

Transition between home dialysis modalities – another piece in the jigsaw of the integrated care pathway.

Mark Lambie and Simon J Davies

Health Services Research Unit, Institute for Science and Technology in Medicine, Keele University and University Hospital of North Midlands, United Kingdom UK

*Address for Correspondence:*

Simon Davies, BSc, MD, FRCP  
Professor of Nephrology and Dialysis Medicine  
Director Health Service Research Unit  
Institute for Science and Technology in Medicine, Keele University  
Consultant Nephrologist, Dept of Nephrology,  
University Hospital of North Midlands  
Newcastle Rd, Stoke-on-Trent, ST4 6QG  
Work: +44 (0) 1782 676346  
[simondavies1@compuserve.com](mailto:simondavies1@compuserve.com)  
[simonj.davies@uhns.nhs.uk](mailto:simonj.davies@uhns.nhs.uk)

## Abstract

The integrated use of dialysis modalities alongside transplantation over a life time of renal replacement is often necessary and well established. In general, outcomes are more favourable when using home-based treatments but what is less certain is the value of using these modalities sequentially. To explore this, using data from the Australian and New Zealand Dialysis and Transplantation Registry, patients using peritoneal dialysis (PD) followed by home haemodialysis (HHD) were compared using propensity matching to those treated by PD and HHD only. For combined patient and technique survival, or patient survival only, outcomes for those using integrated home therapies (PD followed by HHD) had similar outcomes to HHD alone, whereas those using PD only fared less well. The proportion of patients on PD transitioning to HHD was very small, as was the absolute number of patients using PD to HHD integrated pathway, so caution is needed in generalising these results to a wider patient population, but the concept of integrating home therapies in this way is supported by the findings. The study also points to a need for a better understanding of what happens at the transition between modalities so as to improve patient outcomes and experiences of dialysis care.

The concept of integrating different renal replacement modalities is not new. For many patients dialysis is the bridge to or between kidney transplantation where it provides a welcome safety net and an integrated care model that incorporates peritoneal dialysis, (PD) and haemodialysis (HD) with transplantation is well established.(1,2) In truth, younger patients with a lifetime of renal replacement in front of them will almost always require several modality switches over the years and there is some evidence that the use of more than one dialysis modality can confer benefits. PD has theoretical advantages as a preferred initial dialysis modality, such as the relative preservation of residual kidney function (3,4) or sites for vascular access(5) and cost-effectiveness,(6) supported by empirical evidence of a relative survival advantage compared to centre based haemodialysis during the first year or more of treatment and better overall survival in patients using more than one modality.(7–11) Nested within this generalisable integrated care approach is what has been termed the 'Integrated Home Dialysis Model', for example PD followed by home haemodialysis (HHD). However it is not known whether the early advantage of PD is still evident under these circumstances or whether it is even detrimental. Matched studies from the UK Renal Registry comparing the outcomes of patients starting with PD versus HHD have suggested that the latter is

associated with better outcomes.(12,13) It is as an attempt to answer this question that Nadeau-Fredette and colleagues have analysed data from the Australia and New Zealand Dialysis and Transplant (ANZDATA) registry, published in this edition of *Nephrology Dialysis Transplantation*.(14) They have also recently published an analysis of PD versus HHD as incident treatments from the same database.(15)

Their approach is to compare the outcomes of three patient groups, those who had PD-only, HHD-only, and those who transitioned from PD to HD, taking combined patient and home-dialysis technique survival as their primary endpoint (although patient survival alone was also analysed). This type of analysis throws up two major methodological problems – first, how to match these patient groups sufficiently well as to reduce case-mix bias and second, how to account for the fact that patients undergoing sequential therapies need to survive for a period on the first treatment before they can transition, so-called immortal time bias. Their approach to the first is to use propensity matching of baseline patient characteristics, so as to select from the larger group of incident PD patients those who are most like those starting on HHD or transitioning from PD to HHD. The second problem is dealt with by ensuring that patients from the single modality groups (in each case twice as many as in the PD to HD group) had to survive on their treatment at least as long as those patients who made the switch were on PD. The main finding was that integrated use of PD and HHD is associated with similar outcomes as HHD, suggesting that prior PD does not have a negative influence on subsequent HHD outcomes. Compared to those PD patients not switching to HHD (i.e. either remaining on PD or switching to centre HD) technique and patient survival was significantly better for those undergoing integrated home therapies, but for reasons that will be discussed further it cannot be concluded that routine application of the ‘home integrated pathway’, even if this were practicably possible, would necessarily lead to better outcomes overall.

The ANZDATA group and co-authors are to be congratulated on undertaking this analysis, which very few, if any other national registries could have done, as it requires a relatively, large number of HHD patients, especially those who switched from PD, to be meaningful. Even so, it is important to recognise that the absolute number of patients included in the analysis is still small, representing between 0.7% and 1.4% of all patients treated with home dialysis during this period, 2000-2013, (there were only 93 patients treated by PD then HHD in the 13 years of study, 90% of which are included), already a selected group of the whole population undergoing renal replacement. Although their propensity matching was effective, as shown by the McFadden fit, score distribution and equivalency cross a wide range of baseline covariates, (which includes amongst other items comorbidity, smoking, BMI, late referral and indigenous race), the explanation as to why so few PD

patients transition to HHD remains unanswered. The implication, however, is that HHD remains a highly selective treatment, being used as a primary modality in just 6% of new home dialysis patients and less than 1% of those who started on PD. This degree of selection, reflected in the excellent overall survival rates of these patients also seen in other registry analyses including ANZDATA,(12,15) likely results in a degree of confounding that even the most sophisticated baseline matching techniques will be unable to account for. However it is not just baseline confounding that is at question here; for those transitioning from PD to either HHD or centre-based HD there is a second selection hurdle. Ideally the authors would have undertaken second round of propensity matching at this time point that would have included information of much greater depth and richness with the objective of understanding why it was that such a small proportion of PD patients are felt or feel able to switch to HHD. This could be due to patient level factors such as progressive ill health, burn-out, lack of social support or dialysis centre level factors known to influence the uptake of home therapies, not least physician enthusiasm and expertise.(16) This is not a criticism of the present study as it is clear that this level of granularity is well beyond the scope of a registry analysis such as this, but it does point to the need for high quality research that focuses on the whole issue of modality transition, especially in view of the relatively poor outcomes observed in the PD-only group both for technique and patient survival. Indeed it provides further rationale, if it were needed, for the International Peritoneal Dialysis Outcomes and Practice Patterns Study, PDOPPS, which is now underway in the US, Canada, UK, Australia and Japan.(17) PDOPPS has taken technique failure as its primary endpoint, redefining the way its causes are captured, which can often be multiple, with the intention of establishing those practice patterns that prevent or delay technique failure without adversely affecting overall patient survival.(18)

So what have we learned from this study? Proponents of home dialysis can advise their patients that there is further evidence for good outcomes when integrating home modalities – albeit in a small proportion of the dialysis population – and starting with PD and graduating to HHD appears to be a strategy that is supported by the evidence. For those who are not proponents, then this is still information that should be made available when discussing dialysis treatment options, for example when using a shared decision aid.(19) It also strongly suggests that we need as clinicians to make a better job of planning and managing modality transitions through regular discussions with our patients and on the basis of better quality evidence. For example, what defines a good or a bad transition? It is not just the optimisation patient or technique survival, although clearly these are key, but also the associated patient experience, morbidity and how best to convey the pros and cons of these treatment opportunities that we need to understand better so as to improve their lives on dialysis.

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