**Research Activity Report (2021-2022)**

**Mr Stephen O’Neill MSc PhD FRCS**

**June 2022**

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On behalf of the Medical Advisors to the Northern Ireland Kidney Research Fund (NIKRF), it is a privilege to submit this annual research report highlighting selected kidney research projects from Northern Ireland. For the first time in many years the annual research report has not been submitted by **Professor Peter Maxwell,** who has now retired from clinical practice but will hopefully continue to guide us all in our research and teaching endeavours. A theme that emerges throughout this report is the legacy of Professor Maxwell’s incredible career.

In the words of Professor Maxwell, “Research will always be an integral part of our renal services.” In 2021, NIKRF celebrated the outstanding achievement of providing 50 years of unbroken support for kidney research in Northern Ireland. Over the past year, NIKRF volunteers have continued to help promote kidney transplantation, support local renal services, and raise amazing amounts of money to invest in research and the training of people undertaking this research. These efforts have directly contributed to the high quality of renal services in Northern Ireland and further afield.

The NIKRF continues to support a wide range of kidney research. In the last 5 years, these projects have included research in the following areas:

* Diabetic kidney disease (the major global cause of end-stage kidney failure)
* Factors influencing the long-term success of renal transplantation
* Increased risk for heart disease in people with chronic kidney disease
* Safer ways of prescribing intravenous fluids
* Reasons for rapid weight loss in people receiving dialysis
* Links between chronic kidney disease and blood vessel changes in the eye
* Genetic risks for kidney disease
* Acute kidney injury

NIKRF Supported Research Fellows

NIKRF has directly funded numerous research fellows over the past 50 years, many of whom have gone onto to have prodigious clinical and research careers. In 2021 and 2022, the researchers directly supported by NIKRF have included:

**Russell Costello**, who is a scientist completing a PhD under the supervision of Mr James McDaid. Russell has been investigating new anti-rejection drugs for use in kidney transplantation. Russell has been testing a completely novel type of anti-rejection drug on discarded white cells from blood donors. Russell has finished his PhD project and has plans in place for his PhD viva later this year.

**Michael Matthews**, who is a staff nurse based at Antrim, is informing the development of a psychosocial intervention to support informal caregivers of people with end-stage kidney disease receiving haemodialysis (BMC Nephrol. 2020 Oct 1;21(1):421. doi: 10.1186/s12882-020-02075-2). Dr Helen Noble and Professor Joanne Reid (School of Nursing, Queen’s University Belfast) are the supervisors on Michael’s PhD project. Michael has collected data from interviews with 26 informal caregivers of people receiving haemodialysis. These interviews have provided a rich insight into the unmet needs and experiences of informal caregivers. This information is currently being disseminated to healthcare professionals involved in the care of patients undergoing haemodialysis and their informal caregivers through focus groups, the aim of which is to pull together components of a supportive intervention.

The most recent publication from Michael’s PhD is; Knowledge Requirements and Unmet Needs of Informal Caregivers of Patients with End-Stage Kidney Disease (ESKD) Receiving Haemodialysis: A Narrative Review. Matthews, M., Reid, J., McKeaveney, C., & Noble, H. (2022). Healthcare (Switzerland), 10(1), 57. https://doi.org/10.3390/healthcare10010057.

**Aaron Lake** is a renal trainee who after successfully completing a MSc has now started a PhD project under the supervision of Professor Ciaran O’Neill. Aaron’s research assesses why acute kidney injury is increasing in Northern Ireland and the cost implications of this rise.

Queen’s University Belfast

The nephrology research staff at Queen’s University Belfast includes **Professor Amy Jayne McKnight** (former NIKRF PhD student and NIKRF postdoctoral fellow) and **Dr Gareth McKay**.

The Queen’s University Nephrology Research laboratory has moved to the Institute of Clinical Science at the Royal Victoria Hospital site. It has been a busy year in the laboratory and several updates regarding team members are summarised below:

* Jill Kilner who has run the laboratory for the last 20 years, was runner up in the QUB technician of the year awards, recognising her excellent contributions to the team’s research.
* Kerry Anderson (a PhD student with Professors Maxwell and McKnight working on links between chromosome Y and kidney disease) has recently taken up a new post with Randox Laboratories.
* Ruaidhri Cappa (a PhD student with Professors Maxwell and McKnight working on improved bioinformatic approaches for kidney disease) has recently submitted his PhD thesis.
* Caitlin Bailie (a PhD student with Professors Maxwell and McKnight working on the genetics of kidney disease) is now working for the team part-time as a Project Manager.
* Dr Laura Smyth, who was a previous NIKRF fellow, recently welcomed a baby girl into her family.

The group are also involved in the research of rare diseases, which includes renal focused research. All 14 actions listed in the NI rare disease action plan 2022 were derived from the group’s research and they are currently working on delivering the actions from this plan with Professor McKnight co-leading two of four working groups.

Numerous papers have been submitted by the group over the past year and the following paper has just been published in Frontiers in Nephrology: Hill, C., Avila-Palencia, I., Maxwell, A.P., Hunter, R.F. and McKnight, AJ. Harnessing the full potential of multiomic analyses to advance the study and treatment of chronic kidney disease (https://doi.org/10.3389/fneph.2022.923068).

The group did a charity walk/run for NIKRF in May 2022, and to inspire future scientists also took part in the NI Science Festival event in February 2022 called “The-future-of-kidney-research-is-steam-powered”.

**Dr Gareth McKay** has enjoyed a prolific year of publication with a range of 10 different nephrology research papers published, including the three publications below that were directly funded by NIKRF:

* Paterson EN, Maxwell AP, Kee F, Cruise S, Young IS, McGuinness B, McKay GJ (2021). Association of renal impairment with cognitive dysfunction in the Northern Ireland Cohort for the Longitudinal Study of Ageing (NICOLA). Nephrol Dial Transplant 36(8):1492-1499.
* Paterson EN, Neville CE, Wallace SM, Woodside JV, Kee F, Young IS, Cruise S, McGuinness B, Maxwell AP, McKay GJ (2021). Dietary patterns associated with renal impairment in the Northern Ireland Cohort for the Longitudinal Study of Ageing (NICOLA). Eur J Nutr 60(7):4045-4054.
* Paterson EN, Cardwell C, MacGillivray TJ, Trucco E, Doney AS, Foster P, Maxwell AP, McKay GJ; UK Biobank Eye and Vision Consortium (2021). Investigation of associations between retinal microvascular parameters and albuminuria in UK Biobank: a cross-sectional case-control study. BMC Nephrol 22(1):72.

There are also other renal studies and projects being conducted by Queen’s University researchers in the School of Nursing that have been funded by NIKRF, including the **COVID-19 renal study** and **Renal cachexia research.**

**COVID-19 renal study**

This multi-methods study was funded by NIKRF and led by Queen’s University Belfast School of Nursing (Prof Joanne Reid / Dr Helen Noble) along with international collaborators. The work has now been completed, published in BMC Nephrology – ‘Experiences of renal healthcare practitioners during the COVID-19 pandemic: a multi-methods approach’ and accepted for oral presentation at the RCN International Nursing Research Conference (September, 2022).

**Renal cachexia research**

This programme of work is led by Queen’s University Belfast School of Nursing (**Prof Joanne Reid**) and funded via the Public Health Agency NI and NIKRF. The team have completed their initial study focusing on developing a clinical phenotype for renal cachexia, published in Nephrology, Dialysis and Transplantation (‘Using a generic definition of cachexia in patients with kidney disease receiving haemodialysis: a longitudinal (pilot) study’). The team are continuing to publish high-impact papers, for example their publication ‘Estimating the prevalence of muscle wasting, weakness, and sarcopenia in hemodialysis patients’ has been recognised as one of the most highly cited since 2018 in the Journal of Renal Nutrition. Impact is being achieved, as evidenced through invited publications (‘Disease-related malnutrition in chronic kidney disease’) and importantly this research has been cited in guidelines such as the ESPEN Guideline on clinical nutrition in hospitalized patients with acute or chronic kidney disease. The team have also completed an international mixed methods study focusing on establishing ‘Awareness, understanding and treatment practices when managing cachexia in end-stage kidney disease’, again published with both local and international collaborators. Work to date has been very well received and the team are continuing to present their findings, for example, Prof Reid has been invited to deliver an oral presentation on the renal cachexia work at the upcoming 15th International Conference of the Society on Cachexia, Sarcopenia & Muscle Wasting which will take place on the 24-26 June 2022 in Lisbon, Portugal. The research team involved in this work also includes Mr William Johnston, Dr Carolyn Blair, Dr Helen Noble, Dr Joanne Shields, Dr Robert Mullan, Dr Clare McKeaveney, and Professor Peter Maxwell.

Renal Research Group

At the beginning of 2022, a new Renal Research Group was formed by all those undertaking and interested in renal research in Northern Ireland. ‘Renal Research in Progress’ Meetings are chaired by **Mr Stephen O’Neill** and take place on the last Thursday of every month in the Seminar Room on Level 11 and virtually on MS Teams. Each month an ongoing research project or proposal is presented. A diverse range of presenters this year has included Dr Michael Toal (renal trainee), Professor Amy Jayne McKnight, Dr Helen Noble, Renal Arts Group coordinator Anna Wilson and Mr Christopher Brown (surgical trainee). Later in the year Professor Joanne Reid, Dr Clare McKeaveney, Dr Ruth Fergie (renal trainee), Dr Hannah Gillespie (renal trainee) and PhD candidate Mari McPeake will be presenting. In a new development, people seeking funding from NIKRF are using the Renal Research in Progress forum to present proposals to the medical advisors of NIKRF. A new NIKRF application form has been developed to support the process going forward.

**Renal Arts Group**

**Dr Helen Noble** and **Anna Wilson** from the Renal Arts Group (RAG) presented the ongoing work of the group along with a pitch for a potential research project to the Renal Research in Progress meeting on the 28th of April 2022. The project aims to undertake an international mapping exercise to identify the current provision of arts programmes for renal patients, co-produced with a consortium made up of RAG members with project partners in the Philippines, US, Ireland and the World Health Organization. The project will include an overview of the literature, a mapping survey which will be shared with renal, arts and health networks across the world and qualitative interviews with 10 centres who are facilitating arts activities. The project will include arts workshops for RAG members, delivered by project partners, and the research team will identify policy recommendations for future development of arts and health programmes for renal patients. The RAG is delighted that NIKRF have supported the proposal, and they hope to recruit a part time Post-Doctoral Research Fellow to undertake the work as soon as possible.

Ongoing research studies

**Exploration of cAregiver experienCes Of conseRvatively maNaged end-stage kidney disease to inform development of a psychosocial intervention: The ACORN Study**

The ACORN study, which began in 2021, seeks to explore the experiences of informal carers for people with conservatively managed end stage kidney disease. End stage kidney disease that is conservatively managed often relies on informal caregivers such as family and friends to provide support. Caregivers can experience many challenges associated with their caring role which can affect their own health and wellbeing. The ACORN study aims to better understand the experiences of informal caregivers in order to inform the development of a psychosocial intervention to help support people in this caregiving role.

The study is funded by Marie Curie and led by **Dr Helen Noble** from the School of Nursing and Midwifery at Queen’s University Belfast. The research team comprises expertise in areas including nephrology, psychology, palliative care, and intervention development. The study consists of 3 phases and is set for completion in 2024. Over the last year, the ACORN Study has seen the development of the following publications:

* Carswell C, Yaqoob M, Gilbert P, Kuan Y, Laurente G, McGuigan K, McKeaveney C, McVeigh C, Reid J, Rej S, Walsh I, Noble H. Exploration of Caregiver Experiences of Conservatively Managed End-Stage Kidney Disease to Inform Development of a Psychosocial Intervention: The ACORN Study Protocol. Healthcare (Basel). 2021 Dec 14;9(12):1731. doi: 10.3390/healthcare9121731.
* McGuigan K, Carswell C, Laurente G, Kuan Y, Yaqoob M, Rej S, Gilbert P, McKeaveney C, McVeigh C, Tierney C, Reid J, Walsh I, Noble H. Effectiveness of interventions for informal caregivers of people with end-stage chronic illness: a systematic review BMJ Supportive & Palliative Care 2022;12:A7. doi: 10.1136/spcare-2021-MCRC.16

**The COmpaSsionate mindful resilience (CMR) prograMme to Improve psyChosocial wellbeing in people with kidney disease: the COSMIC study**

The COSMIC study is a collaborative research study between Queen’s University, Kidney Care UK and Mindfulness UK, which aims to support a new service development project by implementing the four-session Compassionate Mindful Resilience (CMR) programme, developed by MindfulnessUK, and explore its effectiveness for patients with stage 4 or 5 chronic kidney disease or have received a kidney transplant. Outcomes from this study will include an evidence-based mindfulness and compassion programme for use with people with kidney disease, which is likely to have applicability across other chronic diseases. The study has reached the recruitment target of 75 participants, with the first CMR session due to start on Wednesday 29th June. The study protocol has been submitted to the Healthcare journal for peer review and Research Assistant Anna Wilson will present the study at the EDTNA/ERCA conference in September 2022.

**Validation of Arterio Venous Access Stage Classification (VAVASC) Study**

Worldwide over 2 million people living with renal failure receive haemodialysis. Prior to creating vascular access for haemodialysis, guidelines recommend ultrasound mapping of blood vessels. However, mapping descriptions are not uniform, and complicated heterogeneous reports are generated. This leads to inefficiency of communication and potential for adverse events. In 2020, the renal access team in the Belfast City Hospital published a study describing and confirming the inter-rater reliability of the AVAS (Arterio Venous Access Stage) classification, which is a simplified way of sharing information about suitability for vascular access creation (https://doi.org/10.1093/ckj/sfaa189).

In 2021, the team in Belfast and colleagues in Prague designed the VAVASC (Validation of Arterio Venous Access Stage Classification) study, which is an observational, prospective, international, multicentre study that aims to validate the AVAS classification. The VAVASC study protocol is published (https://doi.org/10.1177/11297298211042677) and registered (https://clinicaltrials.gov/ct2/show/NCT04796558). The work is supported by a PhD student from Charles University in Prague that is co-supervised by **Mr Stephen O’Neill** and is partly funded by The Belfast Health and Social Care Trust Charitable Funds PA Programme.

**Northern Ireland Clinical Research Network**

Renal Departments across Northern Ireland played a key role in recruiting patients to a highly successful multi centre international trial called The Study of Heart and Kidney Protection with Empagliflozin(EMPA-Kidney Study).Plans are in place to take part in future trials including the ACHIEVE study, which will assess for cardiac protection in dialysis patients receiving a widely available drug called spironolactone. **Dr Neal Morgan** and **Dr Chris Hill** are the co-leads of the Network.

**Electronic Treatment Advice Note**

**Wendy Hutchinson**, a Clinical pharmacist in Antrim, has undertaken a study to evaluate the introduction of sending an electronic Treatment Advice Note (eTan) from the renal transplant outpatient clinic to GPs. An eTAN is sent electronically to the GP practice by the renal pharmacist to communicate medication changes made by the medical team. The primary outcomes of the study are to determine if there is a significant difference in the timeliness and quality of information sent to GP in comparison to the previous method, which entailed emailing a paper form and telephoning the GP practice. To evaluate timeliness, a total of 130 communication timings were recorded, 65 in both the control and intervention group. The study found there was a significant reduction in time for communication to GPs using eTan. Wendy is still awaiting results regarding the quality, which is being assessed using an electronic survey sent to the GP practices.

**Enhanced Recovery After Surgery**

The Belfast Protocol for enhanced recovery after surgery following kidney transplant was introduced by **Mr Tim Brown** in 2013. The transplant team in Belfast City Hospital published a study (https://doi.org/10.1016/j.transproceed.2021.07.046) assessing the impact of the Belfast Protocol for enhanced recovery after surgery on hospital length of stay after kidney transplant. Despite an increase in both donor and recipient complexity over time a significant reduction in length of stay has been observed because of protocol. The hope is that the Belfast Protocol will now be adopted by other transplant centres.

Future projects

The next generation of renal and surgical trainees are embarking on research projects as part of their broader training. These future research stars include Dr Ruth Fergie, Dr Michael Corr, Dr Michael Toal and Mr Christopher Brown.

* **Dr Ruth Fergie** is a renal trainee who is interested in how frailty can affect the chances of being offered a kidney transplant and whether having a transplant will decrease frailty. Ruth has secured funding from the HSC Research and Doctoral Fellowship to undertake a PhD.
* **Dr Michael Corr** is a renal trainee who previously secured a QUB/NIMDTA Academic Clinical Fellowship and has gone onto gain a highly prestigious Irish Clinical Academic Training (ICAT) fellowship. Michael is interested in kidney transplantation and whether studying combinations of proteins (proteomics) in blood can predict future success of a transplanted kidney.
* **Dr Michael Toal** is a renal trainee who is interested in the variations in the types of glomerulonephritis over many years in Northern Ireland. Michael is hoping to study the epidemiology and health economic costs of glomerulonephritis in more detail for a PhD degree supervised by Dr Chris Hill and QUB academics. Michael is in the process of applying for NIKRF funding to support his period of research.
* **Mr Christopher Brown** is a surgical trainee who has a particular interest in whether the use of more marginal living donors (e.g., elderly donors or donors with co-morbidity) has been critical to the success of Dr Aisling Courtney’s living donor kidney transplant programme in Northern Ireland. Christopher is developing a PhD project under the supervision of Mr Stephen O’Neill and Professor Ciaran O’Neill. The research aims will explore whether the lessons we can take from analysis of Northern Ireland programme could translate into effective policy changes that will have broader impact on live donor transplant rates beyond Northern Ireland.

Conclusion

In 2021 and 2022 (to date), more than 30 kidney research papers have been published or accepted for publication in peer-reviewed scientific journals by staff supported by NIKRF. A small number are highlighted within this report. The other papers can be found by searching PubMed (http://www.ncbi.nlm.nih.gov/pubmed) using names of the research staff that NIKRF support.

NIKRF funding has been the foundation for excellent research in Northern Ireland for 50 years. The research funded by NIKRF leads directly to long-term improvements in clinical care. NIKRF funding has also generously supported the training and career development of people who become the next generation of healthcare staff, scientists, and educators. This investment in the future is both essential and invaluable. The Medical Advisors, research staff and clinical teams that you have funded are extremely grateful for all your support. We thank everyone associated with the NIKRF, for your time, energy, good humour, and enthusiasm supporting staff who provide renal services and continue the work of kidney research in Northern Ireland.



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