



My research impact journey

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A3 Allied Health Professions



- **Output strength** in all areas of the submission
- 2 outputs unclassified one did not meet definition of research, one was ineligible
- Exemplary approach to **impact**
- Outstanding impact case studies: kidney failure, osteoarthritis and patients with back pain (leaving Medicines Management and menstrual cycle)
- Strongest aspects of environment research strategy, extensive international collaborations, staff and research student development
- Sub panel noted Athena SWAN Silver award and HR Excellence in Research Award



Institution: Keele University

Unit of Assessment: UoA3

Title of case study: Improving clinical outcomes of patients with kidney failure treated by peritoneal dialysis

1. Summary of the impact

Peritoneal dialysis (PD) is used to treat kidney failure in 250,000 individuals worldwide, a figure growing at 20% per annum in developing economies. Critical to this therapy is the removal of adequate salt, water and uraemic toxins by the peritoneal membrane. Our research has shown how variability in peritoneal membrane function impacts on clinical outcomes, how the treatment itself affects this function over time and how the design of dialysis solutions can improve membrane performance. This knowledge has informed changes in dialysis prescription practice and fluid design contributing to the sustained improvement in patient outcomes observed over the last 20 years.

Dialysis

- > 2.3 million people worldwide
- > 380,000 using peritoneal dialysis





How does peritoneal dialysis work?



What does dialysis do?



What did we discover?

- That patients with functionally bigger membranes had worse outcomes
- That over time there are functional changes in the membrane which make them less efficient in removing salt and water

Importantly, this changed the then prevalent paradigm – that the main 'limiting' factor for dialysis treatment was adequate removal or uraemic solutes, not salt and water balance What have we done since then? Can we really claim that this has improved survival on dialysis?

- Understanding the determinants of variability in membrane function and the nature of damage over time
 - Bigger (worse) membranes are linked to local inflammation separate from the systemic inflammation that is common in kidney failure
 - There is another type of membrane damage that happens over time this is a fall in the efficiency of fluid removal, and it is linked to progressive fibrosis
 - This type of injury increases the risk of a rare (but serious) complication in long-term PD – encapsulating peritoneal sclerosis
 - Recently, we have shown that genetic determinants of the efficiency of fluid removal (the aquaporin pathway) are associated with survival on PD

What else?

- Our original observations (big membranes worse outcomes) dictates that certain treatment strategies should work better...
 - More use of automated peritoneal dialysis
 - Use of glucose polymers (2003 trial we led confirmed this)
 - Maintain residual urine output (2015 trial we led supported this approach)

How can we illustrate the impact of these extensions in our understanding of the membrane?

Impact of different types happens over different time scales

- Shortest: Communication of research findings to patients and colleagues
- Short-Medium: Influence of guidelines
- Medium-Long: Demonstration of change in practice
- Longest: Demonstration of change to patient survival, technique survival

vol 2 Figure 5.1 Adjusted all-cause mortality by treatment modality (a) overall, dialysis, and transplant, and (b) hemodialysis and peritoneal dialysis, for period-prevalent patients, 2001-2016



Data Source: Reference Tables H.2_adj, H.4_adj, H.8_adj, H.9_adj, and H.10_adj; and special analyses, USRDS ESRD Database. Adjusted for age, sex, race, ethnicity, primary diagnosis and vintage. Reference population: period prevalent ESRD patients, 2011. Abbreviations: ESRD, end-stage renal disease; HD, hemodialysis; PD, peritoneal dialysis.

2018 Annual Data Report Volume 2 ESRD, Chapter 5 Nephrol Dial Transplant (2016) 31: 120–128 doi: 10.1093/ndt/gfv295 Advance Access publication 26 August 2015



Original Articles

Trends in dialysis modality choice and related patient survival in the ERA-EDTA Registry over a 20-year period



FIGURE 1: Five-year patient survival for patients starting dialysis on HD and PD in 1993–97, 1998–2002 and 2003–07, adjusted for age, sex, PRD and country.

Changing practice, Technique failure

• 2012: While president of ISPD – set up the Peritoneal Dialysis Outcomes and Practice Patterns Study...



Peritoneal Dialysis Outcomes and Practice Patterns Study

PDOPPS Country Participation



Australia, Canada, Japan, New Zealand, South Korea, Thailand, United Kingdom, and United States

PD

PPS

Phase 1 Recruitment

	Clinic/Unit Participation		Patient Enrollment Status	
Country	Target (N)	Started (N)	Census (N)	Consented (N)
United States	100	99	8787	3981
Canada	20	20	3286	925
Japan	32	32	1664	923
Australia	19	19	2097	520
United Kingdom	20	19	2266	387
New Zealand	2	2	341	73
Thailand	22	22	4644	820
Total:	215	213	23,085	7629



Permanent transfer to HD rates, by facility



PD P P P P P S

Planned analyses:

- To establish whether use of strategies to mitigate the bad effects of big membranes (APD, Glucose polymer) lead to better outcomes..
- This combined with meta-analyses of the trials showing that glucose polymers have clinical benefits – would provide strong evidence linking our research to better outcomes.
- We are also working with industry to get evidence of the increased use of APD and glucose polymer over the last 19 years.

Short-Medium: Influence of guidelines

- International Society of Peritoneal Dialysis: guidance on how long a patient should remian on peritoneal dialysis without risking membrane injury and encapsulating peritoneal sclerosis. In this guideline 8/104 of the references are from our research – more than any other single group. Brown EA, Bargman J, van Biesen W, Chang MY, Finkelstein FO, Hurst H, Johnson DW, Kawanishi H, Lambie M, de Moraes TP, Morelle J, Woodrow G. Length of Time on Peritoneal Dialysis and Encapsulating Peritoneal Sclerosis - Position Paper for ISPD: 2017 Update. Perit Dial Int. 2017 Jul-Aug;37(4):362-374
- International Society of Peritoneal Dialysis: guidance on evaluation of membrane function. (In preparation)
 - New categorisation of membrane function
 - Advice on membrane testing that includes moth membrane size and effciency

Shortest: Communication of research findings to patients and colleagues

- Fear of developing Encapsulating Peritoneal Sclerosis has led to patients being taken on PD
- Our research has shown that this fear is unreasonable in the majority of cases because most patients are older (the young usually get transplanted) – they are much more likely to die of other causes
- We are now creating patient and clinician facing materials that puts these risks into context.

What have I learned about impact?

- Research that answers the right questions should be impactful
- Pathways to impact are multiple, they run over different timescales and work through different partnerships (e.g. with patients, industry, research collaborations)
- Its never too early to start planning – this now forms part of my thinking

