist immunology services.

Comparison of outcomes between low dose versus standard dose MMF in renal transplant recipients >60 years.

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Introduction: Renal transplantation is the preferred modality of treatment for end-stage renal disease, and immunosuppressive therapy is essential for preventing rejection and preserving graft function. Mycophenolate mofetil (MMF) is a cornerstone of immunosuppressive therapy. A previous multicentre Scottish study demonstrated recipients >60years tolerate the standard dose (2000mg/day) of MMF poorly with only a minority being still on this dose 6 months after transplant. In 2019 our centre therefore changed the standard immunosuppressive protocol so that recipients >60 years start on low dose MMF (500mg twice daily). This retrospective controlled cohort study aimed to compare the outcomes of renal transplant recipients >60 years who received low dose MMF versus a historical cohort who received standard dose MMF.

Methods: All consecutive kidney transplant recipients >60 years performed at the Glasgow renal transplant unit between January 2015 and January 2022 were included. Recipients prescribed MMF 500mg twice daily at the time of transplant (low dose group) were compared to those prescribed 1000 mg twice daily before the change in protocol (standard dose group). We compared actuarial patient survival, transplant survival, incidence of biopsy-proven acute rejection (BPAR) at 12 months, mean eGFRs at different time points, incidences of CMV/BK viraemia and incidence of leucopaenia in the first year.

Results: 295 renal-transplant-recipients were included, with 138 in standard dose MMF cohort versus 157 in low dose cohort. 12 months actuarial survival with transplant function was 90.45% in low dose v 88.41% in standard dose group (p=0.60). There was no difference in incidence of BPAR 12 months. (12.7% vs 11.5% p=0.72) or CMV (19.7% vs 27.53%, p= 0.11) /BK viremia (8.9% vs 13.7%, p= 0.18) in the first year. Mean eGFR at each time point was higher in low dose cohort (38.7 vs 37.6 ml/min at 12-months, p=0.028). Incidence of leucopoenia was lower in the low-dose cohort (28.6% vs 41.3%, p=0.02).

Conclusion: Our data suggest that a low-dose of MMF is equally effective as high-dose in renal transplant recipients >60 years with fewer adverse effects and better transplant function.

Global prevalence of chronic kidney disease: A systematic review and meta-analysis examining prevalence and disparities in age, sex and socio-economic status

Rachael Duff, Omodolapo Awofala, Muhammad Tahir Arshad, Emilie Lambourg, Peter Gallacher, Neeraj Dhaun, Samira Bell

Background
Chronic kidney disease (CKD) is a significant non-communicable disease, contributing to global morbidity and mortality. This study investigated disparities in age, sex and socio-economic status in CKD and updated global prevalence estimates through systematic review and meta-analysis.

Methods
Five databases and grey literature were searched from 2014 to 2022, with 14,871 articles screened for inclusion, 119 papers included and data analysed on 29,159,948 participants. Random effects meta-analyses were conducted to determine overall prevalence, prevalence of stages 3 – 5 and prevalence in males and females. Influences of age, sex and socio-economic status were assessed in subgroup analyses, and risk of bias assessment and meta-regressions were carried out to explore heterogeneity.

Findings
The overall global prevalence of CKD was 13.0% (11.3 – 14.8%) and 6.6% (5.6 – 7.8%) for CKD stages 3 – 5. Prevalence was higher in 13 studies carried out in older populations (19·3% for stages 1 – 5, 15·0% for stages 3 – 5) and meta-regression demonstrated independent association of age, body mass index, diabetes and hypertension with prevalence of stages 3 – 5. The prevalence of CKD stages 1 – 5 was similar in males and females (13·1% *versus* 13·2%) but the prevalence of stages 3 – 5 was higher in females (6·4% *versus* 7·5%). Overall prevalence was 11·4%, 15·0% and 10·8% in low, middle and high- income countries respectively; for stages 3 – 5 prevalence was 4.0%, 6·7% and 6·8%, respectively.

Interpretation
This study provides a comprehensive up-to-date assessment of global CKD prevalence, highlighting important disparities related to age, sex and socio-economic status. Future research should focus on targeted screening and treatment approaches, and improving access to care and providing more effective data monitoring, particularly in low- and middle-income countries.

Discrepancy of creatinine and cystatin C-based measures of eGFR in people with cancer and association with VEGF-signalling pathway inhibitor toxicity in a prospective cohort

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Introduction:
Creatinine based measures of kidney function are particularly unreliable in the cancer population. Cystatin C is filtered unchanged through the glomerulus and is a validated alternative measure of glomerular filtration rate (GFR). Accurate measurements of GFR are paramount in people with cancer, particularly when calculating doses of systemic anti-cancer therapies. VEGF-signalling pathway inhibitors (VSPIs) are a targeted anti-cancer therapy that are associated with significant renal and cardiovascular toxicity. We aimed to study the discrepancy between creatinine and cystatin C-based measures of GFR and the relationship between the development of drug toxicity.

Methods:
A single centre prospective observational longitudinal study over 24 weeks was conducted in people with cancer receiving VSPI therapy. Samples collected at baseline were analysed in this study prior to starting VSPI therapy. Modification of Diet in Renal Disease equation was used to calculate eGFR creatinine (eGFRcr), as this was the measure reported by the laboratory at time of data collection. CKD-EPI Cystatin C Equation (2012) was used to calculate eGFR cystatin C (eGFRcys).
Estimated GFR difference (eGFRdiff) was calculated as eGFRcys – eGFRcr. Positive eGFRdiff values mean that eGFRcys > eGFRcr, and negative eGFRdiff values mean that eGFRcys < eGFRcr.
We tested for associations between substantial discrepancies in eGFRdiff (>= 15 mL/min/1.73m^2) and drug toxicity (defined as any general or organ-specific toxicity related to VSPI treatment, excluding isolated hypertension) associated with VSPI using logistic regression models, adjusted for age and sex.

Results:
Ninety-seven people with cancer who received VSPI were recruited of whom 42 developed VSPI-associated toxicity during follow-up. The median age was 66.0 years [IQR 56.0-72.0] and 71.1% were male. Most cancers (93.8%) were stage 4 (advanced) and the majority of people had renal cell cancer (69.1%).
The median baseline eGFRcr was 65.0 mL/min/1.73m^2 [IQR 53.0-83.0] and eGFRcys was 56.0 mL/min/1.73m^2 [IQR 46.3 – 75.4]. Most people had a negative eGFRdiff (Figure 1) but the range of eGFRdiff was broad (mean -8.59 mL/min/1.73m^2, SD 22.52). A negative eGFRdiff (i.e. eGFRcys < eGFRcr) was not significantly more likely with increasing age or by sex, but was significantly more likely [p <0.0001] with higher eGFRcr.

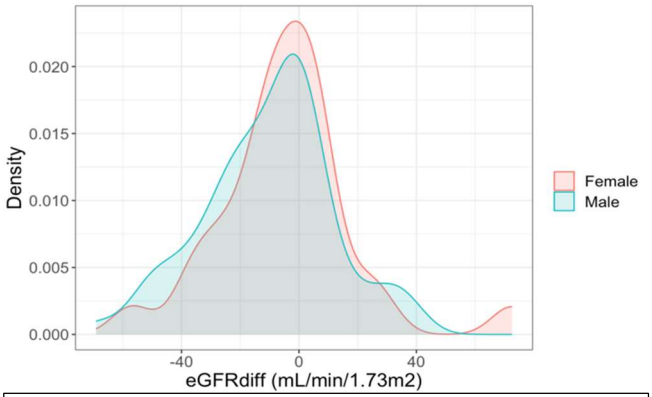

Figure 1: Density plot of the eGFR difference (eGFRdiff, eGFRcys - eGFRcr) by sex

Subsequent drug toxicity was not associated with either eGFRcr [p=0.09] or eGFRcys [p=0.91], but was associated with eGFRdiff: for each 10mL/min/1.73m^2 negative eGFRdiff, the likelihood of VSPI toxicity was reduced [OR 0.79, 95% CI 0.64 – 0.97, p = 0.02] and persisted after adjustment for age and sex [OR 0.80, 95% CI 0.64 – 0.98, p = 0.04].

Conclusion:
We found that this cohort of people with cancer treated with VSPI more commonly had lower GFR estimates with cystatin C-based measures compared to creatinine-based. A negative difference between eGFR measurements (eGFRcys < eGFRcr) was associated with lower likelihood of developing toxicity. The lack of association between eGFRcr or eGFRcys with propensity to develop toxicity suggests that this may not directly related to kidney function. A large negative eGFRdiff may relate to other factors such as frailty, comorbidity or severity of disease and therefore propensity to toxicity.

C3GN and Novel Therapeutics: A Case Report

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Background: C3 glomerulonephritis (C3GN) is a rare disease characterised on biopsy by proliferative lesions of predominant C3 deposition on immunofluorescence, particularly deposits within the mesangium and capillary walls. Dysregulation of the alternative complement pathway is thought to be the underlying mechanism (1). There are no approved treatments for C3G and prognosis is poor, with 50% progression to kidney failure over 10 years and similar rates of transplant loss due to disease recurrence. Iptacopan (a selective Factor B complement inhibitor) is proposed to suppress key enzymes involved in the alternative pathway cascade (2). It is being studied in clinical trials of C3G (3).

Aims: To describe our experience in diagnosing and managing a 25-year-old with C3GN who presents with nephrotic syndrome, hypertension, and a reduction in his estimated glomerular filtration rate (eGFR) with a novel small molecule therapeutic.

Case Presentation and Diagnostics: A 25-year-old male with a background of autism spectrum disorder was referred to his regional nephrology service due to reduction in his eGFR and proteinuria. His creatinine was 158µmol/L with an eGFR was 51.8ml/ml/1.73m^2 (CKD-EPI equation); urinary protein creatinine ratio (uPCR) 500mg/mmol; urinary albumin creatinine ratio (uACR) 400.2mg/mmol. Serum album 32g/L. His C3 0.22 (normal range 0.82 – 1.85 g/L); C4 0.27 (normal 0.15 – 0.53 g/L). Complement C5b-9 Complex was elevated at 1396. A faint paraprotein was detected on serum immunofixation with negative urine studies for immunofixation / Bence Jones protein and a normal kappa / lambda light ratio of 1.37. Anti-nuclear antibody was detected at a titre of 1:80 with homogenous and speckled appearance. The reminder of the GN and infectious screen was negative. A renal biopsy was performed which demonstrated diffuse MPGN dominant C3 staining; cholesterol crystals; and moderate to severe chronic tubulointerstitial damage.

Case Management and Therapeutics: His eGFR dropped to 34ml/ml/1.73m^2 within one week. 1mg/kg oral prednisolone with mycophenolate mofetil (MMF) titrated up to a dose of 1g twice a day were initiated. As he was established on the therapy his eGFR rose back to 57.9ml/min with a creatinine of 144 µmol/L over approximately 8 weeks. Following initial weaning of his prednisolone dose, his eGFR dropped back down to 29.7ml/min with a creatinine of 250 µmol/L. With involvement and clinical support from the National Renal Complement Therapeutics Centre an application was made to Novartis for the compassionate use of Iptacopan which was commenced early August 2023 (He would not have been eligible for recruitment into any current clinical trials). His latest eGFR is 55.4 ml/ml/1.73m^2 with a uACR of 55.3mg/mmol and normal C3 and C5b-9 levels.

Conclusions: In this report we sought to highlight the challenge of management of patients with rare diseases. Early detection and conferring with highly specialist services is critical to ensuring a time-sensitive process is rapidly executed. Furthermore, management of young patients with rapidly deteriorating function is a demanding situation for all involved as clinicians are acting to preserve as much nephron mass as possible, steering patients away from renal replacement therapies. The introduction of a novel therapeutic in this case may delay or prevent an inexorable decline to end-stage disease, and avoid burdensome and harmful adverse effects of conventional therapies.

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CARDIAC CHANGES IN EARLY CHRONIC KIDNEY DISEASE: A UK BIOBANK CARDIOVASCULAR MAGNETIC RESONANCE SUBSTUDY

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Background: Chronic kidney disease (CKD) patients are at a significant risk of accelerated cardiovascular disease (CVD), which increases as glomerular filtration rate (GFR) declines. Detection of possible early myocardial changes in the early stages of CKD may be important. We investigated early alterations in cardiac structure and function associated with early CKD using cardiovascular magnetic resonance (CMR) imaging.

Methods: We used automated measures of CMR analysis from participants in the UK Biobank CMR imaging substudy to extract information on LV cardiac function (ejection fraction, cardiac output, and index) and geometry (end-diastolic volume and end-systolic volume). Early CKD was defined as an estimated GFR with cystatin (eGFRcys) between 60 and 90 ml/min, or an urinary albumin:creatinine ratio (uACR) between 3 and 30g/mmol. Patients with left ventricular ejection fraction <50%, history of CVD, eGFRcys < 60ml/min, uACR > 30 mg/mmol, and those on renal replacement therapy were excluded. The associations between early CKD and LV measures were analysed using 3 different linear regression models: an unadjusted crude model (Model 1), a model adjusted for age, sex, and body mass index (Model 2) and a multivariable model adjusted for age, sex, ethnicity, smoking, body mass index, and use of blood pressure or cholesterol medication (Model 3).

Results: A total of 30,502 individuals, 17035 (55.8%) women, age 63.2 (7.5) years were identified: 18,159 with no CKD and 12,343 with early CKD. Participants with early CKD were more likely to be older, males and smokers. In the fully adjusted model, there was no difference in LV end-diastolic volume [CKD vs no CKD; coefficient (95% CI): -1.69 (-4.10 to 0.72), p=0.17], LV stroke volume [-0.99 (-3.10 to 1.12), p=0.36], LV cardiac output [-0.07 (-0.23 to 0.09), p=0.42], and LV cardiac index [-0.05 (-0.13 to 0.02), p=0.14]. However, both LV ejection fraction [-0.15 (-0.26 to -0.04), p=0.006] and LV end-systolic volume [-0.71 (-1.17 to -0.25), p=0.002] were significantly reduced in CKD.

Conclusions: In a low-risk patient population (without known CVD and with preserved LV ejection fraction) with mildly reduced kidney function, as measured with eGFRcys, early CKD was associated with some LV abnormalities. These findings suggest that cardiomyopathy represents one of the very early manifestations of the uraemic milieu.

Impact of uric acid lowering therapy on CKD progression in patients with gout and chronic kidney disease: sub-analyses of the Febuxostat versus Allopurinol Streamlined Trial (FAST)

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Background
Chronic Kidney Disease (CKD) is strongly associated with both gout and asymptomatic hyperuricaemia. It has been observed that CKD is a risk factor for incident gout. Hyperuricaemia in CKD may result from reduced excretion of uric acid and may contribute to kidney dysfunction and progression of CKD. Observational studies have demonstrated some evidence that treatment with uric acid lowering therapies (ULTs), such as allopurinol and febuxostat, may result in improved cardiovascular and kidney outcomes.
The Febuxostat versus Allopurinol Streamlined Trial (FAST) was a prospective, randomised, open-label, blinded endpoint (PROBE) design clinical trial comparing cardiovascular outcomes in participants with gout randomised to allopurinol or febuxostat therapy. the primary composite endpoint included death from cardiovascular causes, non-fatal myocardial infarction and non-fatal stroke.

Aims
To determine the effect of allopurinol and febuxostat, when used as uric acid lowering treatments, on kidney function in the FAST Study population.

Methods
Participants receiving chronic prophylactic treatment for gout with allopurinol were randomised to either continue allopurinol or switch to febuxostat. Participants had a blood sample for serum creatinine taken at the screening visit and at annual visits thereafter. Presence of dipstick proteinuria at the point of screening was also recorded.
The primary kidney outcome for this analysis was the rate of change in eGFR between febuxostat and allopurinol (eGFR slope). Secondary outcomes included a composite outcome as per the international consensus definitions of clinical trial outcomes for kidney failure (time to end-stage kidney disease (defined as need for dialysis, kidney transplantation or eGFR<15 mL/min/1.73m^2) or a 40% reduction in eGFR from baseline).

Results
The annual rate of decline in eGFR in the allopurinol group was -0.26 mL/min/1.73m^2 versus -0.56 mL/min/1.73m^2 in the febuxostat group (difference 0.29 [95%CI 0.14, 0.44] p-value <0.001). The difference was present at year 1 and persisted throughout follow-up. A higher drop-out rate was observed in the febuxostat arm compared to the allopurinol arm. There were no statistically significant differences in any of the secondary kidney outcomes.

Conclusion
A statistically significant difference in eGFR slope was observed between the participants who received allopurinol compared to those who received febuxostat. This did not reach a level that could be considered clinically significant and may relate to the higher withdrawal rate in the febuxostat arm of the study.

Genetic Variants in HNF1B – Clinical Phenotype of Children and Young People in Scotland

Rachael Harley

Background

Hepatocyte nuclear factor 1β (HNF1β) is a homeodomain containing transcription factor. It is the protein product of the *HNF1B* gene, located on chromosome 17q12. HNF1β plays an important role in early fetal nephrogenesis and is involved in gene expression in epithelial cells of various other organ systems, including the pancreas, liver, and Mullerian duct. Pathogenic variants in *HNF1B* result in a multi-system disorder, referred to as HNF1β, which is associated with a diverse range of clinical phenotypes. Given the variable phenotype, it is important that renal function is monitored regularly alongside screening for associated extra-renal features of HNF1β to allow appropriate monitoring of disease trajectory with early subspecialist involvement.

Methods

A report of children and young people (CYP; <18 years) with a confirmed genetic diagnosis of HNF1β was obtained from the Scottish Electronic Renal Patient Record (SERPR). Electronic Patient Records were accessed for baseline characteristics. Data were collected on each patient's genetic variant, renal function, presence of diabetes, as well as associated extra-renal features including hypomagnesaemia, hyperuricaemia, hepatic dysfunction and uterine abnormalities.

Results

There are 17 CYP with a confirmed genetic diagnosis of HNF1β in Scotland (9 males) with an age range of 2.16-17.48 years. 11 of the cohort are regularly reviewed at the Royal Hospital for Children (Glasgow) with the remaining children reviewed at local paediatric hospitals. Of the 13 CYP with available data on the underlying genetic diagnosis, 7 have *HNF1B* whole gene deletion, 4 have 17q12 deletion, 1 has a 2bp duplication and 1 has a single nucleotide variant (c.392A>C).

Of the 15 CYP with available data on renal function, 4 children have stage 1 CKD, 8 children have stage 2 CKD, 2 children have stage 3 CKD, and 1 child has stage 4 CKD. One individual in the cohort required renal replacement therapy and has subsequently received a renal transplant.

From a diabetes perspective, 1 individual within the cohort has a confirmed diagnosis of monogenic diabetes. 1 further individual in the cohort is being considered for commencement of metformin therapy (HbA1c - 45, Weight – 142.2kg). Of the 12 CYP with available HbA1c levels, 3 have an elevated HbA1c. 6 children have received annual HbA1c screening. 3 children are known to endocrinology services – 1 for diabetes management, 1 referred directly by the clinical genetics team following genetic diagnosis, and 1 for growth hormone deficiency.

In the context of broader phenotypes of HNF1β, 5 of the 15 CYP in which urate has been checked have known hyperuricaemia. 5 of the 16 CYP in which magnesium has been checked have associated hypomagnesaemia. 1 of the 16 CYP who have had liver function tests performed have a known liver abnormality in the context of conjugated hyperbilirubinemia and hepatosplenomegaly. This individual also has a confirmed alpha-1 antitrypsin deficiency. No females have confirmed uterine abnormalities within our cohort.

Conclusion

The clinical phenotype of CYP with confirmed *HNF1β* variants within our cohort of CYP in Scotland is incredibly heterogeneous. This highlights the importance of regular screening and monitoring for all associated manifestations of the condition to allow prompt and targeted management. A standardised approach to monitoring for extra-renal manifestations would be of benefit, suggesting the role for a centralised specialist HNF1β clinic supporting this cohort of patients.

Inequality of Access to Living Donor Kidney Transplantation in Scotland – REACH Transplant home-based education contributing to overcoming barriers to LDKT

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Background Living donor kidney transplantation (LDKT), preferably pre-emptively, is the optimal treatment for suitable patients with end stage kidney disease (ESKD), but barriers to access and inequality of access to this treatment exist. Scottish Government priorities for organ donation and transplantation aim to increase overall LDKT rates, increase the proportion of LDKTs that take place pre-emptively and reduce inequality of access to LDKT, which is associated with socio-economic deprivation and belonging to an ethnic minority.

REACH Transplant is a Scotland-wide home-based patient education initiative, implemented by a team of REACH Transplant Nurse Specialists, embedded in each of Scotland's nine renal units. Funded by the Scottish Government, REACH Transplant aims to provide high quality, tailored information about treatment options to patients approaching ESKD who are likely to benefit from kidney transplantation, and their support networks, with the objective of increasing the likelihood that such patients will eventually access LDKT, preferably pre-emptively.

As part of the long-term evaluation of the REACH Transplant approach, baseline information about equality of access to kidney transplantation, LDKT and pre-emptive transplantation in Scotland, in terms of socio economic deprivation, was gathered and analysed.

Materials/Methods The Scottish Index of Multiple Deprivation (SIMD) is the Scottish Government's standard approach to identifying areas of deprivation in Scotland, improving understanding about the outcomes and circumstances of people living in the most deprived areas in Scotland and allowing effective targeting of policies and funding. In healthcare, SIMD quintiles are most commonly used in analysis, dividing all of Scotland's postcode into in five equal categories from "1" (most deprived) to "5" (least deprived).

Patient information management systems in Scottish health boards were used to extract the anonymised postcode, and the associated SIMD, of transplant recipients in Scotland over a five year period from April 2018 - March 2023, along with information about whether their transplanted kidney came from a living or deceased donor and whether their transplant was performed pre-emptively or after dialysis had commenced.

Simple analysis of the distribution of recipients among each of the SIMD quintiles in the following categories was undertaken: non-pre-emptive DDKT, pre-emptive DDKT, non-pre-emptive LDKT and pre-emptive LDKT.

Results The results of this baseline analysis indicated that, during each of the five years investigated, and for the majority of health boards, the postcodes of recipients of non-pre-emptive DDKTs were evenly distributed across the SIMD quintiles. By contrast, the distribution of postcodes of recipients of pre-emptive DDKTs, non-pre-emptive LDKTs and pre-emptive LDKTs were all strongly skewed towards increased affluence.

Conclusions Prevalence of chronic kidney disease and ESKD is associated with increased socio-economic deprivation. Greater numbers of deprived patients than affluent patients, therefore, are likely to require RRT. Non-pre-emptive DDKTs are evenly distributed across the SIMD quintiles indicating that increased comorbidity among potential recipients from deprived areas, precluding transplant suitability, does not necessarily explain the strength of the relationship between increased affluence and the number of recipients who received a pre-emptive DDKT or a LDKT. In order to reduce inequality of access to LDKT and pre-emptive transplantation, barriers, other than increased comorbidity, faced by potential recipients affected by deprivation, need to be identified and addressed. REACH Transplant plays an important role in ensuring all potential recipients receive tailored information about treatment options to support well-informed shared decision-making.

Prediction of ESRD in IgA Nephropathy using IgA:C3 ratio at diagnosis. 10 year cohort

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IgA Nephropathy is the commonest glomerular pathology with a wide range of outcomes depending on the severity of the circulating serological pathophysiology and on the resulting inflammatory response in the kidney. Prediction of kidney loss, which results in renal failure in 20-40% of cases -versus very benign disease, has largely used traditional clinical parameters such as proteinuria, hypertension and already established renal decline at the point of diagnosis. There has been variable utility from biopsy severity scoring. Pathogenicity of IgA immune complexes may result from activation of complement via the alternative pathway and assessment of serum IgA and complement C3 has been suggested as a marker of pathogenicity.

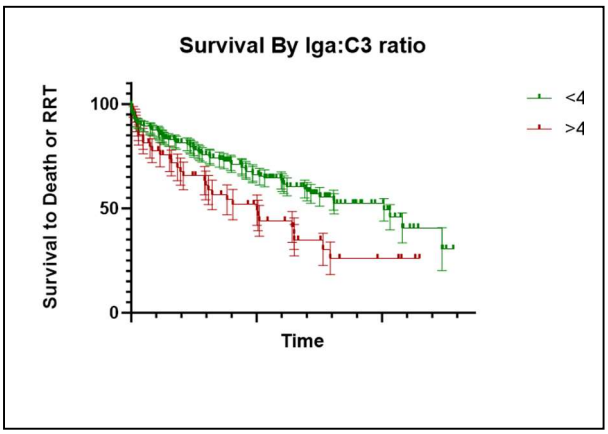
Methods We examined all the electronic records of biopsy proven IgA cases from 2010 onwards when serum electrophoresis and serum complement became been widely tested at new renal presentations.

Results. Of 319 cases between 2010 and 2023, 216 had serum IgA and complement studies at diagnosis, with median PCR 309 and median serum creatinine 177. 56 patients had IgA:C3 >4. Outcome of “death or renal replacement therapy” rather than “RRT or doubling serum creatinine” was used to select those with the most severe outcomes. Median follow up was 4.5 years, during which 101 (46%) died or reached ESRD. Among those with IgA:C3 > 4, 35 (61%) median survival 5years , versus 67(42%) of those <4 (median survival 10years) . Hazard ratio for IgA:C3 >4 was 1.9 (1.2-3.2) Cox Proportional Hazard show this to be independent 0from creatinine, proteinuria, and age. However, much of the effect is on overall survival rather than time to dialysis.

A cohort of 107 between 2010 and 2015 had data on CMEST score. 62 of this cohort also had IgA and complement measured. There was no correlation with CMEST score, or occurrence of crescents present on biopsy.

	IgA:C3 <4	IgA:C3>4
CMEST (av)	2	2
Cresc >0	35%	24%

Discussion IgA to C3 ratio is readily available result which powerfully predicts IgA outcome independently from pathology score and traditional clinical severity estimates. It may well become a useful indicator to target novel immune/complement therapies



AV fistula formation and CKD progression – a target trial emulation

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Introduction – Multiple retrospective studies have demonstrated a link between AV fistula formation and a deceleration in the decline of eGFR in patients with CKD. However, these studies were limited by selection and immortal time biases. We employed target trial emulation to explore this potential association while addressing these pitfalls.

Method – We designed a target randomised controlled trial in which patients were allocated to AV fistula or no AV fistula groups at baseline. Inclusion criteria included age >18 and <65 years old at enrolment, an eGFR CKD-EPI 2021 of 15mL/min/1.73m^2 or below, and attendance at a renal clinic. Exclusion criteria included prior AV fistula or graft formation, and prior renal replacement therapy. Patients were identified using the Strathclyde Electronic Renal Patient Record, covering the West of Scotland. We collected patient demographics (age, sex, Scottish index of multiple deprivation), comorbidities, medications, and laboratory tests (including baseline eGFR, 6-month pre-study start date eGFR slope calculated by linear regression, and urine protein:creatinine ratio).

A pseudo-population was created using auxiliary trials. Each patient entering the trial in the 'AV fistula' group generated a secondary auxiliary trial. Patients who had not undergone AV fistula formation at a comparable point but remained eligible to enter the study were entered into the auxiliary trial in the 'no AV fistula' group. Patients could therefore enter the trial multiple times in the 'no AV fistula' group. Auxiliary trials were 'stacked' to create the trial dataset.

Missing data were imputed using multiple imputation by chain equations, using the MICE package on R Studio. Stabilised inverse probability of treatment weights (IPTW) were calculated to adjust baseline covariates between the 'AV fistula' and 'no AV fistula' groups.

The primary outcome was difference in eGFR slope at 6 months between the two groups, estimated using a mixed-effects model. The secondary outcomes were dialysis and all-cause death, estimated using a Fine-Gray (competing risks) model.

Results: 1,364 patients were included in the trial (760 men [55.7%]; mean [SD] age 51.1 [11] years), generating a trial dataset of 3,125 participants (561 in the AV fistula group and 2,564 in the no AV fistula group). In the IPTW-adjusted trial dataset, mean [SD] eGFR was 12.5mL/min/1.73m^2 [3.1] in the AV fistula group, and 12.6mL/min/1.73m^2 [2.6] in the no AV fistula group. The 6-month pre-trial eGFR slope was -0.021mL/min/1.73m^2/day [0.032] in the AV fistula group, and -0.024mL/min/1.73m^2/day [0.039] in the no AV fistula group.

A mixed-effects model analysis of the eGFR slope for the first 6 months of the trial showed the estimate for the interaction between time from the start of the trial and AV fistula formation crossed zero (-0.0020, 95%CI -0.0041 to 0.0002, p=0.074). This is indicative of AV fistula formation having no effect on the eGFR slope at 6 months.

The Fine-Gray model showed a higher risk of dialysis (HR 1.63, 95%CI 1.46 to 1.82, p<0.001) and a lower risk of death (HR 0.31, 95%CI 0.20 to 0.49, p<0.001) in those who underwent AV fistula formation.

Conclusions: Contrary to previous retrospective studies, we did not identify a kidney-protective effect of AV fistula formation. Those who underwent the procedure did not experience a slower eGFR decline as measured by eGFR slope. We found a significant increase in the risk of dialysis and a decrease in the risk of death among those in the AV fistula group, which most likely reflects residual confounding. Unmeasured factors such as frailty, and nephrologist's clinical judgment may have mediated decisions around AV fistula formation.

Intravenous contrast material exposure in advanced CKD and adverse renal outcomes: a propensity-score matched study

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Introduction: Most studies of contrast administration in patients with CKD have focused on the association between contrast and AKI and have not examined long-term adverse renal outcomes. We explored the association of intravenous contrast administration for CT imaging with adverse renal outcomes in patients with CKD stages 4 or 5.

Method: Data were obtained from the Strathclyde Electronic Renal Patient Record. We included adult patients with an incident CT scan and an eGFR < 30 mL/min/1.73m^2 between April 2008 and May 2020. Structured query language (SQL) and visual coding strategies were used in CT scan reports to identify whether IV contrast had been administered or not. Patient demographics (age, sex, Scottish index of multiple deprivation), laboratory tests (including eGFR slope for 6 months preceding the study calculated by linear regression, eGFR at time of CT, potassium, C-reactive protein, urine protein:creatinine ratio), anthropometric measurements (blood pressure, body mass index), co-morbidities, and medications were collected.

The primary outcome was a composite renal outcome (AKI, sustained eGFR drop, renal replacement therapy [RRT], and renal death). Secondary outcomes included individual components of the composite outcome and all-cause death. AKI was defined as a 25% creatinine rise from index creatinine between days 7 and 14 post CT. Sustained eGFR drop was defined as two consecutive eGFR < 15 mL/min/1.73m^2 more than 4 weeks apart. Renal death was defined as death from acute kidney injury, chronic kidney disease or end stage renal disease without dialysis. A total of 12% of data was missing and were multiply imputed using the MICE package on R studio. A propensity-score matched dataset was created using a 1:2 ratio with no replacement. Multivariable logistic, proportional hazards and Fine-Gray (competing risks) regressions were used to identify independent correlates of the primary and secondary outcomes.

Results: 9,226 patients with an eGFR < 30 mL/min/1.73m^2 underwent an incident CT scan during the study period. Among 9,214 patients meeting the inclusion criteria (4504 (48.9%) men; mean [SD] age 71.4 [14.3] years; mean [SD] eGFR 19.7 [7.0] ml/min/1.73m^2), 1,608 had received IV contrast. A propensity-score matched dataset was generated consisting of 1,608 patients who had a contrast CT and 3,216 with non-contrast CT. Standard mean difference was between -0.1 and 0.1 for all variables, indicating a well-balanced dataset.

On multivariable analysis, contrast administration was not associated with the composite renal outcome (HR 0.85, 95%CI 0.66 - 1.09, p=0.193), but was associated with a higher risk of AKI (HR 1.58, 95%CI 1.28-1.95, p<0.001). Contrast administration did not change the risk of a sustained eGFR drop (HR 0.74, 95%CI 0.49 - 1.11, p=0.147) or RRT (HR 0.85, 95%CI 0.64 - 1.12, p=0.243). Risk of all-cause death was lower in the contrast group (HR 0.83, 95%CI 0.72 - 0.96, p=0.014) by logistic regression, but no effect on time to death was seen on Cox regression (HR 1.04, 95%CI 0.96 - 1.14, p=0.341). We did not identify an effect of contrast administration on the time to composite renal outcome or RRT by Cox regression (HR 0.98, 95%CI 0.77 - 1.23, p=0.83 and HR 1.11, 95%CI 0.86 - 1.44, p=0.43 respectively). On Fine-Gray regression, we did not identify an impact of contrast administration on the risk of RRT (HR 0.88, 95%CI 0.68 - 1.13, p=0.31) or death (HR 0.99, 95%CI 0.92 - 1.08, p=0.89).

In subgroup analysis in patients with an index eGFR < 20 mL/min/1.73m^2, contrast administration was associated with AKI (HR 1.50, 95%CI 1.08 - 2.09, p = 0.02), but not with the composite renal outcome (HR 0.83, 95%CI 0.60 - 1.16, p = 0.28), RRT (HR 0.92, 95%CI 0.64 - 1.32, p = 0.64) or death (HR 0.92, 95%CI 0.73 - 1.15, p = 0.46).

Conclusion: In a high-risk CKD population, we identified an association between IV contrast administration and the risk of AKI, but this did not translate into adverse renal outcomes, including sustained eGFR drop, or RRT. We showed a lower risk of mortality in patients receiving IV contrast, likely reflecting residual confounding. These findings suggest that increases in serum creatinine post-contrast are meaningless and not associated with adverse outcomes.

Transplant outcomes in recipients with IgA nephropathy 2000 – 2020

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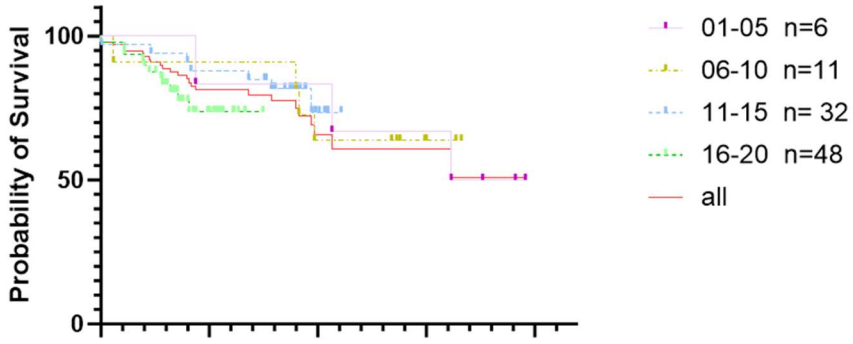
IgA remains the commonest glomerular disease resulting in End Stage Renal Disease. There is always a concern that recurrence can affect the transplanted kidney and cause graft loss. We aimed to describe the changing pattern of transplant outcomes over the last 23 years and the incidence of recurrence of IgA Nephropathy.
Data were collected for transplanted patients with a Primary Renal Diagnosis of IgA Nephropathy transplanted between 2000 -2020 within NHS GGC. Patient survival, graft loss and transplant biopsy details were recorded along with time to onset of sustained haematuria > 1+ and onset of sustained proteinuria PCR >100.

Results

533 patients had biopsy diagnosis of IgA nephropathy between 2000 – 2020 of whom 99 went on to have renal transplantation. Grouped in to 5 year cohorts there is an increasing proportion of patients undergoing transplantation; 5% in the 2001-2005 (Mean Age39) cohort to 44% in the 2016-2020 (Mean Age 47). Overall 5 yr graft survival was over 80% with no significant differences by cohort. Although Graft survival fell to 50% overall over the 20 years, overall patient survival for the oldest cohorts were significantly better than later cohorts likely reflecting changes in selection for transplantation over that time. (Figure 1)
Biopsies occurred for clinical indication. 42(42.4%) had a biopsy later than 6 months post transplant. Identification of recurrence was rare 9 (9.1% of transplants) cases overall (21.4% of Biopsies). Loss of transplant was only attributed to IgA in 2 cases.
17 (17.2%) developed sustained Proteinuria, 15 of whom had biopsy. 7 showed recurrence. 7 patients (including 2 who had recurred) subsequently lost their graft.
Haematuria correlated poorly with recurrence, or with graft loss or death. Episodic haematuria was almost universal and many had haematuria predating and continuing after transplant. New Sustained haematuria occurred in 18 (18.2%) 8 of whom had a biopsy. 3 had recurrence, and only 1 of the 18 subsequently lost graft.

Discussion

Transplant survival in patients with IgA nephropathy appears similar to overall Scottish transplant survival rates[1].
There are dramatic changes in transplantation rates over the last 20 years with a greater proportion of patients transplanted from increasingly older ages. Recurrence of IgA seems rare from a reactive biopsy practice, and less than published series[2] However, clinically significant undiagnosed IgA seems unlikely or has little clinical effect on outcome. Proteinuria selects well for those needing diagnosis by biopsy, Haematuria less so.



Survival to Graft loss or Death by 5 Year Cohort. Years

(1) https://www.srr.scot.nhs.uk/publications/docs/2020-10-13-SRR-Report.pdf
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Travel for transplant: Implications for clinicians

Jen Lumsdaine; Linda White; Living Donation Scotland

Background

Longer kidney transplant waiting times and freedom to travel following the covid pandemic have resulted in an increase of recipients travelling outwith the UK for a kidney transplant. Although many of these transplants will be legitimate, there may be cases where there is a suspected financial transaction. In July 2022 an amendment was made to the Human Tissue (Scotland) Act 2006 which extends the financial or commercial dealings in human material for transplant offences to extraterritorial jurisdiction. In practice, this means that any person will be committing an offence if they are involved in buying or selling human organs for transplantation, anywhere in the world.

The current advice on the Human Tissue Authority (HTA) website is that “any instances where it is suspected that a person has travelled overseas for an illegal organ transplant should be reported. Where a medical professional has a concern, it will be reported to the HTA and we will consider a referral to the police”.

Method

Our aim was to identify knowledge amongst clinicians on the recent law change, reporting structure and information that is currently provided to patients who are awaiting a transplant. A short survey on MS Forms was circulated via the SRA secretariat and by direct contact with link nephrologists and the transplant multi-disciplinary team.

Results

Sixty-seven responses were received which included 33 nephrologists; 22 transplant coordinators, 7 surgeons, 4 renal nurses and a social worker. Thirty three of the 67 respondents were not aware of the law change, and of these 20 were not aware of the reporting structure.

Seven of the 63 respondents inform all potential recipients of the implications of travelling abroad for a transplant, with 47 advising only those who indicate they are considering travelling for transplant and the remaining 12 stating that this will be discussed by another healthcare professional.

Discussion

Any recipient considering travelling outside the UK for a kidney transplant is encouraged to discuss the implications with their clinical team. It is well documented there may be potential health and infection risks, depending on the facility, alongside lack of clinical information for NHS follow up. The legal implications will usually be integrated into this discussion.

Not all recipients may approach the clinical team prior to travel, but there is still an expectation that the recipient would be reported on return if illegal transplantation is suspected. In our survey the majority of respondents only mention the legal aspects if the recipient raises the question. Medical professionals are required to report to the HTA with an ongoing referral to the police, so all recipients should be informed of the implications of illegal transplantation at an early stage.

Further policy work is ongoing with the HTA, NHSBT and Departments of Health. Interim information for UK healthcare professionals and patients will be available shortly. The Declaration of Istanbul Custodian Group has further information on worldwide transplant commercialism, including patient information materials.

Evaluation of Immediate Discharge Letters (IDL) in management of Acute Kidney Injury (AKI)

Rachel McDougall

Background -In 2009, the NCEPOD report (National Confidential Enquiry into Patient Outcome) - 'Adding Insult to Injury' published a review of the care of patients who died in hospital with a primary diagnosis of AKI (acute kidney injury). Only 50% of patients were thought to have a good standard of care, for recognition, assessment, and management of AKI[1]. This led to work from leading professional bodies like Kidney Disease Improving Global Outcomes (KDIGO) and UK Kidney association to improve AKI education.

Aims - The aim of this project was to examine the IDL and review the communication and follow up with primary care in the management of patients with a diagnosis of AKI.

Method - We assessed discharge letters for AKI recognition, medication changes and follow up blood tests from three clinical areas (Cardiology, intensive care unit and renal) for September 2022 in a district general hospital. The KDIGO definition of AKI based on measurement of serum creatinine was used to diagnose AKI. Potential contributory factors like gender and age were reviewed. The documentation of medication changes and clarity of follow up blood tests were also evaluated.

Results - 182 IDLs were surveyed. 69 patients (38% of IDL reviewed) had biochemical evidence of AKI but only 49% (n=34) had a diagnosis of AKI mentioned on their IDL.

Patient characteristics from each of the areas are illustrated in Table 1.

Areas	Biochemical AKI KDIGO (n)	IDL diagnosis of AKI n (%)	Age in years Mean (2DS)	Females n (%)	Missing data, n (%)
A	26	13 (50%)	59.5 (24.8-94.2)	12 (46%)	2 (1%)
B	20	5 (25%)	75.7 (53.9-97.5)	11 (15%)	0
C	23	16 (70%)	67.7 (39.2 -96.2)	14 (60%)	0
Total	69	34 (49%)		37 (54%)	2 (3%)

Table 1: Characteristics of patients with AKI based on KDIGO definition of serum creatinine. IDL - Immediate discharge letter, AKI - Acute Kidney Injury, KDIGO - Kidney disease Improving Global outcome

Follow up arrangements: Follow up blood tests were deemed necessary by the parent team for 12 of the 69 patients. 6 of these were carried out by community phlebotomy and only 3 patients had these completed within the desired time. 33 of the 69 patients had medications that should have been suspended or stopped, but only 26 had them altered. 7 patients had clear plans documented in the IDL for when to restart the medications. 2 patients had ambiguous plans for restarting medications.

Conclusion - The study suggests sub-optimal communication between primary and secondary care in AKI management highlighting the need for education. Services like ward-based pharmacists and community phlebotomy seem to improve outcome. A larger sample size may help in providing more definite conclusions.

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Travelling time and distance between home and dialysis unit in patients' RRT decision

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Introduction

Choosing between Haemodialysis (HD), Peritoneal Dialysis (PD) or Conservative Care (CC) is an important decision in the journey of patients with advanced CKD. University Hospital Monklands (UHM) currently is the only Renal Dialysis Unit within NHS Lanarkshire (NHSL), serving a population of over 650,000 across rural and urban communities. We aimed to determine if there is any association between patients' choice of Renal Replacement Therapy (RRT) in relation to the travelling time and distance between their home and the dialysis unit.

Method

All patients followed up in NHSL Low Clearance Clinic with eGFR <30ml/min/1.73m^2 were identified from West of Scotland Electronic Renal Patient Record (SERPR). Primary renal diagnoses (PRD), patients' preferred RRT and their registered home addresses were extracted from SERPR and Clinical Portal. Google Map was used to calculate the distance as well as travel time by car from patients' home address to UHM dialysis unit.

Results

There were 198 patients on the low clearance clinic list as of February 2023. After excluding those with eGFR >30ml/min/1.73m^2 , 172 patient records were analysed.

Using the European Renal Association-European Dialysis and Transplant Association (ERA-EDTA) PRD codes, 26.7% (n=46) were multi-system diseases, 21.5% (n=37) not known and other, 19.8% (n=34) diabetic nephropathies, 19.2% (n=33) primary glomerulonephritis, and 12.8% (n=22) interstitial nephropathies.

HD was the dominant preferred RRT accounting for 39.5% (n=68) of patients. A sizeable proportion were still undecided (n=56, 32.6%) and equal number of patients had opted for PD (n=24, 14.0%) or CC (n=24). There were 32 patients (18.6%) who were listed or eligible for transplantation.

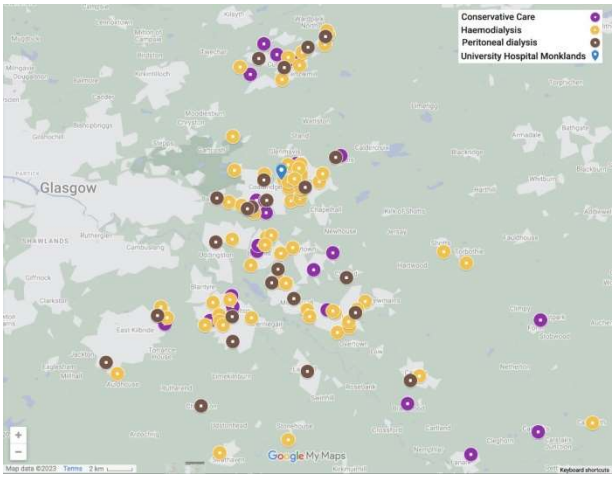

Figure 1 – Distribution of CKD 4/5 patients in relation to UHM

Figure 1 shows the distribution of CKD4/5 patients in NHSL in relation to UHM. The mean distance from home to the renal dialysis unit was 8.3 miles, with a mean travel time of 18.0 minutes by car. When patients had decided on a preferred RRT, those who opted for HD lived the closest (mean = 7.1 miles) compared to those opted for PD (mean = 7.7 miles) and CC (mean = 8.6 miles). Similarly, the travel time between patient's home to dialysis unit is the shortest in the group who have opted for HD (mean = 16.2 minutes), compared to that for PD (mean = 17.2 minutes) and CC (mean = 19.1 minutes). However, there was no statistically significant difference between the groups for travel distance (p=0.06) or travel time (p=0.09) using single factor ANOVA testing.

Discussion

In NHSL, the majority of patients on a trajectory towards requiring RRT tend to opt for HD, albeit with an understandably sizeable proportion still undecided. This decision is often made over multiple clinic appointments, RRT education, dialysis unit visits, MDT discussion and vascular-access workup. One of the unknowns prior to this work was understanding where the CKD 4/5 population lived in relation to UHM, and whether this was potentially an influencing factor in patients' RRT decision. Whilst not statistically significant, patients who opted for HD, who will require to attend renal dialysis unit regularly, tended to live closer to UHM than those opted for PD, who will need to travel to the hospital less regularly, with patients managing their renal disease conservatively lived further still. It is important to consider this factor during RRT planning with patients whilst also ensuring equity of access to the appropriate RRT options.

An Audit of the NHS Fife Supportive Care Kidney Pathway; Measuring patient outcomes at end of life since its inception in 2017

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Background
One of the options for treating advanced kidney disease is to manage symptoms and prioritise quality of life whilst choosing not to have dialysis. It is known that for co-morbid, frail or particularly dependent patients, dialysis has little survival benefit and risks medicalisation of death and greater likelihood of dying in hospital.[1] There is evidence that conservative kidney management confers benefits in quality of life, hospitalisation rates and place of death.[2] For some patients this is the treatment approach selected following discussion between the patient and their renal team to explore future wishes and priorities. This non-dialysis approach is often referred to as conservative care or kidney supportive care.

Supportive Kidney Care Pathway
The Supportive Kidney Care Pathway (SKCP) has been running in NHS Fife since 2017, standardising the management of these patients and providing a framework aiming to meet their needs. This pathway aims to provide realistic medicine in a holistic manner. There have been 207 patients on this pathway between 2017 and July of 2023. Realistic medicine recommends a personalised approach to patient care and minimisation of harm and waste, through minimising over-treatment and excessive intervention.[3] For patients on the KSCP these principles help us to recognise and address patient priorities.

Question
How has the supportive kidney care pathway been performing over time?
Has this been meeting the needs of our patients and practicing realistic medicine by avoiding unnecessary tests, unnecessary hospital admissions and reducing inpatient deaths?
Are there any recurring themes leading to admissions where the pathway could be improved to keep patients out of hospital where appropriate?

Method
This audit of conservative care in NHS Fife assesses outcomes over time from the SKCP. The records of all 207 patients placed on the SKCP to date have been searched for the required outcomes. The data collected were measuring length of time on the SCKP, admission burden (through number of inpatient nights in the final 6 months of life), burden of phlebotomy (through number of days in the final 30 & 90 days of life where phlebotomy occurred) and also place of death. Reason for each admission has been noted. The data has been collected for each year allowing comparison in annual SKCP outcomes and analysis of themes. Patients who are still living have not had data collected pertaining to admissions or investigations as these will not be comparable to the data collected in pre-set time intervals prior to death.

Results
Data are still being analysed. Results so far suggest that the KSCP has been consistent in place of death and in-hospital death rates have not risen. A difference can be seen when comparing patients who had greater than thirty days on the KSCP to those who died within thirty days of commencing conservative care. Whilst the remaining data is still being analysed, this result implies that conservative care performs best when there is time to optimise care.

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Rapid Steroid Withdrawal in Low-Risk Renal Transplant Recipients and Rates of Post-Transplant Diabetes

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Background – The aim of renal transplantation is to maximise patient and graft survival whilst minimising side-effects of immunosuppression. The most widely used immunosuppression protocol utilises tacrolimus, mycophenolate mofetil and steroids following the ELITE-SYMPHONY study. However, approximately 20% of transplant recipients treated this way will develop new-onset diabetes after transplant (NODAT). Cardiovascular disease remains the leading cause of death post-transplant. Since steroids are associated with NODAT, hypertension and hyperlipidaemia they contribute to this risk. The HARMONY study demonstrated that rapid steroid withdrawal was associated with reduced NODAT but was not associated with an increased rates of biopsy proven rejection. Current local practice in Glasgow is to consider rapid steroid withdrawal in patients who meet the criteria which includes: 1st transplant; CRF <30%; no DSA; HLA mismatch grade 1/2 with no DR mismatch; and primary renal diagnosis with a low risk of recurrence. A previous audit of rapid steroid withdrawal in Glasgow transplant recipients found no increased rejection with rapid steroid withdrawal but did not show a reduction in the incidence of NODAT compared to standard steroid regime.

Aims – 1) Compare rates of NODAT in rapid steroid withdrawal vs standard regime.
2) Compare rates of biopsy proven rejection between rapid steroid withdrawal vs standard regime.

Method – Retrospective analysis of Glasgow renal transplant recipients from August 2016 – August 2022. Rapid steroid withdrawal and NDOAT identified through SERPR through “diagnosis” screen, HbA1c results and “medications” screen. Patients who were diabetic pre-transplantation were excluded from NODAT analysis.

Results – 870 transplants were performed from August 2016 – August 2022 with 812 patients receiving standard steroid regime but only 58 receiving rapid steroid withdrawal regime. Mean age between the groups were similar at 56 in the standard group (range 22, 81) and 53 in the rapid withdrawal group (range 21, 80). The majority of transplants were deceased donor in both groups (71.06% standard, 74.14% rapid withdrawal). There were more diabetics pre-transplant in the rapid withdrawal group compared to standard (36.21% vs 19.09%). Rates of delayed graft function were similar between the groups (14.29% standard, 15.52% rapid withdrawal). Mortality was lower in the rapid withdrawal regime compared to standard regime (7.9% vs 12.32%). 6 month mean creatinine was lower in the rapid withdrawal regime but not significantly so (129, SD 42 vs142 SD 118). The incidence rate of NODAT in the rapid withdrawal regime was significantly lower compared to the standard regime (1% vs 10.45%, $p = 0.02$). Rates of biopsy proven rejection were not increased in rapid withdrawal vs standard regime (23.0% vs 16.67% $p = 0.77$).
Conclusion – Rapid steroid withdrawal is associated with significantly reduced rates of NODAT compared to standard steroid regime without significant increased rates of biopsy proven rejection. Rapid steroid withdrawal should be strongly considered in transplant recipients who meet the necessary criteria.

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Peritoneal Dialysis Associated Peritonitis: Improving rates in NHS Ayrshire and Arran

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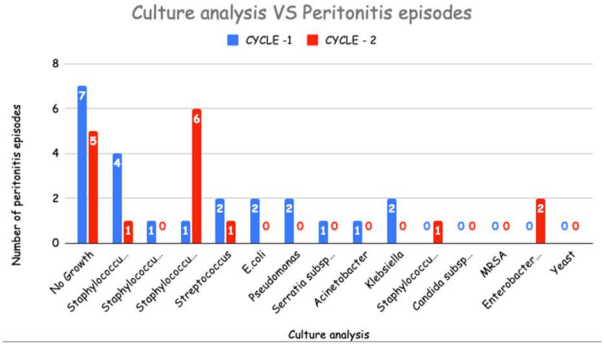
Introduction: NHS Ayrshire and Arran has a successful home dialysis programme including a large peritoneal dialysis (PD) population. PD associated peritonitis is a common complication of peritoneal dialysis with a significant impact on morbidity and mortality. In 2021, Scottish Renal Registry data identified NHS Ayrshire and Arran as an outlier for PD peritonitis rates. In response to this we elected to undertake a retrospective analysis of all PD peritonitis cases in our unit for a 12 month period with the aim of identifying modifiable risk factors and reducing infection rates.
Objective: A prospective analysis of PD peritonitis data was undertaken to assess infection rates, causative organisms and current practice. Areas for improvement were identified including the introduction of a peritonitis checklist, introduction of a dedicated PD consultant and enhanced coverage of potential infection sources during patient training. A repeat cycle was undertaken to assess the impact of these changes.
Method: A closed loop audit with data collected from 2 x 12 month cycles was undertaken within the time frame of 1/8/21 to 31/7/23. Data was collected to calculate PD peritonitis rates. In cases of peritonitis further data was collected for causative organisms, exit site infection and re-swabbing, duration of antibiotics and eventual outcomes.
Audit standard: The 2022 updated ISPD guidelines were taken as a standard to compare with current practice in our unit.
Results: The first audit cycle identified 41 patients undergoing PD with 23 incident episodes of peritonitis. The observed peritonitis rate was 0.34 episodes/patient year (standard <0.4). The proportion of patients free of peritonitis was 61% (standard >80%). A multidisciplinary review of peritonitis cases was undertaken with the outcome being to introduce a peritonitis checklist, increase patient awareness to potential sources of infection during training, and introduce a dedicated PD consultant. The second cycle identified 53 patients undergoing PD with 16 episodes of peritonitis. The observed peritonitis rate was significantly better at 0.19 episodes/patient year. The proportion of patients free of peritonitis was 79.2%. The spectrum of organisms yielded from fluid cultures reduced in the second cycle with predominantly staphylococcus species yielded as shown below in *Figure 1.*



Conclusion: This study was undertaken to assess infection rates and outcomes of our current practice against ISPD guidance. We found that our practice is in line with ISPD guidelines however we were able to identify areas for improvement in reducing peritonitis rates. By the end of the first cycle it was evident that patient training and understanding of potential sources of infection were important variables in reducing infection rates. We added a bacterial source of infection poster to our training pack and introduced a peritonitis checklist so that observed technique and re-training post peritonitis could be clearly documented. Our checklist also includes mandatory data entry to our Scottish Electronic Renal Patient Record (SERPR) when a patient has an exit site infection or peritonitis as this had not been the case previously. We have successfully identified modifiable risk factors and implemented changes based on these, with a resulting reduction in peritonitis rates in Ayrshire and Arran.

Rates of emergency temporary central venous access and emergency haemodialysis in the advent of SZC: A case control study in a UK tertiary centre

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Glasgow Renal & Transplant Unit

Background: Acute hyperkalaemia is a life-threatening electrolyte disturbance often necessitating emergency temporary central venous access (CVC) and emergency haemodialysis (HD). Sodium zirconium cyclosilicate (SZC) has been shown to be of benefit in the outpatient care of hyperkalaemia, but its value in the emergency setting is yet to be proven. We hypothesised that the introduction of SZC for treatment of hyperkalaemia would be associated with a reduction in emergency CVC, emergency HD and length of stay in a tertiary renal unit.

Methods: We conducted a case control study of patients admitted to our sixty-four bedded renal unit with hyperkalaemia, comparing patients managed before (January 2018 to December 2019) and after (April 2021 to September 2022) SZC was available for treatment of hyperkalaemia in an inpatient setting. All patients with a potassium >5.5 mmol/L during their inpatient stay who were treated with at least one >=10g dose of SZC were analysed (post-SZC period). Patients treated with alternative potassium binders during admission in the post-SZC period were excluded. A random number generator was used to select a comparator group of patients admitted to the unit with a serum potassium >5.5 mmol/L (pre-SZC period). Our two primary co-outcome measures, emergency temporary CVC and emergency HD, were retrieved from our electronic patient record where they are recorded as part of unit protocol. We also considered length of stay as an explanatory outcome. For the co-primary endpoints, we initially constructed an unadjusted logistic regression model (model 1) to determine the likelihood of emergency temporary CVC and HD in the pre- and post-SZC periods, generating odds ratios with 95% confidence intervals. Sequential multivariable logistic regression models (models 2, 3 and 4) were run to adjust for potential explanatory variables. We used linear regression models to describe the relationship between SZC and length of stay. We calculated absolute risk reduction and number needed to treat with SZC for both co-primary outcomes. Statistical interaction between sex and SZC treatment was also sought.

Results: There were 1668 patients admitted to the unit in the post-SZC period: of those we excluded 427 who did not have a potassium >5.5 mmol/L, 34 who were treated with an alternative potassium binder and a further 934 who were not treated with at least one dose of SZC (>= 10g) leaving 271 patients for analysis. We identified 265 randomly-selected patients from the pre-SZC period. Participants in pre-and post-SZC periods were well matched for age, sex, baseline eGFR, primary renal diagnosis of diabetic nephropathy, kidney failure requiring replacement therapy, use of hyperkalaemia-inducing medications and peak serum potassium (Table 1). In the post-SZC period, patients were 69% less likely to require emergency temporary CVC (OR 0.31; CI 0.21 – 0.47) and 73% less likely to need emergency HD (OR 0.27; CI 0.18 to 0.40). These results were consistent after sequential adjustment for potential explanatory variables (Figures 1 and 2). The absolute risk reduction for emergency line insertion was 21%, with NNT of 5; the absolute risk reduction for emergency dialysis was 25%, with NNT of 4. SZC treatment was associated with a reduction in length of stay of 1.8 (95% CI 0.6 - 3.0) days (p=0.004). The treatment effect of SZC was similar in men and women (emergency CVC for sex-SZC interaction p-value = 0.639; emergency HD for sex-SZC interaction p-value = 0.186; length of stay for sex-SZC interaction p-value = 0.435 in fully adjusted model 4).

Conclusion:
In a heterogeneous group of patients admitted to a tertiary renal unit with hyperkalaemia, SZC use was associated with a signification reduction in emergency HD, emergency temporary CVC and length of stay.

Table 1 – Baseline characteristics of patients

	Pre-SZC period	Post-SZC period	p
N	265	271	
Age (years): mean (SD)	67.02 (13.84)	66.19 (14.65)	0.500
Male sex: n (%)	149 (56.2)	160 (59.0)	0.567
eGFR (mL/min/1.73m^2): n (%)			0.013
>= 50	84 (31.7)	72 (26.6)	
>=30 - <50	22 (8.3)	48 (17.7)	
>=15 - <30	52 (19.6)	47 (17.3)	
<15	107 (40.4)	104 (38.4)	
Dialysis-dependent: n (%)	83 (31.3)	72 (26.6)	0.264
Dialysis access: n (%)			0.097
Arteriovenous fistula	46 (51.1)	38 (50.7)	
Arteriovenous graft	10 (11.1)	12 (16.0)	
Peritoneal dialysis catheter	2 (2.2)	7 (9.3)	
Tunnelled central venous catheter	32 (35.6)	18 (24.0)	
Renal transplant recipient: n (%)	35 (13.2)	26 (9.6)	0.238
Primary renal diagnosis of diabetic nephropathy: n (%)	61 (23.0)	60 (22.1)	0.889
Hyperkalaemia-inducing medications: n (%)	94 (35.5)	98 (36.2)	0.939
Peak potassium (mmol/L): mean (SD)	6.30 (0.81)	6.28 (0.61)	0.674

Figure 1 – Odds ratios with 95% CI for emergency temporary CVC following sequential adjustment using models 1-4 (see footer)

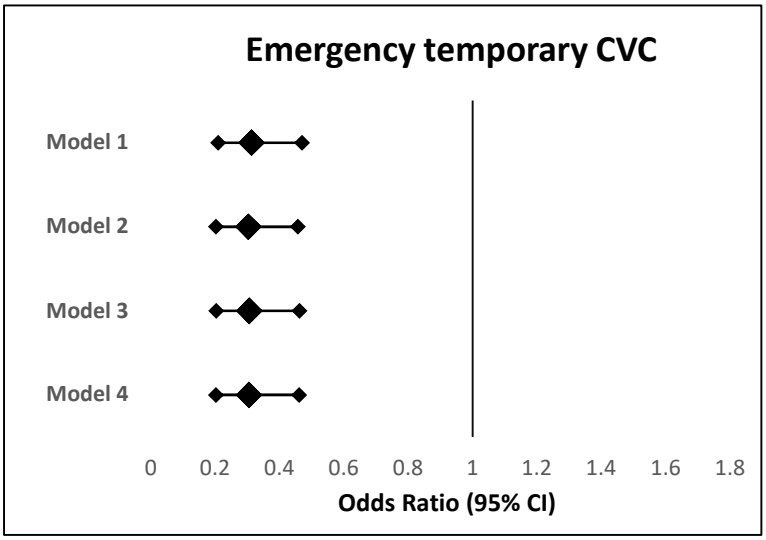
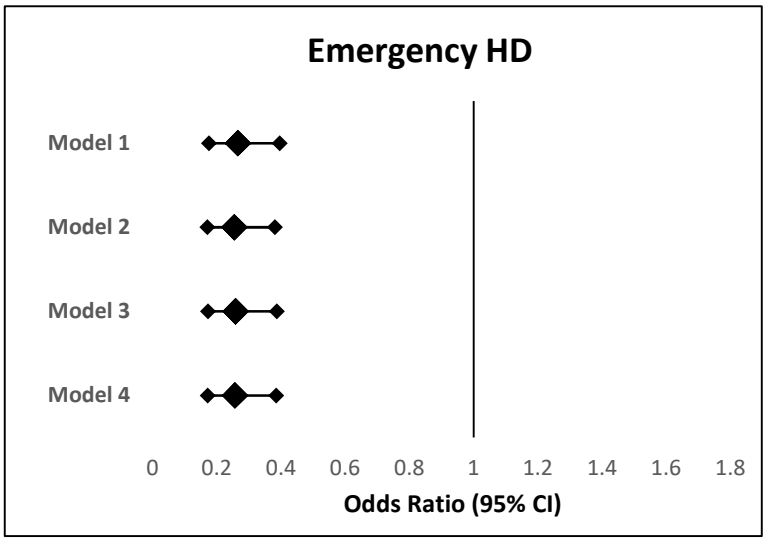


Figure 2 – Odds ratios with 95% CI for emergency HD following sequential adjustment using models 1-4 (see footer)



Model 1 – No adjustment

Model 2 – Adjusted for age, sex

Model 3 – Adjusted for model 2, baseline eGFR, whether already dialysis – dependent

Model 4 – Adjusted for model 2, model 3, primary renal diagnosis of diabetic nephropathy, hyperkalaemia – inducing medications (ACEi, ARB, MRA or Trimethoprim)

A Local Audit into Mental Health Outcomes in Kidney Transplant Recipients

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As a population plagued by innumerable stressors, ESRD patients are likely to benefit from greater psychological support. Psychology and psychiatry have been established by current literature to play an important part in the prognosis of life post renal transplantation. Rates of depression in ESRD patients are greater than in the general population both before and after transplantation. To gain a better understanding of how this affects the cohort in Tayside, an audit was carried out to gauge the level of input currently received locally. The aim of this audit was to understand the current level of psychological and psychiatric input that transplant recipients experienced post-transplant. To evaluate the psychopathology of kidney transplantation within Tayside we assessed 267 transplant patients. We collected data on the following categories: transplant type (deceased or live), number of transplants, SIMD quintile, age, gender, premorbid psychiatric diagnoses, post-transplant psychiatry and psychology referral, number of appointments attended, DNA frequency and reason, post-transplant mental health related diagnoses, treatment type (psychological or pharmacological) and any regular psychiatric medications. Results showed a large number of renal transplant recipients developed mental health conditions post transplantation.

Multidisciplinary perspectives on cardiac assessment before kidney transplantation: results from a national survey

Ailish Nimmo

Introduction

Screening patients for asymptomatic coronary artery disease prior to kidney transplantation is frequently performed, but there is no available randomised control trial evidence to support this practice or advise on how to best assess patients' cardiac risk and analysis of observational data does not support routine screening. Cardiac assessment pathways vary across the UK, but it is not known how these are viewed by different members of the transplant multidisciplinary team.

Methods

An online survey was distributed to nephrologists, transplant surgeons, anaesthetists, and cardiologists via the lead transplant nephrologist from each kidney transplant centre, Kidney Research UK Transplant and Cardio-Renal Clinical Study Groups, and the British Association for Renal Transplant Anaesthesia between April and July 2023. Questions explored the minimum cardiac workup required before transplant listing, which patients required more detailed investigation, and what further investigation should entail. Two survey rounds were distributed 8 weeks apart to explore if consensus on these matters could be achieved.

Results

Responses were received from 104 individuals in the first survey round (51 nephrologists, 23 anaesthetists, 15 surgeons, 15 cardiologists), and 69 in the second round (35 nephrologists, 15 anaesthetists, 8 surgeons, 11 cardiologists). Respondents were from all 4 nations of the UK and 55% had over 10 years of experience in their current role.

Of those completing the first survey round, 50% felt an echocardiogram should be performed as a minimum for patients being assessed for transplant, but this varied by specialty ranging from 23% of anaesthetists to 87% of cardiologists. There was consensus that further cardiac investigation beyond an ECG and echo was not required for patients under the age of 60 without additional cardiovascular risk factors but was necessitated for patients with diabetes or a history of cardiovascular disease. There was no consensus on whether patients aged over 60 or with reduced exercise capacity required further assessment. Individuals were more likely to recommend further investigation for patients with raised BMI, smoking history, or longer duration of kidney failure if these were present in combination with other risk factors.

With respect to what cardiac assessment should involve, there was consensus that patients should be maintained on optimal medical therapy and that routine coronary angiography was not required. There were varying opinions on whether workup should involve non-invasive cardiac investigations or review by a cardiologist or anaesthetist. Despite the importance of medical management of cardiovascular disease, 41% reported that medications were not routinely reviewed at their transplant listing meetings. Peri-operative management of higher cardiac risk patients differed from the standard approach in 46% of respondents' centres, including increased intra-operative invasive monitoring, post-operative care in a high dependency or intensive care environment, lower tolerance of hypotension, and selection of kidneys predicted to have a low risk of delayed graft function or consideration of live donor transplantation only.

Free text comments highlighted varying opinions in relation to current cardiac screening protocols. Some felt *'the solution needs to be owned by cardiologists and anaesthetists, not nephrologists'*, whilst others reported *'the renal physician should be able to ensure they are appropriately medicated and determine their operative risk… cardiology specialist input is needed either to ensure optimal medical management .. or to undertake investigations. There is no evidence that revascularisation alters transplant outcomes. Therefore .. referral to cardiology should be the same as for any other patient.'*

Two-thirds of respondents felt that cardiac assessment should be standardised in the UK. Only 15% reported that current processes aid equitable access to transplantation for patients, and only 29% felt they aid equitable use of the donor pool by identifying patients at high risk of early cardiovascular events.

Discussion

This survey highlights variation in opinion within the transplant multiprofessional team regarding which patients should undergo detailed cardiac assessment before transplant listing, and what such assessment should involve. Whilst concerns are raised regarding the lack of standardisation in practice and the potential impact on equity of access to transplantation, this does not negate the need for cardiac assessment of high-risk patients. Further work is required to determine the optimal cardiac assessment pathway.

Progression of kidney disease in patients with ANCA-associated vasculitis

Ailish Nimmo

Introduction

Kidney involvement in anti-neutrophil cytoplasm antibody (ANCA)-associated vasculitis (AAV) is common and is a poor prognostic indicator for patient outcomes. However, predicting kidney outcomes in these patients remains challenging. Whilst risk scores have been developed which incorporate clinical and pathological variables at disease presentation, these are only useful for those patients who undergo a kidney biopsy and do not consider patients' clinical and pathological responses to treatment. Here, we aim to describe the progression of kidney disease in a cohort of patients with AAV and kidney involvement.

Methods

This was a single centre cohort study of incident and prevalent patients with AAV within the Vasculitis Service in South East Scotland. Patients were identified from a systematic search of the local AAV database and the Scottish Renal Biopsy Registry. Demographic and clinical data comprising all measures of serum creatinine, proteinuria, and ANCA antibody titres following the date of diagnosis, alongside kidney biopsy dates and results, comorbidities, and dates and severity of AAV relapses and remissions were extracted from the local renal database, VitalData, and the hospital electronic record, TrakCare. Glomerular filtration rate was estimated (eGFR) using the 2021 CKD-EPI formula. Progression of kidney disease was defined as the change in eGFR over time and accounted for the effects of major and minor disease relapses.

Results

Three hundred and four patients with AAV and kidney involvement were diagnosed between May 2002 and December 2022 and included in the study. Median age at presentation was 65 years [IQR 54.8-74.5] and 161 patients (53%) were male; 297 (98%) were of White ethnicity. One hundred and fifty-nine patients (52%) were MPO ANCA-positive, 129 (43%) were PR3-positive, and 16 (5%) were ANCA negative. Two hundred and sixty-two patients (86%) had a kidney biopsy. In terms of comorbidity, 229 patients (75%) had hypertension, 80 (26%) had a prior cardiovascular event, 31 patients (10%) had diabetes mellitus, and 34 patients (11%) had a history of malignancy. Median follow up time was 4.2 years [IQR 1.7-8.4].

At presentation, the median eGFR was 29.9 ml/min/1.73m^2 and the median albumin to creatinine ratio (ACR) was 38.9 mg/mmol [IQR 10.1-96.5]; 50% of patients presented with CKD stage 4 or 5. Remission was achieved in 295 patients (97%), with a median remission eGFR of 44.1 ml/min/1.73m^2 [IQR 28.1-65.0]. Based on presenting eGFR and ACR, the median 2- and 5-year kidney failure risk equation scores were 3.1% [IQR 0.04-15.1] and 10.6% [IQR 0.1-44.4], respectively. Kidney replacement therapy (KRT) for acute kidney injury was required in 41 patients (13%), though 22 patients (54%) recovered independent kidney function within 3 months and a further 5 (12%) recovered kidney function beyond 3 months (median 8.9 months). During follow up, 43 patients reached kidney failure of whom 30 received KRT and 13 were managed conservatively.

From the point of remission, 246 patients had $\geq$1 year of follow up and 209 patients had $\geq$2 years follow up. The median change in eGFR from remission to 1 year was +2.8 ml/min/1.73m^2 [IQR -2.9 – 9.4] and to 2 years was +5.0 ml/min/1.73m^2 [IQR -4.0 – 13.2].

Sixty-nine patients had at least 1 disease relapse during follow up, of whom 34 had a major relapse and 35 had a minor relapse; 26 patients (38%) had a renal relapse. In those patients with at least one relapse, the median eGFR at initial disease remission was 60.6 ml/min/1.73m^2 [IQR 44.0-77.6], and the median eGFR at relapse was 58.0 ml/min/1.73m^2 [IQR 41.5-80.2]. Of these patients, 61 had $\geq$1 year of follow up and 56 had $\geq$2 years of follow up. The median change in eGFR from relapse to 1 year was +0.7 ml/min/1.73m^2 [IQR -4.1 – 12.1] and to 2 years was +1.9ml/min/1.73m^2 [IQR -7.1 – 12.5].

Discussion

This is the first study to examine the progression of kidney disease in patients with AAV and kidney involvement. We found that over half of patients continue to gain kidney function during the first 2 years following diagnosis, including in those who suffer a disease relapse. Although follow up times were short, the incidence of kidney failure in our cohort was low. Future work will define those patients with AAV at particular risk of kidney disease progression and how this might help planning for kidney failure in this patient group.

The role of plasma exchange in the management of digoxin toxicity in a patient with an acute kidney injury.

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Background:
Digoxin is a commonly used drug for atrial fibrillation. Digoxin toxicity is well recognised and is potentially life threatening through cardiac arrythmias. In health, digoxin is cleared unchanged, predominantly by renal excretion. Clearance is prolonged in those with renal impairment.
Digoxin specific antibody fragments (DSA) have a licence for use in severe digoxin toxicity. DSA bind to digoxin molecules forming complexes. The bound digoxin-DSA complexes cannot bind to Na/K ATPase reducing the clinical effects of digoxin and are then renally excreted. However in severe renal impairment clearance is prolonged, leading to rebound toxicity as the fragments uncouple.
There is currently a lack of evidence on how to manage digoxin toxicity in renal impairment and neither Digoxin nor Digoxin-DSA complexes are removed by haemodialysis.

Case:
An 80yr old gentleman presented to the Emergency with features of severe digoxin toxicity (bradycardia, hypotension, reduced Glasgow coma score- GCS, nausea). His digoxin level was 3.6 nanograms and so DSA was given. Despite this it rebounded to 8 nanograms/ml and so another round of DSA was given. He was subsequently referred to renal services when he developed pulmonary oedema on a background of oligo-anuric severe acute kidney injury.
He was then transferred to the Renal high dependency unit and commenced on haemodialysis with fluid removal for management of pulmonary oedema. He remained anuric with ongoing features of digoxin toxicity.
Discussions occurred with Haematology and Toxicology regarding his ongoing management and the use of plasma exchange (PEX) to facilitate removal of digoxin based on evidence from a handful of published case reports indicating that PEX facilitates the removal of digoxin-DSA complexes. Based on pharmacological data regarding the peak formation of digoxin-digibind complexes, PEX was undertaken 4 hours after the digoxin specific antibodies were administered (figure 1).
The procedure was well tolerated and uneventful. During the procedure he improved clinically and continued to improve over the next 24 hours, with a sustained improvement in heart rate, blood pressure and GCS.
Over the next few days his renal function improved, he did not require further dialysis or PEX. His renal function subsequently returned to baseline and he was discharged home.

Reflective points:
This case highlights the difficulties faced with the management of digoxin toxicity in someone with acute renal failure.
The use of plasma exchange facilitated digoxin specific antibody administration and complex removal resulting in sustained reduction in serum digoxin concentration and clinical improvement of the patient.
Plasma exchange should therefore be considered in conjunction with DSA for the management of severe digoxin toxicity in renal failure.

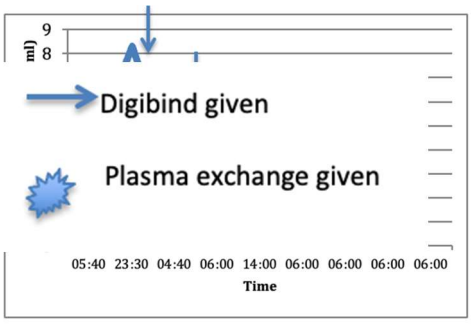

Figure 1. Serum digoxin levels over time

Monitoring disease activity in large vessel vasculitis: implications for the nephrologist and future potential for Scotland

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Introduction

Large vessel vasculitis (LVV) is the most common primary vasculitis and comprises giant cell arteritis (GCA) and Takayasu arteritis (TAK). Though not historically associated with kidney disease, recent advances in imaging have demonstrated important renal complications of LVV. Disease-monitoring in large vessel vasculitis (LVV) is challenging. Positron emission tomography with magnetic resonance imaging (PET/MRI) provides functional assessment of vascular inflammation alongside high-definition structural imaging. Here, we outline what a nephrologist should know about LVV, and report a prospective, Scotland-wide study evaluating the ability of PET/MRI to monitor LVV disease activity longitudinally.

Methods

Adult patients with active LVV were recruited from participating Scottish health boards in association with the Scottish Systemic Vasculitis Network (SSVN). Participants underwent PET/MRI at baseline and ≥6 months alongside clinical phenotyping and blood sampling. PET/MRI scans were assessed for disease activity and referenced to clinical assessment. Using logistic-regression modelling of PET/MRI metrics, we developed a novel disease activity score (VAMP score), which was validated in an independent cohort. A panel of candidate blood biomarkers were assessed in health, LVV, and a group of matched patients with small vessel vasculitis. Finally, clinical utility of PET/MRI in LVV was assessed *via* clinician survey.

Results

Forty PET/MRI scans were performed in 24 subjects (61±15 years; 71% female). Renal involvement was seen in three of 24 participants, including one participant who had complete occlusion of a renal artery. Blinded radiologist interpretation of PET/MRI demonstrated a sensitivity of 78% and specificity of 88% for distinguishing active from inactive LVV. Using PETVAS, an established PET disease-quantification score, PET/MRI distinguished active from inactive disease (15.6±7.0 *vs.* 8.8±4.2, P=0.001). MRI-derived mural signal was increased in active *versus* inactive LVV (2.4±3.3 *vs.* 0.1±0.5, P=0.007). In patients who achieved clinical remission, both PETVAS and mural signal fell (PETVAS: 20.5±5.2 *vs*. 8.9±3.7, P=0.0007; mural signal: 4.1±3.5 *vs.* 0.0±0.0, P=0.01). In the derivation cohort, VAMP score distinguished active from inactive disease (sensitivity of 96%, specificity of 82%), and fell between baseline and follow-up (P=0.002). In the validation cohort (n=64), VAMP score associated with clinical disease assessment (r=0.26, P=0.04). All five candidate blood biomarkers were elevated in LVV *vs.* health and correlated with PET/MRI metrics. Finally, PET/MRI improved clinicians' assessment of LVV disease activity and confidence in disease management.

Conclusions

LVV is likely to be encountered with increasing frequency in nephrology practice. This study showcases the potential power of the SSVN and other nationwide networks in facilitating collaborative clinical research in Scotland. PET/MRI may be useful in tracking disease activity and assessing treatment-response in LVV. Based on our findings, larger, prospective studies assessing PET/MRI in LVV are now warranted.

Evolution of a renal supportive care service in NHS Greater Glasgow and Clyde 2021-2023: insights and learning points

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Background: Supportive care draws on principles of palliative care and realistic medicine to provide holistic, patient-centred care for patients with chronic kidney disease (CKD) stage G5 who are unlikely to benefit from kidney replacement therapies.[1] NHS Greater Glasgow and Clyde (NHS GGC) introduced a renal supportive care nurse specialist (RSCN) and multi-disciplinary team meeting in October 2021.

Aim: To capture how the NHS GGC renal supportive care service has evolved since its inception in October 2021 to March 2023 and identify challenges in order to improve patient care.

Methods: Patients referred to the service between 01/10/2021 and census 01/03/2023 were identified using the Strathclyde Electronic Renal Patient Record (SERPR). Demographic data were captured, along with mortality data and information regarding source of referral and time from referral to assessment. Data were collected on the number of RSCN interactions prior to death or census, completion of Do Not Attempt Cardiopulmonary Resuscitation (DNACPR) and advanced care plans (ACP) and their communication with primary and unscheduled care providers. Continuing previous audit work, we evaluated the number of acute unscheduled admissions and outpatient clinic attendances for patients prior to RSCN appointment and from October 2021-March 2023.

Results: 98 patients were referred in the study period. Median age at referral was 80 years (range 48-97 years, IQR 11 years) and sex distribution: 57 male, 41 female. Median Rockwood clinical frailty score was 6 at referral. 63% patients (n=66) lived in the most deprived Scottish Index of Multiple Deprivation (SIMD) areas, comparable to 56% (n=208) in the NHS GGC low clearance population. Most patients (79%) were referred from an outpatient clinic setting. Haemodialysis patients represented the remaining 21% of referrals.

92 patients (94%) were reviewed prior to death or census, with a median time from referral to assessment 14 days (IQR 22 days). 47 patients (48%) died during follow-up, with median time from referral to death of 100 days (range 2-505 days, IQR 150 days). Patients had a median 2 home visits and 3 telephone consultations with the RSCN.

60 patients (61%) had a DNACPR completed prior to death or census. Only 37 of these patients (62%) had this decision communicated on an electronic key information summary (eKIS). 50 patients (51%) had an ACP documented on their eKIS during follow-up.

Conclusions: The renal supportive care service is supporting a group of frail, older adults with advanced CKD. The RSCN is able to be responsive, organising prompt review of new patients. However, patients are referred 3-4 months prior to death and the short duration of these therapeutic relationships can lead to challenges ensuring that fundamental components of the supportive care process, such as DNACPR and ACP conversations, are completed. In order to improve patient care, future work will be needed to evaluate the challenges in ensuring effective communication of important end of life decisions with primary and unscheduled care providers. The proportion of referrals which are received from haemodialysis units suggests a need for a service which specifically addresses the holistic care needs of this complex patient group.

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1.SN Davison et al. Supportive care in CKD: a KDIGO executive summary report. *Kidney International*. 2015; 88: 447-459.

Development and internal validation of a multivariable prediction model for early mortality in individuals with ANCA-associated vasculitis and severe infection

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7. School of Cardiovascular and Metabolic Health, University of Glasgow

Background

Individuals with ANCA-associated vasculitis (AAV) are highly susceptible to severe infections, which can result in premature death. Currently, no predictive models are available to forecast mortality in this setting. This study aimed to create such a predictive model.

Methods

A linked dataset was used. This comprised routine administrative healthcare data covering all individuals in Scotland who had experienced a hospital admission. AAV patients were identified using ICD-10 codes. All subjects had experienced at least one hospital admission associated with infection. The candidate predictive factors considered were demographic data, comorbidities and medications prescribed within the community setting. The primary outcome was mortality either before discharge from hospital or within a 30-day period following discharge. Model development utilised logistic regression and a backward selection procedure, which involved fitting fractional polynomials to continuous variables. Elastic net penalized logistic regression was then applied to shrink the model coefficients. To assess model performance, optimism-adjusted performance metrics were estimated using bootstrapping.

Results

The study cohort comprised 1,015 patients, among whom 157 (15.5%) experienced the outcome. The final predictive model demonstrated that increased age, increased time since AAV diagnosis, the presence of specific comorbidities (including liver disease, metastatic cancer, renal disease, and diabetes), and recent exposure to glucocorticoids were independent predictors of the mortality end point. Following internal validation, the optimism-adjusted model performance indicators were: calibration slope 0.967, calibration in the large 0.004 and concordance (c) statistic 0.713. A c-statistic over 0.7 indicates a good model. A calibration curve showed the model was well calibrated.

Conclusions

The development of this predictive model represents an important step in developing tools to estimate the risk of mortality in individuals diagnosed with AAV who face the challenge of severe infection.

‘Prepare the Umbrella Before it Rains’: Improving Anticipatory Care Planning for Patients with End Stage Kidney Disease

Shanan Teo, Rachel Smith, Pei Hwa Thing , Laura Clark

Introduction

Patients with end stage kidney disease (ESKD) have reduced life expectancy. Anticipatory Care Plans (ACP) provide people with person-centered, coordinated care focusing on goals and preferences whilst offering opportunities to consider realistic treatment and care options [1]. Renal physicians have long-term care relationships with patients and therefore are well placed to discuss ACP. Forty-one deaths occurred amongst dialysis patients in Grampian in the past year (July 2022- June 2023). Only 29% (12/41) of these people had do not attempt resuscitation (DNACPR) forms in place and even fewer (18/41, 18.5%) had an ACP prior to death. Thus, a quality improvement (QI) project was initiated aiming to increase the prevalence of ACPs amongst frail haemodialysis (HD) and peritoneal dialysis (PD) patients as well as all conservative care patients. We used Clinical Frailty Score (CFS) as an objective assessment tool to help identify frail dialysis patients most likely to benefit from this planning.

Methods

We collected baseline data between July 2021 and August 2022 including the number of HD, PD and conservative patients with CFS documented within the previous 4 months, the number of HD and PD patients with CFS ≥ 5 with an ACP and DNACPR in place and the number of conservative patients with ACP and DNACPR in place. We identified problems here and made changes as shown below:

1. Problem: CFS is recorded inconsistently between dialysis units
Changes: we suggested dialysis nurses record CFS at time of quarterly bloods tests including PTH. We also sent reminder emails to relevant senior charge nurses.
2. Problem: Lack of awareness of the importance of ACP
Changes: We shared results from the first cycle of data at departmental meetings
3. Problem: The complexity of the topic and time constraints of appointments makes ACP discussions challenging
Changes: Input from palliative care consultants in a new supportive care clinic for complex conservative care patients; ACP information leaflets created and shared with patients.

We carried out further data collection from July 2022 to June 2023 after the changes to assess for improvement.

Results

124 out of 223 dialysis patients (40%) in NHS Grampian had a CFS recorded in the past 4 months: a slight decrease from 41.1% in 2022. The satellite dialysis units performed better than main unit in ARI in updating CFS, ranging from 85%-100%. 5 of 52 (9.62%) conservative care patients had an updated CFS, which was an improvement compared to 0% last year.

In the frail dialysis population, the prevalence of ACPs improved from 12% to 35% from 2022 to 2023. DNACPR decisions also increased from 35% to 40%. With the conservative care patients, ACPs increased from 20% to 29%, although DNACPR documentation reduced from 43% to 33% from 2022 to 2023.

Conclusions

Following the changes, documentation of frailty score has not improved. Despite this ACP provision in both groups of patients has increased, which is the ultimate goal of the project. Whilst this is encouraging, the overall numbers remain lower than optimal and therefore further changes will be required to reach our targets. We plan to try electronic reminders for CFS documentation and notifications for clinicians to highlight patients with CFS ≥ 5 in the current clinical software. We also hope that a new expansion of the supportive care clinic to include frail dialysis patients as well as conservative care patients will provide further opportunities for holistic care and anticipatory care planning in collaboration with palliative care colleagues.

References:

1) https://ihub.scot/project-toolkits/anticipatory-care-planning-toolkit/anticipatory-care-planning-toolkit

Sex differences in the impact of risk factors on kidney function decline: a population-based cohort study

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Background: Females are more likely than males to have chronic kidney disease (CKD), but more males are treated with kidney replacement therapy (KRT). We studied whether the impact of risk factors on decline in kidney function differed between females and males.

Methods: We conducted a population-based cohort study of adults living in Wales, UK, using the Secure Anonymised Information Linkage Databank. We estimated yearly decline in estimated glomerular filtration rate (eGFR: CKD-EPI 2009 equation without the race coefficient) using linear mixed effects models, comparing females and males with and without risk factors. The risk of incident kidney failure (long-term KRT and/or eGFR<15mL/min/1.73m^2 sustained for >90 days) was estimated using Cox proportional hazards models. Interaction terms were used to assess sex differences in risk factor impacts.

Results: Amongst 1,127,731 people, the average decline in eGFR before age 73 was equal in females and males. After age 73, eGFR decline was faster in males than females. Rate of decline was similar in females and males with and without hypertension. Diabetes and current smoking were more important risk factors for eGFR decline in males compared with females: diabetes: males -1.44mL/min/1.73m^2 per year (95% confidence interval (CI) -1.45 to -1.43) versus females -1.21 mL/min/1.73m^2 per year (CI -1.22 to -1.20: Figure 1); current smoking: males -1.58 mL/min/1.73m^2 per year (CI -1.60 to -1.55) versus females -1.27 mL/min/1.73m^2 per year (CI -1.29 to -1.25). Males were at increased risk of kidney failure, which was mainly driven by higher rates of incident KRT compared to females

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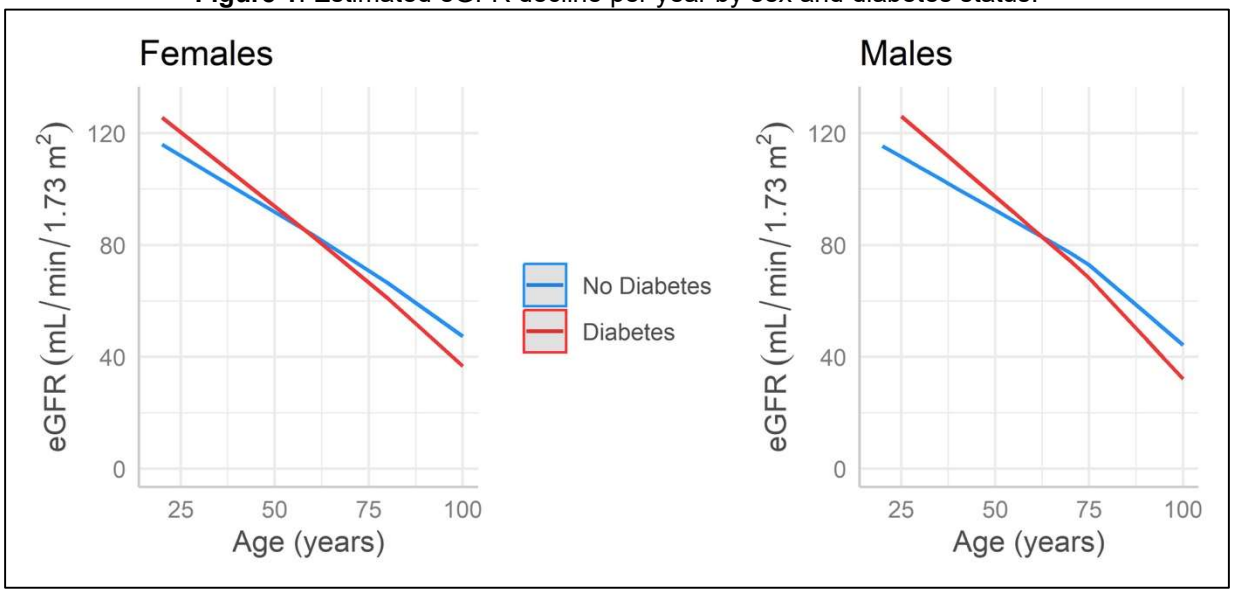
Figure 1. Estimated eGFR decline per year by sex and diabetes status.



Conclusions: While hypertension impacted eGFR similarly for males and females, males with diabetes and males who smoke had the fastest rates of eGFR decline. These findings suggest that established risk factors are primarily associated with progressive CKD in males. Further work is required to identify key modifiable risk factors in females.

What can we learn from patient feedback - exploring the views of patients on haemodialysis and how this could help to shape future renal dietetic service provision.

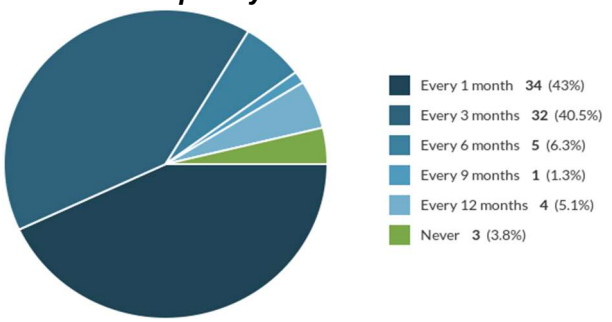
Susan Reed, Hannah Herron, Gillian Walker

Introduction:
Due to increasing demands on the renal dietetic service and recognising the importance of person-centred care, we wanted to obtain feedback from patients about the dietetic care they receive on haemodialysis. We were keen to gather both quantitative and qualitative data which might help to inform and shape future dietetic service delivery. This included asking about frequency of dietetic reviews, what future care might look like to them, the option of patient-initiated reviews (PIR) and their engagement with the Renal Patient View (RPV) platform, now Patient Knows Best (PKB).

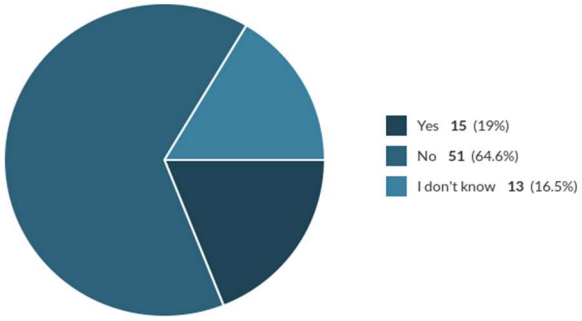
Methods:
Paper questionnaires were issued to patients on haemodialysis in Lothian to complete either on the unit or at home. Assistance was provided to complete the questionnaire if required and reassurance given that their responses would remain anonymous. Data was analysed using the JISC online survey platform. Questions addressed overall satisfaction with the renal dietetic service, how frequently they wished to be seen, their views on PIR, what advice and support they wanted from the dietetic service, how they wanted to receive this support and their experience with the RPV/PKB platforms.

Results:
To date, there have been 97 questionnaires returned. 74% of patients were satisfied or extremely satisfied with the dietetic care. 61% of participants reported that they would like regular feedback from a dietitian (or from a dietetic support worker) and the majority preferred face to face contact on dialysis for these reviews. 33% of patients expressed an interest in the option of PIR rather than regular dietetic input. Only 19% of patients used RPV/PKB and, of these, 93% used it regularly. Of the 64% of patients who did not have an RPV/PKB account, 49% were interested in having one. Potassium was the main dietary concern followed by phosphate, fluid and salt. Valuable qualitative feedback was obtained by asking the question - *'Is there anything that the renal dietitians could do better / improve upon'.*

Preferred Frequency of Dietetic Review:



Patients with RPV / PKB Access



Conclusion:
75% of patients were satisfied or extremely satisfied with their current dietetic care. As many as 43% of patients would like dietetic input once per month and 33% were keen to explore PIR review only. Based on these findings and the qualitative feedback, there is scope to review the dietetic service to the Lothian Haemodialysis population and to promote more self-management. This might include encouraging and enabling patients to access PKB and individualising the frequency of review based on what patients want, alongside providing more regular face to face feedback to patients who want this.

What is the representation of multimorbidity and frailty in the development and validation of kidney failure risk prediction models? - a systematic review

Heather Walker[1], Scott Day[2], Robert Ker[3], Christopher H. Grant[4], Michael Sullivan[1,3], Bhautesh Jani[5], Katie Gallacher[5], Patrick Mark[1,3]

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Background: Multimorbidity, defined as the presence of two or more long-term conditions (LTCs), is becoming increasingly common in people with chronic kidney disease (CKD). Alongside this, individuals with CKD are more likely to experience frailty than the general population.

Accurate risk prediction of the progression of CKD to kidney failure is important to allow clinicians and their patients to understand the future risk of requiring dialysis and/or kidney transplantation. The 2021 NICE guidelines for management of CKD recommend using the Kidney Failure Risk Equation (KFRE) to guide referral of adults with CKD for specialist assessment.

The presence of multimorbidity or frailty may impact the progression of CKD and are also likely to influence competing risks such as death. Despite this, it is currently unclear to what extent current prognostic models that predict kidney failure in patients with CKD (e.g. KFRE) consider patients with multimorbidity and frailty and what impact these factors have on model validity and performance.

This systematic review describes, summarises, and evaluates the representation of multimorbidity and frailty within cohorts that have been used to develop and/or validate prognostic models assessing the risk of kidney failure in individuals with CKD. Additionally, the review aimed to assess what impact multimorbidity and frailty has, if any, on the validity of risk prediction models in estimation of kidney failure risk.

Methods: An electronic search for published peer-reviewed articles was performed, supplemented with manual review of references from previous systematic reviews and clinical guidelines. Risk of bias of included studies was assessed using the Cochrane Collaboration's tool for assessing risk of bias and the Prediction model Risk Of Bias ASsessment Tool (PROBAST). Study selection, data extraction and risk of bias assessment were conducted by two independent reviewers. Overall findings are reported using narrative synthesis. Heterogeneity were assessed using Cochrane's Q statistic test and I^2 statistic.

Systematic Review Registration: The systematic review was prospectively registered with PROSPERO (Registration Number: CRD42022347295).

Results: A total of 85 studies, reporting 72 kidney failure prognostic models were identified. A total of 2,258,238 participants and 148,043 outcome events were included across all studies. Included patients had a mean age of 62.6 years (SD 10.0), 37.8% were female, with a mean eGFR of 36.7ml/min/1.73m^2 (SD 10.4). 76.5% of studies reported baseline data on co-morbidities which consisted primarily of diabetes (67.1%), hypertension (61.2%), and cardiovascular disease (42.4%). Only two studies reported multimorbidity (reported by Elixhauser Cormobidity Index and Charlson Co-morbidity Index) and one study reported a frailty measure (self-reported general health scores as a proxy for frailty). Inclusion of multimorbidity or frailty variables for consideration within the prognostic model were also infrequent with only one study considering the inclusion of the Charlson Comorbidity Index as a measure of multimorbidity. No studies were identified that assessed the performance or validation of kidney failure prognostic models in populations with CKD and multimorbidity. A single study was identified assessing clinical utility of a model and referral algorithms considering frailty, risk of kidney failure and risk of death.

Conclusions: There is a paucity of kidney failure risk prediction models that consider the impact of multimorbidity and/or frailty in adults with CKD, resulting in a lack of clear evidence-based practice and guidance for multimorbid or frail individuals in this population. The results from this systematic review will allow gaps in the research identified to be explored and for the optimisation of prediction models for use in this population in the future.

Implications: Clinical guidelines currently lack the evidence to support the use of kidney failure risk prediction tools to guide informed discussion or referrals for people with CKD and multimorbidity and/or frailty. Further work is required to establish the validity of prediction models and specifically KFRE, due to its inclusion in NICE guidelines, for use within this population.

Validation of the kidney failure risk equation in UK Biobank participants with chronic kidney disease and multimorbidity or frailty

Heather Walker[1], Michael Sullivan[1], Bhautesh Jani[2], Katie Gallacher[2], Patrick Mark[1]
[1]School of Cardiovascular and Metabolic Health, University of Glasgow, [2]School of Health and Wellbeing, University of Glasgow

Background: Chronic kidney disease (CKD) is a global healthcare problem affecting around 1 in 10 individuals and increasing numbers in this population will also experience multiple long-term conditions (multimorbidity) or frailty.

Progression of CKD to kidney failure requiring treatment with kidney replacement therapy (KRT) is an important consideration in these individuals. The 2021 National Institute for Health and Care Excellence (NICE) guidelines for the management of CKD recommended using the four variable KFRE, comprised of age, sex, eGFR creatinine (eGFRcr) and urine albumin creatinine ratio, to inform adults with CKD about their 5-year risk of the need for KRT and to guide referrals of adults with CKD to secondary care kidney clinics.

Multimorbidity has been shown to be associated with progression of CKD and there is evidence that there is a cumulative risk of major adverse kidney events, including KRT, with increasing numbers of long-term conditions (LTC). Frailty is also associated with advancing CKD and mortality in this population.

It is currently unclear how well KFRE predicts kidney failure in patients with CKD and multimorbidity and/or frailty.

Cystatin C has been proposed as a more accurate biomarker for estimating kidney functioning, compared to the currently used biomarker creatinine, particularly in older patients. There is evidence to suggest that using Cystatin C to calculate eGFR (eGFRcys) or a combined creatinine and Cystatin C eGFR (eGFRcrcys), rather than creatinine (eGFRcr), improves risk stratification and discrimination of future kidney failure.

We validated the four variable KFRE in individuals with CKD, with and without multimorbidity and/or frailty. We also assessed the performance of the equation using eGFRcr, eGFRcys and eGFRcrcys.

Methods: Data were sourced from UK Biobank. Individuals were included if they had CKD, defined as eGFR<60mL/min/1.73m^2 by any of the three eGFR equations (eGFRcr, eGFRcys and eGFRcrcys), at the baseline study assessment. Multimorbidity was defined as the presence of two or more LTC in addition to CKD and was grouped into multimorbidity clusters based on previous research. Frailty was assessed by the Fried frailty phenotype, Rockwood frailty index (FI) and laboratory frailty index (lab-FI). The outcome was kidney failure, defined as the need for long-term dialysis or kidney transplantation. KFRE performance at 2- and 5-years was assessed using the area under the receiver operating characteristic curve and c-index for discrimination and calibration plots and curves for calibration.

Results: A total of 24,490 individuals were included; mean age 62.8 (SD 5.6), 54% female. 14,211 had multimorbidity, 4,144 had cardiometabolic multimorbidity, LTC count median 2 (IQR 1-3) and 4,599 had frailty, median FI score 0.14 (IQR 0.09-0.20) and median lab-FI 018 (IQR 0.18-0.25). Overall, there were 312 and 252 kidney failure and 1,109 and 1,472 death events within 2- and 5-years respectively. Discrimination power of KFRE was good in individuals with and without multimorbidity and was consistent across the 2-year and 5-year models. There was a trend towards improved discrimination in both groups with the eGFRcys and eGFRcrcys equations compared to eGFRCr. Calibration plots revealed over-estimation of risk at 2-years and under-estimation of risk at 5-years in patients with multimorbidity.

eGFR equation used in KFRE		c-index (95% CI)	
		2-year KFRE	5-year KFRE
eGFRcr	Multimorbidity	0.90 (0.87-0.93)	0.91 (0.88-0.93)
	No-multimorbidity	0.85 (0.76-0.93)	0.92 (0.88-0.95)
eGFRcys	Multimorbidity	0.92 (0.90-0.94)	0.93 (0.91-0.94)
	No-multimorbidity	0.94 (0.91-0.97)	0.92 (0.88-0.95)
eGFRcrcys	Multimorbidity	0.92 (0.90-0.95)	0.93 (0.91-0.94)
	No-multimorbidity	0.93 (0.90-0.97)	0.96 (0.93-0.97)

Conclusions: KFRE adequately predicts kidney failure in individuals with multimorbidity but eGFR equations which include cystatin C may improve its performance. Further analyses assessing for the competing risk of death are planned, in addition to repeating the analyses using routinely collected healthcare data to confirm their generalisability to the general population.

Reasons for Vascular Access Choices in Hemodialysis Patients

Zeneera Yusuf, Leigh Bainbridge, David Kingsmore, Peter Thomson, Karen Stevenson

There are currently three modes of vascular access for haemodialysis (HD); central venous catheter (CVC) , arteriovenous fistula (AVF), and arteriovenous graft (AVG). CVC access offers immediate use and eliminates the use of needles for needle-phobic patients. However, CVCs have higher rates of staphylococcus bacteraemia, and central venous stenosis. The shift towards a patient-centred approach rather than an access-centred approach in UK vascular access audit measures means that understanding the reasons for patient choice around different access types is important.

The aim of this audit was, firstly, to determine; (i) the reasons that patients who have a range of vascular access options, opt for a CVC. ii and if these were undertaken as part of a shared decision-making process or whether this was a default option due to system pressures. We also reviewed who in the multidisciplinary team had those discussions about risks and benefits of HD access through interaction with specialist staff - transplant surgeons, nephrologists, and vascular access nurses (VANs).

Data was collected as part of a departmental audit in June 2023 to determine the percentage of HD patients using different vascular access types; At the time of audit 279/631 (44.2%) HD patients were using a TCVC. Of those TCVC users 78/279 (28.0%) were regarded as having possible AV access alternatives available but had opted to use a TCVC by choice.

As part of ongoing quality improvement, 40/78 patients who had opted for CVC by choice were reviewed. Patients were searched on Strathclyde Electronic **Renal** Patient Record (**SERPR**). Details on their demographics, and reasons for access choice was collected. Letters and notes on SERPR by vascular access nurses, transplant surgeons, and nephrologists were surveyed by scanning for keywords “TCVC”, “access”, ”AVF”, “AVG”, “tunnelled line”, “non-tunnelled line”. The reasoning for the patient’s access choice, if documented, was then noted down. If there was no reasoning of the choice provided, this was recorded as “no reason stated”.

Analysis so far has shown overarching themes in the reasons why some chose a CVC as opposed to an AVF or AVG, as displayed by Fig.1. It is important to note that in the 44.7% of cases, where there was no reason stated, 58.8% of these patients had tried either AVG or AVF before their current CVC. Fig. 2 shows that only 10.5% had documented discussion with all three types of specialist staff, and over a third had only spoken with one type of specialist staff. There are also a proportion of patients (7.9%) who did not have a record of a conversation regarding their access.

Patients have discussions about their access with different combinations of the multi-disciplinary team, however just under 8%of patients dialysing through a TCVC have had no documented discussion about their access options at the time of audit. Of patients dialysing through a TCVC by choice in 44% no reason for that choice has been documented. Surgical complexity and fatigue are recognised contributory factors but other reasons are unknown. Shared decision making in vascular access involves both patient and clinician discussing the options available and weighing choices together. This data shows that some patients haven’t had access choice discussions documented. Understanding the reasons why and identifying if choices remain the same after opportunity for discussion, offers opportunities to improve a patient centred access approach.

References:

1. Ishikawa K, Furukawa K. Staphylococcus Aureus Bacteremia Due to Central Venous Catheter Infection: A Clinical Comparison of Infections Caused by Methicillin-Resistant and Methicillin-Susceptible Strains. Cureus. 2021 Jul 24;13(7):e16607. doi: 10.7759/cureus.16607. PMID: 34336531; PMCID: PMC8312998.

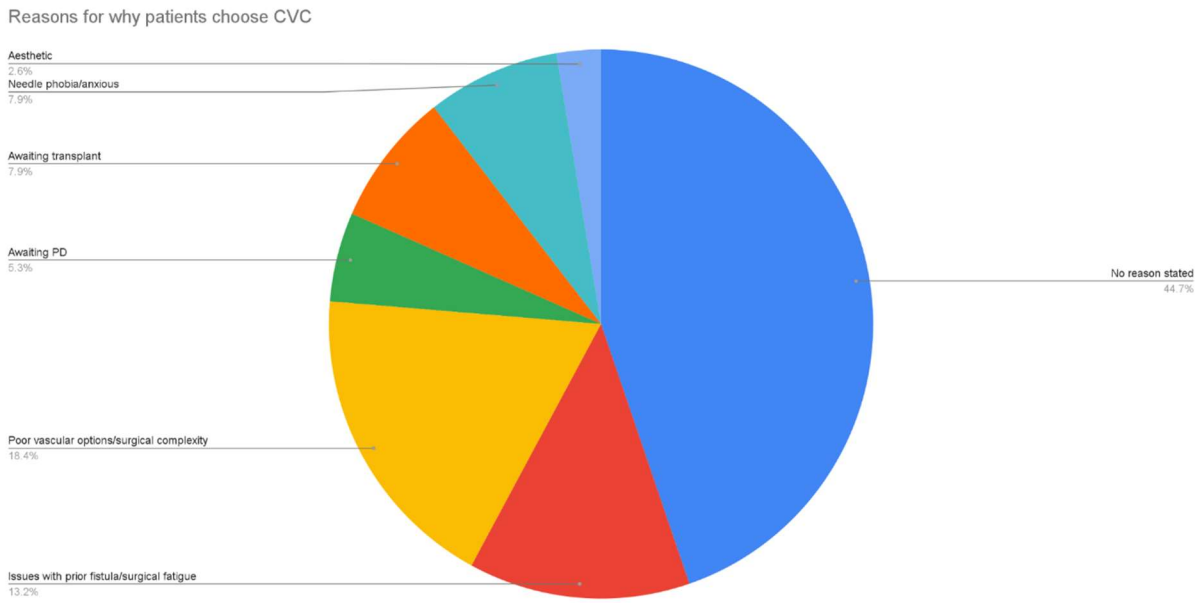

Figure 1. Reasons for why patients choose CVC

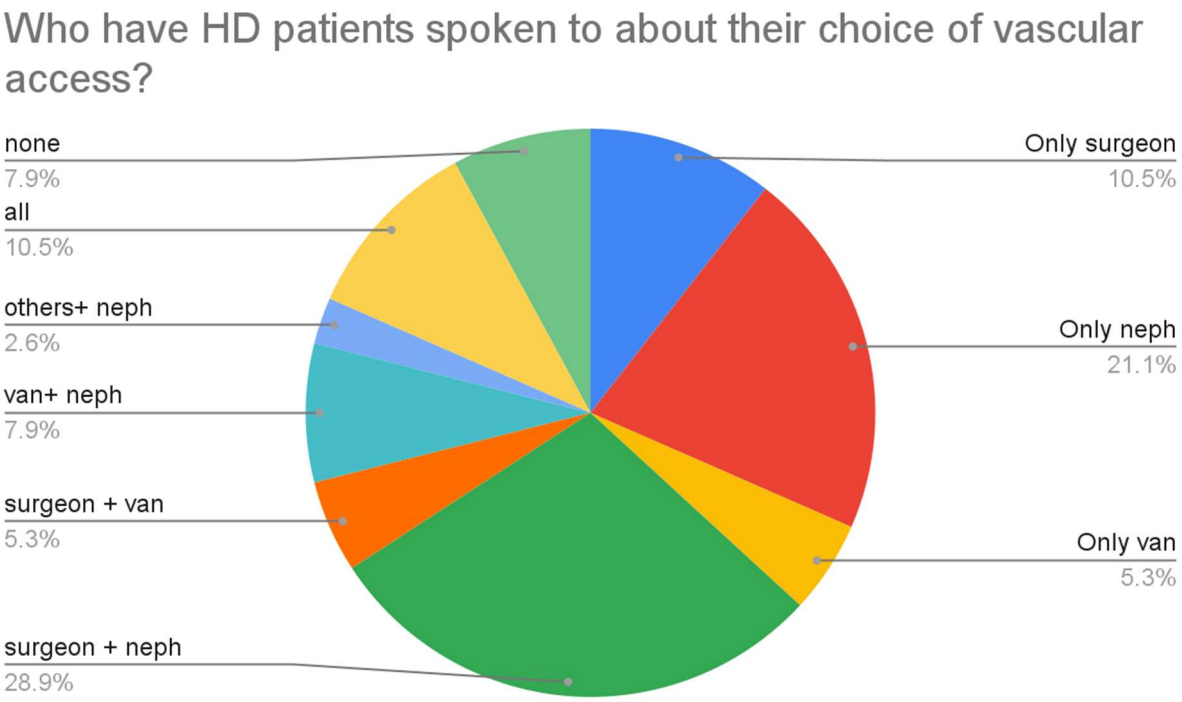

Figure 2. Who have HD patients spoken to about their choice of vascular access?

NURSING & AHP ABSTRACTS

Spiritual Care

Lorraine Allan
Lanarkshire

> *The best chaplains speak little but listen intently, becoming a container for all that the patient needs to share and then with great care sifts through and captures the "pearls" that the larger medical team need to know and weaves a narrative note that is full of deep listening, reverence and truth.*
>
> *RITA CHARON, MD (2006)*

Within my role as Chaplain in NHS Lanarkshire I have been providing spiritual care to renal patients within both an inpatient and outpatient setting. The healthcare team will regularly refer patients to spiritual care at different points of their healthcare journey.

Spiritual Care can offer support and comfort to people at times of difficulty and responds to the needs of the person when they might be facing life changing events. Spiritual Care can provide an opportunity to explore the deeper questions, the existential questions, such as "why is this happening to me?" or "what have I done to deserve this?". Often as patients face difficult times, regrets and questions can bubble to the surface and as they wrestle with what is happening to them in the 'here and now' they have the need to address these unresolved issues or unanswered questions which are buried deep in the past. Within my experience as a chaplain in renal I have witnessed, cared and sat with patients who are wishing to explore and find answers to these questions at different times of their lives.

Through spiritual assessment chaplains can assess patients' spiritual needs and responding to them can help shape and support care for that patient not just from chaplaincy but from the wider healthcare team. In NHS Lanarkshire we have developed a spiritual assessment model which is available for both healthcare professionals and chaplains. Healthcare professionals can use the "everyday" model which is a tool that they can use to assess spiritual needs and determine if onward referral to a chaplain would be beneficial and the chaplains use an "enhanced" model which enables them to provide a more in depth assessment. The assessment model is also used as a basis to our documentation and includes our aims for the care from the chaplain. Being able to provide and share our spiritual assessment with the wider Multi-Disciplinary Team enhances the person centred care for the patient, ensuring that the patient is cared for physically, mentally and also spiritually.

The need for spiritual care support can be required at all stages of a patient's healthcare journey. Often as they commence dialysis, when they often express fears or concerns about the impact on their life and also that of their family. Throughout their journey as they cope with reality of life on dialysis. When they face their own mortality as they witness the death of fellow dialysis patients that they have built up relationships with over weeks, months or years. Also as they might face difficult decisions about continuing or stopping dialysis as they face the end of their life. As patients face these difficult times this is also as they are managing their own lives, caring for children, spouses or parents. Chaplaincy support is not just available to the patient but is also there for the families. Families can be provided support as patients near the end of their life, helping both the patient and family prepare for the end of their life and bereavement support following the death.

As a chaplain my role is not only to support patients and families but also staff. Staff working in renal regularly witness the death of patients that they have continually cared for often for many months or years. Building up relationships with not only them but also their families. The grief and loss that staff and teams experience has an impact on them while they still need to care for other patients. Providing a space for staff to talk about the impact on them, to process what is happening and to have an opportunity share this with someone who is known and part of the healthcare team can be beneficial. Caring for those who care for others can help them keep well not only for the other patients and families that they care for but also enable them to stay well for themselves and their families out with the work setting.

Does a rapid access clinic benefit the renal department and the patient experience? A quality improvement and service development project

Jacqueline Annand, Pei Hwa Thing, Laura Clark, Claire Brunton, Dana Kidder
Aberdeen Royal Infirmary, NHS Grampian

Background:
In NHS Grampian, urgent community renal referrals were previously reviewed in the consultation room in the renal inpatient ward for urgent assessment and decision to admit. With the increasing admission pressure at the front door, the consultation room has been converted to an inpatient room and the workload of the ward team has increased tremendously with the increasing numbers of inpatient admissions. Unscheduled outpatient assessments have been difficult to carry out due to limitation of space and staff availability, therefore the rapid access clinic (RAC) was established at the end of October 2022 to help streamline the workload and reduce the need for unscheduled admission to the ward.

Methods and Aims:
RAC was set up after agreement of having allocated time slot from medical staffs, nursing staffs, health care supporter workers to cover this clinic. It is currently running once per week with two appointment slots. This presentation aims to explore whether having a RAC benefits the patient experience and the running of the renal department. We sought to carry out a quality improvement project with rapid cycles of change and an iterative process of improvement.

Results:
Data has been collected from the beginning of RAC at the end of October 2022 until now (August 2023). Fifty-six referrals have been made to RAC in the past ten months, with an average of five to six RAC reviews in a month. Reason of referrals includes acute kidney injury(14/56), new chronic kidney disease needing to be reviewed urgently(6/56), nephrotic syndrome(8/56), haemaproteinuria suspected underlying glomerulonephritis(7/56), post ward discharges(15/56) and others(5/56). Two inappropriate referrals have been identified, one was referred due to purely vascular access issue, another one was referred with deteriorating renal function who is already known to renal team. 26 out of 41 new community referrals(63%) had appointments given within a week. Five patients required admission following RAC reviews, seven patients had day case biopsy arranged after RAC, five patients discharged from renal services, three patients did not attend, and with majority of patients, thirty-one of them had renal clinic follow up arrangement after review.
We are in the progress of collecting staff surveys and patient surveys regarding their experience with this new setup of rapid access clinic and will be able to present the results in SRA.

Conclusion/Discussion:
This data showed we have avoided fifty-six of unscheduled ward reviews in the past ten months. If we assumed all acute kidney injury cases and suspected glomerulonephritis cases needed urgent admission for assessment through acute admission ward or renal ward, twenty-eight admissions have been avoided up to this point. It is a great achievement especially in the current climate of inpatient bed shortage. We had a few hiccups with staffing availability and staff responsibilities at the beginning of the setup, but progress has been made to tackle the problems to keep the clinic going. We will continue to improve the service as we go along.

How can extending the nursing role improve the satellite unit service?

Nicola Brook

Satellite units are an important part of the renal family, allowing patients to dialyse closer to home with shorter travelling times and providing valuable spaces to support the main units. However, without medical cover within the units, how can we support nursing staff to have the skills required to support an ageing demographic with multiple co-morbidities, in times with GP shortages and increased ambulance waiting times?

Current challenges facing nursing staff within nurse-led satellite renal units include caring for groups of patients with an increasing dependency and levels of acute illness. Our patients will often discuss the difficulties they have in accessing GP appointments and out of hours care, this then means that patients will often attend their dialysis unit with acute illnesses and injuries including infections, pain and injuries after incidents at home. When care does get escalated, staff have been left waiting for several hours after calling an Ambulance for them to attend.

How can we support our staff to ensure they have the skills to deal with these difficult situations? This was a question asked within the Aberdeenshire/Moray satellite units of Aberdeen Royal Infirmary. Senior nursing staff had a desire for staff to undertake postgraduate education in clinical assessment skills to provide competency in skills that would support their existing clinical skills and knowledge. We also looked at the benefits that we felt this would provide for our renal units including, reduced hospital admissions, improved dry weight assessment skills, increased competency in acute cardiac events, assessment of acute pain/illness and after falls and injuries. Many patients do not want to be admitted to hospital or travel 50 miles to be assessed by Renal medical staff, enhanced assessment skills can help to reduce this. Ultimately, we wanted staff to feel confident in their assessment skills and their decision to escalate their patients care when it is required, and develop the service provided to the satellite renal patients.

Many courses were reviewed and checked for their accessibility, suitability and practical skills they would provide. Staff felt it was important that the course was accredited to ensure that the work put in would provide a qualification and allow for further development. Two Senior Staff nurses from Banff and Inverurie have successfully completed the Clinical History Taking and Examination Skills for Advancing Practice module with The Robert Gordon University, with more staff currently applying for places and funding. This included theoretical and practical clinical skills in respiratory, gastrointestinal, cardiovascular, neurological and musculoskeletal. Competence was ensured by completing an online practical questions-based exam and an OSCE which tested history taking and clinical examination skills.

It has enhanced the assessment of fluid overload and acute respiratory issues and helped to assess target weights. The clinical assessment skills learned have helped in situations of acute illness including abdominal pain, neurological symptoms, post fall assessments and cardiac events. This has also improved staff ability to handover their assessment findings when care is escalated to renal medical staff or GP’s. These skills have all added to developments we have made over the last few years within the satellite units including bedside vascular scanning, which has helped us detect vascular issues and aid cannulation.

You would be forgiven for thinking this was the end of the process, however this is only the beginning. Challenges that impact the success of this that require further exploration include, measuring long term success, roll out to large numbers of staff, funding, study time, medical staff support and regular use of practical skills. All challenges for the future and certainly worth discussion.

An overview of in-centre dialysis transport and home dialysis energy reimbursement costs in Scotland.

Judith Connell
Kidney Care UK

Background

People with kidney disease in Scotland, as in the UK as a whole, have faced significant and increasing challenges and stresses as a result of the ongoing cost-of-living crisis. This crisis has seen energy costs soar and consequently the utility bills of those on home dialysis increase. The cost-of-living crisis has also seen a significant surge in fuel prices impacting on the petrol costs for those who travel by car to and from in-centre dialysis, however this is only one of a number of transport issues and concerns for those who travel to and from in-centre dialysis with in-centre dialysis transport consistently being one of the lowest scoring areas in the annual PREM survey.

Methodology

In-order to obtain a comprehensive overview and understanding of the reimbursement of energy costs for home dialysis in Scotland alongside building our knowledge and awareness of in-centre dialysis transport processes and experiences, Kidney Care UK, during SpringSummer 2023, undertook an information gathering exercise, through a series of freedom of information requests to health boards and contact with key individuals in health board finance and renal units. An incentre dialysis transport survey was also designed and distributed online and via the post to a sample of kidney health care professionals and individuals on home centre dialysis in Scotland to ascertain their views and experiences in this area.

Aims and Objectives

The aim of this exercise and survey was to analyse and utilise our findings to inform and improve quality outcomes for patients and as a result to produce two reports that provide up to date information that can be distributed to and used by Scottish government, key health care stakeholders, health boards, kidney health care professionals and individuals with kidney disease to help improve knowledge and awareness of service provision in these areas.

In terms of home dialysis reimbursement, our aim was to discover if, what, when and how each Health Board reimburses people with kidney disease on home dialysis. In terms of in-centre dialysis transport, our aim was to discover patient and kidney health care professional views of in-centre dialysis transport across Scotland and to obtain an overview and understanding of the state of transport and transport reimbursement in Scotland.

Findings

This presentation will present the key findings of the exercise and survey, illustrating disparities between health boards in policy, service provision, reimbursement and patient experience. On the issue of transport, it will also highlight issues of importance and concern to kidney health care professionals and people on in-centre dialysis.

To assess the effectiveness of a 12-month remote weight management clinic for patients with diabetes and chronic kidney disease aiming for transplant.

E. Hamilton, A. Baird, B. Conway, H. Herron

Introduction

The number of patients with diabetes and chronic kidney disease (CKD) who are obese is increasing and is associated with worse outcomes and reduced access to transplantation. Weight management in this population is complex; commercial programmes and low-calorie meal replacement interventions are often unsuitable due to renal dietary restrictions and there can be delays in accessing NHS weight management services. The aim of this project was to pilot a remote renal dietetic-led clinic providing specialist weight management advice for patients with diabetes and CKD aiming for renal transplantation.

Methods

Recruitment criteria were: patients with diabetes who had BMI >30kg/m^2; CKD 3b-5 (not on dialysis); and who were aiming for transplant (but not excluded on this basis). Recruited patients were posted a letter inviting them to opt in within two weeks. Patients who opted in were contacted by phone or video call at baseline, then at 3, 6, 9 and 12 months. Topics discussed included weight history, previous weight loss attempts, barriers to change, renal dietary advice, physical activity levels, diabetes, renal function, blood pressure, medications and whether the patient consented to referral into the NHS Lothian Weight Management Service. Specific, achievable patient led goals were agreed that would facilitate weight loss while also incorporating renal and diabetes dietary management. Following the initial consultation, relevant written resources were posted to the patient including a newly designed 'Working towards a healthy weight with kidney disease' leaflet. On completion of the 12-month telephone clinic, patients were invited to complete an online feedback questionnaire.

Results

34 patients were invited with 19 (53%) opting to take part. Of the patients who opted in: 63% were male, the mean age was 61 years, mean eGFR was 26 and mean HbA1c was 65. At the baseline assessment, mean BMI was 37.6kg/m^2 and 74% reported doing minimal exercise. 74% of patients opted for a phone call rather than a video consultation. Fifty-three percent of those who opted-in completed the 12-month clinic duration. Of these, mean weight loss was 5.6kg (5.3%) over 12-months. All patients who responded to the feedback questionnaire reported that the initial baseline appointment was 'helpful to very helpful'. 83% reported that there was exactly the right amount of follow up appointments and that their knowledge around nutrition and weight loss had improved a lot. 53% of patients consented to referral to the NHS Lothian Weight Management Service for ongoing support following this remote clinic.

Discussion

This project demonstrated that a remote dietetic-led clinic providing specialist weight management advice for patients with diabetes and CKD was successful in achieving significant weight loss.

Reduce inappropriate Urokinase use through systematic fluid assessment.

Lisa Jordan
Crosshouse Hospital

Aim: To reduce inappropriate Urokinase use through systematic fluid assessment.

Purpose: Within the dialysis unit at Crosshouse hospital there are a large number of requests for Urokinase, for malfunctioning TCVC flow. Routinely the ANP/junior Doctor would prescribe Urokinase at the request of the patient's nurse. Prior to requesting Urokinase a nurse checklist would be completed to rule out any other cause of line malfunction. The nurse checklist was often incomplete. The senior renal pharmacist reported that the unit would frequently overspend on Urokinase, with our supply often running out due to national shortages.
For a 2 month period, during the second wave of COVID 19 pandemic, the renal dialysis unit was covered by an ANP. The ANP carried out fluid assessment on all patients for whom Urokinase was requested. During this time the urokinase expenditure reduced by £1500 in one month.

Method: All Urokinase prescriptions during a 1 month period were reviewed. A full clinical examination/fluid assessment was carried out for all patients for whom Urokinase was requested.

Results:

Initial findings: 40% of nurse checklists complete. 50% of patients were found to be hypovolaemic.

Intervention:

1. Add the Fluid assessment score (FASS) to nurse checklist to aid fluid assessment
2. 'No Urokinase to be prescribed until checklist complete' added to nurse checklist
3. Simplified nurse checklist
4. Education sessions with junior medical staff around TCVC flow malfunction and correct Urokinase prescribing procedure

1st cycle: All Urokinase requests during a 1 month period were reviewed. A full clinical examination/fluid assessment was carried out for all patients for whom Urokinase was requested. This cycle included the use of FASS score for correlation with clinical findings.

Findings:

- 56% of nurse checklists completed prior to request
- 62% of patients found to be hypovolaemic/over aggressively ultrafiltrated and/or high Hb
- The FASS score did not correlate with any of the hypolvolaemic patients clinical findings, either scoring them as euvolaemic/hypervolaemic
- 80% of hypolvolaemic patients line flows improved with target weight increase/fluids/<EPO dose. This was assessed by looking at patient's blood flows, line pressures, BP, BVS, symptoms of IDH at each dialysis session, for a week after the intervention was carried out.

Conclusion:

- This study highlights that thorough fluid assessment reduces the use of urokinase. This is supported by previous savings made when the dialysis unit was solely covered by the ANP.
- FASS scoring system did not capture the hypovolaemic patients. In theory, this patient group would be wrongly prescribed Urokinase, with FASS score suggesting that they were euvolaemic/hypervolaemic

Future work:

- Plan to implement a fluid assessment algorithm/flow chart. This will be trialled and validity/reliability will be assessed by nurses assessing patient cases.
- Integration of nurse checklist, malfunctioning TCVC flow chart and Urokinase prescription.
- Fluid assessment/malfunctioning TCVC teaching session for Nurses and junior Doctors.
- Implement a correction over over-hydration guideline

UV spectrophotometric analysis of phosphate content in plant-based milk alternatives.

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Background: Restriction of dietary phosphate is a major aspect of patient care in those with advanced renal disease due to the necessity to control for phosphate balance and to minimise risks of disturbances in bone and mineral metabolism and cardiovascular events associated with vascular calcification. Traditional cow's milk is often restricted in the renal diet in an attempt to reduce dietary phosphate and with increasing popularity of plant-based diets, non-dairy milk alternatives have been proposed as a potential alternative in terms of reducing dietary phosphate load due their naturally lower organic phosphate content[1]. However, the extra amount of phosphate which is consumed as a result of phosphate-containing food additives in these products is currently unknown. This represents a challenge for patients and those working in renal dietary education as it represents a "hidden" phosphate load which is difficult to quantify in the context of an individualised renal diet[2]. The aim of this study was to measure and differentiate the total phosphate content of a range of plant-based milk alternatives commonly consumed in the UK which do or do not contain phosphate additives. Furthermore, phosphate content was also expressed as phosphate:protein ratio in order evaluate phosphate alongside protein content of these products. For reference on average a mixed diet which contains 12-16mg of phosphate per gram of protein is considered a low phosphate diet[3]. Results were also compared to previously documented UK food composition data for cows milk[4].

Methods: A total of 14 plant-based milk alternatives (from 7 different plant sources each with and without listed phosphate-additives) were selected and purchased from a common grocery store in the UK. Foods with phosphate additives were recognised by wording "tri-calcium phosphate, dipotassium phosphate or monopotassium phosphate" or by the initials E340-E341 on the food label ingredients list. Phosphate content was determined by the molybdenum blue complex reaction and measured by UV spectrophotometry using methods previously described[5]. Determination of total phosphate was carried out in triplicate for each sample. Phosphate concentration was expressed as mg/100g and as well as phosphorus to protein ratio (PPR) in order to make comparisons between milks and with known PO4 concentrations in cows milk. Comparisons between groups of milks with and without phosphate additives were made via appropriate non-parametric statistical testing.

Results: Overall results showed plant-based milks with phosphate additives had on average had significantly more phosphate thank those without (59mg/100g vs 5mg/100g respectively; $p<0.001$). Figure 1 shows concentrations of phosphate in each milk sampled by brand and type alongside the corresponding PPR. For comparison, phosphate content in cows' milk in the UK is on average 95mg/100g with a PPR 27mg/g[4].

Phosphate additive containing			Non phosphate additive containing		
Milk type & brand	Phosphate (mg/100g)	PPR (mg/g)	Milk type & brand	Phosphate (mg/100g)	PPR (mg/g)
Alpro soy original	101	31	Alpro soya organic	8	2
Alro coconut original	57	568	Alpro coconut organic	2	24
Alpro oat original	59	195	Plenish organic oat	3	6
Alpro almond original	55	139	Alpro almond organic	5	10
Alpro hazelnut original	58	146	Plenish Hazelnut	15	24
Alpro rice original	18	185	Rice dream organic	3	30
Alpro cashew original	61	122	Plenish cashew	16	18

Figure 1: Phosphate and phosphate:protein ratio (PPR) of plant-based milks sampled.

Discussion: Overall phosphate content analysis shows that plant-based milks with phosphate additives have around 8 times more phosphate in compared to those that did not contain additives. These results suggest that some phosphate additive containing plant-based milks may contribute similar phosphate load to the diet as cow's milk and have a less favourable PPR profile due to their reduced protein content however there is considerable variability between brands. Plant-based milks which do not contain phosphate additives appear to have a more favourable profile in terms of phosphate load as well as PPR; however it should be noted that many of these milks are not calcium fortified. Results associated with this study are obviously limited to the types and brands of milks sampled however it would be of benefit to sample a wider range of products to gain a better overview of the phosphate content of plant-based milk products on the market in the UK.

Conclusion: Phosphate analysis of the samples plant-based milks has shown significantly higher phosphate concentrations in those which contain phosphate additives versus those which do not contain phosphate additives. Phosphate content and PPR was variable between milk type and brand. Plant-based milks without added phosphate may be a suitable alternative to cows' milk for individuals with renal disease following a low phosphate diet.

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Turning Towards Suffering

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Introduction

Living with renal failure is challenging for patients diagnosed with chronic kidney disease for which there is no cure. The treatment options for renal failure are either dialysis or transplantation. This study explored the challenges of living with renal failure with the hope of transplantation using qualitative interviews with ten patients who were listed for simultaneous kidney and pancreas (SPK) transplant. All the participants had chronic kidney disease and diabetes.

Methods

The data from qualitative interviews was analysed from ten participants using constructivist grounded theory (Charmaz, 2014). Ten SPK participants were interviewed on their experience of living with kidney failure and diabetes. The data, the narratives of the participants, was transcribed by the researcher onto NVIVO software and analysed and coded using the principles of grounded theory.

Results

All the participants describe *Holistic Illness Suffering* developed to show the interconnected nature of all elements of suffering in relation to the multidimensional Self. Suffering kidney failure on a physical level affects the participants on a social, psychological and spiritual level. Coping with the suffering of chronic illness was through either *Experiential Avoidance* or *Creative Adjustment.*

Discussion

Awareness of *Holistic Illness Suffering* is the first step in addressing suffering. Suffering often goes without words and can be difficult to identify the root cause, which is individualistic in nature. Recognition of *Experiential Avoidance* as a means of coping with *Holistic Illness Suffering* in chronic illness can help health care professionals to understand patient behaviours. Health care professionals are in a key position as facilitators of Creative *Adjustment* as a means of coping and acceptance of *Holistic Illness Suffering*.

Charmaz, K. (2014) *Constructing grounded theory / Kathy Charmaz.* Second edition. London: SAGE (Introducing qualitative methods).

Renal Non-Medical Dietetic Prescribing Practice in NHS Forth Valley

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Aim/Rationale:
Development & Implementation of Renal Dietetic prescribing

Description of work/Methodology:

Legislation giving dietitians supplementary prescribing (SP) rights was granted in March 2016 and the initial Scottish accredited HCPC course commenced in September 2018. I completed the course in 2021 and I am currently the only Renal Dietitian in Scotland qualified to prescribe.
As a supplementary prescriber, a clinical management plan (CMP) is required and this was developed with approval from Consultant Nephrologists in NHS Forth Valley. A CMP is an agreed, defined plan of treatment on a named patient basis setting legal boundaries and parameters of prescribing.
Phosphate management is an essential role of the Renal Dietitian and the discussion and timings of phosphate binders is an integral part of this. Despite in depth discussions with renal patients regarding phosphate binders, the prescribing of these was previously devolved to Consultant Nephrologists.
The non-medical prescribing course has provided me with the opportunity to increase my knowledge and appreciation of medications and the prescribing decision making process. I utilise this increased knowledge to facilitate early prescribing of phosphate binders in a timely manner to improve renal haemodialysis patient care with the aim of reducing costs and decreasing hospital admissions.

Key Messages:
Dietetic SP can reduce delays in patient access to the appropriate medication supporting dietetic care, increasing concordance and compliance in addition to easing pressure on clinicians. The ability to prescribe can aid patient centred practice, ensure timely intervention and improve the multidisciplinary approach to healthcare.

Impact/Outcomes/Next Steps:
Implementing SP has been a challenge on many levels; personally, academically and professionally. In dietetics SP is currently an evolving skill and not essential in general dietetics however can be an asset in specialist areas such as Renal. As the first Renal Dietitian to gain the qualitifcation in Scotland, there has been a challenge bringing prescribing into practice. There is a prescriber network across Scotland and the UK to share examples of good practice, CMP's and help evolve, enhance and advance dietetic prescribing. The future wil involve developing good prescribing practice to help drive dietetic prescribers to independent prescriber status.
Prescribing within my clinical remit has extended the scope of my role as part of the renal multi disciplinary team, improved patient centeredness by supporting the work of my nephrologist colleagues and benefitted the renal service resulting in timely patient care.

REACH Transplant

Alison Sharry, REACH Transplant Nurse Specialist, RIE

We know that Living Donor Kidney Transplantation (LDKT) is the best option for suitable patients & that barriers exist to accessing this treatment. In addition, we know that inequality of access exists associated with socio-economic deprivation &/or belonging to an ethnic minority. Appropriately timed education & information for potential recipients & their support network can help to overcome these barriers.

REACH Transplant is a Scottish Government initiative to improve access to LDKT & reduce inequality of access. This is a patient education programme, providing high quality, tailored information to patients & their loved ones in a relaxed setting. The project was piloted in Lothian & the Borders & expanded across Scotland in late 2022. There are now 10 REACH Transplant Nurse Specialists across the nine Scottish Health Boards. I came in to post in February 2023 as the Nurse Specialist covering Lothian & the Borders.

Suitable patients are referred by their Nephrologist at an appropriate time in their journey to begin discussions about their treatment options. Specialist Nurses contact the patient & arrange to visit them at home at a time convenient to them & are invited to include any family members or friends they wish to. Home visits are undertaken, providing tailored information about both dialysis & transplantation options with attendees encouraged to fully participate & ask questions. Written information is also provided.

I will discuss the role of the REACH Transplant Nurse Specialist & include examples of the most common questions & misconceptions encountered during my home visits.