What are the factors underlying the variation in the use of peritoneal dialysis?

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A striking feature of the provision of renal replacement therapy (RRT) for end-stage renal failure is the wide variation in the proportion of patients receiving peritoneal dialysis (PD) compared with haemodialysis (HD). It is likely that in many situations, this represents underutilization of PD. This means that some patients are missing the option of receiving PD with its associated benefits as part of an integrated approach to RRT. There are also important economic implications of underuse of PD. The management of end-stage renal failure poses a significant challenge to healthcare budgets, with PD in most settings having a significantly lower cost therapy than in-centre HD.

There is much debate about what ratio of patients receiving PD versus HD in dialysis programmes would represent the optimal use of these therapies. Factors informing this judgement are the relative effectiveness of the treatments, the proportions of patients in whom each therapy is feasible and patient preference on the basis of non-medical factors. There are no major randomized controlled trials comparing PD and HD to guide us. Thus, we need to base recommendations for treatment on evidence from large observational studies. The analysis and potential statistical pitfalls in such studies are complex and outside the remit of this review [1]. A common finding of such studies is either equality or the suggestion of an advantage for PD over HD in the early years after starting dialysis [1]. Possible explanations for this include better preservation of residual renal function on PD, with the advantage being lost once remaining kidney function has dwindled. A study by Mehrotra et al. [2] published in 2011, representing the largest such study, analysing data from the US Renal Data System, has shown a progressively improving survival for patients starting PD, from the cohort commencing therapy in 1996–98 to those starting in 2002–04 and that HD and PD now offer comparable outcomes. There is thus no evidence of a survival difference to justify not promoting PD equally with HD.

In the majority of patients, both PD and HD are feasible therapies, with relatively few patients having absolute contraindications to PD. Studies have reported between 17 and 28% of patients starting RRT having contraindications to PD [3–6]. In these patients, the decision about the presence of a contraindication was often the judgement of the patient’s own physician, and in many cases was relative rather than absolute, or was social (and so potentially surmountable with appropriate assistance in some cases). Thus, in the vast majority of patients, PD is a viable option for RRT.

In the absence of evidence to recommend either therapy on the basis of survival benefit, and given the profound and individual impact of dialysis on a patient’s life, it is suggested that in most cases, modality selection should be the result of a fully informed autonomous free choice by the patient from the available options. Evidence suggests that in patients who are suitable for both PD and HD, who are given adequate time and information to make an informed decision, the proportion opting for PD will approach 50% [3–5, 7]. It is thus important to understand why figures in practice are typically much lower than this, and also why there is such variation.

A wide range of potential factors may affect the uptake of PD compared with HD. At an international level, there are marked differences in PD use between countries. Economic factors including differing methods of healthcare funding or reimbursement are an important reason for this [8–10]. Other factors include the economic development of the country, which can affect the relative costs of the modalities. The greater expense of HD than PD in developed countries relates to the greater cost of staffing and facilities of HD units, while in less economically developed countries with low wages, the greater cost of dialysis consumables in PD than HD is the dominant factor [10].

However, even within individual countries, there may be marked variation in PD use between different areas, as demonstrated by comparison between French districts [11], and at the level of individual renal units, as observed in the UK [12]. Some of this variation may reflect factors at the unit level. A larger, more prominent and successful unit PD programme may promote higher PD uptake. Important effects
on the variable uptake of PD uptake relative to HD may also arise from the differing beliefs, knowledge and practices of individual nephrologists. A survey of Canadian nephrologists in 1999 showed that in their opinion the then current national 66/34% HD/PD ratio was appropriate [13]. A survey of US physicians produced a mean proposed ideal PD prevalence of 29%, a figure far greater than that actually achieved in practice in the USA [14]. A survey of UK physicians suggested an ideal split of 62% HD (including satellite and home HD) and 38% PD, with patient choice being proposed as the most important factor that should determine modality [15]. Bouvier et al. showed a link between PD penetration and physician opinions in France. Opinions on the ‘optimal’ rates for incident or the prevalent use of PD were lower in physicians from regions with lesser use of PD than those with a greater proportion of dialysis patients receiving PD [16]. Barriers to PD use quoted by the physicians surveyed included limited availability of nurses, reimbursement and lack of training in PD.

An important contribution to the evidence supporting the impact of individual physicians on the uptake of PD is provided by the study of Hingwala et al. [17] in this issue of *Nephrolology Dialysis Transplantation*. They retrospectively investigated the effect of individual nephrologists on the proportion of their patients attempting PD therapy in the Manitoba Renal Program. In their analysis, they isolated the effect of individual physicians from other factors such as patient characteristics that may affect dialysis modality selection. They found significant differences between individual nephrologists as to the likelihood of whether or not a patient under their care in their chronic kidney disease clinic would attempt PD. As these nephrologists all practised in the same programme with a homogenous funding system, this suggests that factors directly attributable to clinical practice of individual physicians explain the variation seen. These findings are particularly striking as the patients received education about RRT options delivered by multidisciplinary teams working across more than one clinic, which would tend to reduce the impact of variation between individual physicians. These findings prompt the question of why there should be differences in the uptake of PD between patients under the care of different nephrologists. There are a range of potential factors, from, at one extreme, overt difference in physician belief about the effectiveness of PD compared with HD, to more subtle differences in clinical practice and interactions with patients.

As a home-based therapy, PD patients routinely spend relatively little time in healthcare settings compared with HD patients treated in central units. PD has been an extremely successful example of a therapy delivered by a multidisciplinary team, with much of the routine care and follow-up patients delivered by nurses. Thus, doctors in training and also senior nephrologists not involved in routine management of a PD programme may lack confidence and experience in managing PD patients. Dealing with common PD problems may be difficult and frustrating for those without adequate practical experience and exposure to PD. Studies have shown variation and deficiency in PD training and experience in junior nephrologists [18]. A survey of US nephrologists suggested that many felt inadequately prepared to manage PD patients after their training [19]. Interestingly, in contrast to the low use of PD in the USA, the majority of those surveyed said that they would actually select PD if they required dialysis themselves [19]. Even in countries with greater PD uptake, exposure during training may be modest for many nephrologists.

An important area of misconception is that of the suitability of individual patients for PD. There are a number of ‘relative’ contraindications to PD, but these may be overstated and lead to PD being denied by clinicians with less experience of PD being hesitant to recommend the therapy. An example is previous abdominal surgery. A history of most major surgical procedures such as elective biliary, aortic surgery and elective bowel resection without stoma formation does not preclude future therapy with PD, which can be successfully instituted in the vast majority these patients [20]. Belief that PD is unable to provide adequate small solute clearances in larger patients is another factor that is often exaggerated, potentially leading to unnecessary exclusion of some heavier patients from PD. This may partly be a persisting effect from the period following the initial publication of the CANUSA study [21], when some guidelines advocated high and challenging clearance targets. Further evidence from randomized studies [22, 23], plus a reanalysis of CANUSA demonstrating the relative importance of residual renal function [24], have led to the acceptance that there is no benefit from such high clearance targets. This, combined with a more holistic approach to the idea of PD adequacy, plus the ability to obtain relative high clearances with some cycler regimes, means that far fewer patients should be denied PD on the basis of body size alone. Thus, there may be differences between physicians in the exclusion of patients from the option of PD on the basis of perceived contraindications.

A common reason for exclusion from PD is inability to perform self-care treatment. The ability of an older/frail patient to perform PD should be carefully assessed, to avoid the sometimes misleading initial impressions in a clinic consultation denying the patient the option of PD. Age should not be a contraindication to PD [25] and even in patients unable to perform independent self-care PD, assistance by family members, carers or nurses in the community often means that PD is still a viable option [26].

The lack of exposure to PD of physicians in training and senior physicians not involved with the routine management of PD patients may result in a disproportionate amount of their contact with PD patients being with those experiencing problems, such as after hospital admission for treatment of peritonitis. This can result in inappropriately negative perceptions of PD compared with HD. Encapsulating peritoneal sclerosis, an uncommon but serious complication of PD, appears to have a significant and disproportionate impact on how some physicians view PD.

An important feature of PD is that of technique failure. Over time, a proportion of patients receiving PD will need to discontinue therapy, usually transferring to HD. This is an important negative aspect of PD and is considered as one of the disadvantages of PD compared with HD. PD technique
failure and long-term viability were major concerns about PD in a survey of Medical Directors in New England Dialysis Centres [14]. However, there are potential advantages of receiving PD rather than HD as an initial mode of dialysis (such as better preservation of residual renal function and preserving options for vascular access if needed later for HD). In the concept of ‘integrated therapy’, a successful spell of PD followed by later transfer to HD represents the optimal complimentary use of RRT options rather than a failure, and may be associated with good patient survival [27]. However, when considering options for dialysis, the potential for switching from PD to HD at some stage may not be considered or presented in this fashion, but rather as a stark PD versus HD choice, leading to a negative bias in physicians and patients against PD as an initial RRT option.

Importantly, Hingwala et al. [17] found that there were no differences in outcomes of technique or patient survival between patients selecting PD as their dialysis modality while under the care of physicians with a higher or lower propensity for their patients to attempt PD. Studies suggest that outcomes may be better in larger PD programmes [28, 29] and in Hong Kong where PD is the predominant mode of dialysis, outcomes are very good [30]. This suggests that physician effects are a potentially modifiable factor that could lead to an increase in PD uptake, without adversely affecting patient outcomes.

How should we approach the underutilization of PD? Some clinicians express concern that attempts to promote PD may represent denial of free choice of dialysis modality to patients, particularly where the perception is that the major motivation to do so represents economic rather than clinical reasons. However, to truly offer patients a free choice, it is essential that they are able to select from all feasible options, and that they receive accurate and balanced information about their illness and possible therapies. At present, reduced freedom of choice may actually result from a tendency for HD to be the default therapy and patients not selecting or receiving PD due to bias in the nature of the modality selection process they undergo.

It is important that education of patients approaching end-stage renal failure takes place in a timely fashion, allowing patients adequate time to receive and consider the complex and detailed information relating to their disease and treatment options and to be fully involved in decision-making [31]. In the UK, the National Institute for Health and Clinical Excellence produced a clinical guideline on PD in 2011 which makes important recommendations on the process by which patients chose their dialysis modality [32]. The guideline emphasizes the need for information to be accurate and balanced and provided by professionals with the appropriate knowledge and expertise to support decision-making, which may include the use of decision aids. It also suggests that patients should be offered a choice of options, but that PD can be considered as first-choice modality in children under 2 years of age, those with residual renal function and adults without significant comorbidities [32]. A standardized approach to modality selection and patient education is also an important aspect of the Ontario PD Initiative established in an attempt to reverse the declining utilization of PD in Ontario [33]. Ensuring specified periods of PD experience in programmes for training nephrologists is essential, as PD is one area of nephrology where trainees may not acquire adequate and balanced experience from routine daily duties. Altering the beliefs and knowledge of PD in clinicians involved with managing a patient’s progression towards RRT is an important facet of attempts to increase the proportion of patients receiving home therapies, including PD for the management of end-stage renal disease.

CONFLICT OF INTEREST STATEMENT

None declared.


REFERENCES