

## Peritoneal Dialysis in the United States: Lessons for the Future



Joni H. Hansson and Fredric O. Finkelstein

The use of peritoneal dialysis (PD) varies worldwide, with this variability likely resulting from the different characteristics of health care systems.<sup>1,2</sup> In Hong Kong, where there is a PD-first policy, 71% of patients use PD,

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whereas in Mexico, 61% of patients use PD largely due to lack of availability of other forms of dialysis. In countries with robust education programs (Australia, New Zealand, and Canada), approximately 20% to 30% of patients use PD. In contrast, among maintenance dialysis patients in the United States, PD prevalence reached a low of 6.9% in 2009, although the prevalence increased to 10.1% in 2017.<sup>3</sup> Additionally, the proportion of incident dialysis patients initiating dialysis with PD over the same period has increased from 6.2% to 10.4%.<sup>3</sup> This is due in part to the bundled payment system introduced in 2011.<sup>4</sup> Critically, although the number of patients treated with PD is increasing in the United States, it remains lower than what many nephrologists perceive it should be.<sup>5</sup>

There are many potential reasons why PD use is relatively low in the United States (Box 1). Clinician bias is one factor, and more specifically, the misconception that survival with PD is inferior to survival with hemodialysis. A recent meta-analysis comparing PD and hemodialysis outcomes supported recent studies suggesting that PD and hemodialysis are associated with similar survival.<sup>6</sup> The most recent US Renal Data System (USRDS) data reveal that the adjusted mortality rates for both PD and hemodialysis have improved from 2001 to 2017,<sup>3</sup> but there has been a more marked decline in mortality with PD (42%) than with hemodialysis (27%) during this period. There has been a suggestion that PD may offer a mortality advantage in the first few years of dialysis, perhaps due to better preservation of residual kidney function.<sup>7,8</sup>

In this issue of *Kidney Medicine*, Sukul et al<sup>9</sup> use USRDS data to report trends in regard to mortality and transitions to transplantation and in-center hemodialysis among incident dialysis patients between January 1, 1996, and December 31, 2011. The more recent cohort (2008-2011) had improved technique survival with fewer transitions to in-center hemodialysis (16% decline) and lower mortality (48% decline) compared with earlier cohorts. They also described associations of select factors with outcomes. Older age, diabetes, and smaller PD programs were associated with higher risk for transitions to in-center hemodialysis and death.

The improvement in mortality and technique survival with PD leading to fewer patients transitioning to in-center

hemodialysis is likely due to several factors in the current management of PD patients. First, there has been greater emphasis on preserving residual kidney function, which is associated with improved survival.<sup>7,8</sup> Second, to avoid the challenging long-term complications of ultrafiltration failure and encapsulating peritoneal sclerosis, glucose-sparing strategies are routinely being used. These include the use of diuretics for volume management in patients with residual kidney function, incremental PD, and icodextrin. The International Society of Peritoneal Dialysis (ISPD) has developed a comprehensive set of guidelines for the care of the PD patient.<sup>10</sup> These guidelines, freely available on the ISPD website, likely have contributed to the improved outcomes in PD by setting international standards of care. These guidelines include the assessment and management of cardiovascular risk factors and complications, prevention and treatment of catheter-related infections and peritonitis, creating and maintaining an optimal PD access, and prescribing high-quality goal-directed PD.

Sukul et al point out that although overall mortality has decreased, mortality among PD patients increases as the duration of PD increases. The pattern among hemodialysis patients is different; the mortality rate for in-center hemodialysis patients is highest during the first year after initiation of hemodialysis, nadirs during the second year, and then increases with time thereafter.<sup>1</sup> Unfortunately, transitions of care in dialysis patients are not uncommon and we need to consider the continuum of care of each patient with end-stage kidney disease. For patients who present to medical care needing to start dialysis urgently, either because they had no predialysis care or had an unexpected decline in kidney function, we should consider PD first to avoid the use of central venous catheters. Complications due to the use of central venous catheters may be one of the contributing factors to the very high first-year mortality for those treated with hemodialysis.<sup>11</sup> Notably, there is now a large body of data demonstrating that urgent-start PD is safe and effective and is a viable alternative to urgent-start hemodialysis.<sup>12</sup> Importantly, urgent-start PD is associated with fewer dialysis-related complications within the first 30 days compared with urgent-start hemodialysis.<sup>12,13</sup> For patients who prefer hemodialysis, PD could be a bridge until they have a functional fistula. It would be interesting to see whether the 1-year mortality of hemodialysis patients would improve if this was standard of care. We should also consider PD as a bridge to transplantation, saving vascular access for later in life should the transplant fail.

**Box 1.** Factors Contributing to the Underutilization of PD

- Increased age and complexity of patients
- Availability of HD centers
- Limited patient education concerning CKD and modality options for kidney failure
- Limited access to predialysis nephrology care
- Concern for the long-term complications of PD
- Challenges of running a PD center with limited numbers of patients
- Late presentation with advanced CKD
- Timely PD catheter insertion by trained nephrologists, surgeons, or interventional radiologists
- Fellowship training in PD
- Clinician expertise
- Clinician bias

Abbreviations: CKD, chronic kidney disease; HD, hemodialysis; PD, peritoneal dialysis.

Sukul et al also found that PD in smaller programs was associated with worse outcomes. There was 36% higher risk for transition to in-center hemodialysis and 7% higher risk for mortality in PD programs with 6 or fewer patients compared with programs with 25 or more patients. Similar findings have been reported previously,<sup>14-16</sup> underscoring the importance of program size on patient outcomes. Small programs likely have less experience managing the complications and troubleshooting problems that may arise, with the resultant worse outcomes. Building the infrastructure of a PD center with robust experience and a continuous quality improvement program can be challenging with limited numbers of patients. In areas in which there are several small PD centers, one could consider consolidating the units to form a larger PD center with more resources and infrastructure.

A comprehensive chronic kidney disease (CKD) education program is also critical for patient care. Problems developing and supporting these programs may contribute to the low percentage of dialysis patients treated with PD in the United States and to the exceptionally high proportion of patients initiating hemodialysis with a central venous catheter.<sup>3</sup> There are several challenges in providing CKD education. First, many patients lack the knowledge that they even have CKD, and even if they are aware of CKD, they may not understand what CKD is and its associated complications. Even patients being followed up regularly by nephrologists have little knowledge of the various dialysis modalities. Education concerning dialysis modality options should focus on an unbiased discussion of the relative risks for morbidity and mortality of hemodialysis versus PD, quality-of-life issues, and expectations and goals of the individual patient, as clearly outlined in the recent ISPD guidelines on high-quality PD.<sup>17</sup> In centers in which this is available, a higher percentage of patients choose PD as their mode of dialysis.<sup>5</sup>

Sukul et al showed that older patients were at higher risk for transition to in-center hemodialysis and death while receiving PD. Understanding factors that contribute to both these outcomes will be important to intervene to improve patient care. For example, assisted PD may be helpful for individuals with cognitive/visual/dexterity impairments. Assisted PD has been successful in several countries in helping older dialysis patients stay at home and has contributed to the growth of PD.<sup>2,18</sup> With the aging population, dialysis patients may be increasingly likely to require care in long-term care facilities. Although there are challenges, PD can be successfully and safely performed at long-term care facilities and should be seriously considered as a modality option.<sup>19</sup> PD offers less disruption to the daily routine and dialysis can be performed without interfering with physical therapy and avoids the need for transportation to an outpatient hemodialysis unit 3 times a week.

Last, we need to consider the “life-plan” for individual patients with kidney failure and integrate shared decision making into CKD educational programs, incorporating discussions about the patient’s age and comorbid conditions, geography, social and family support, goals of care, and quality of life. Although transitions will be part the continuum of care for patients with kidney failure, anticipated changes can be planned for. The article by Sukul et al therefore is important for several reasons. It again demonstrates the improvement in mortality for patients receiving PD over the years, as well as better technique survival with fewer transitions to in-center hemodialysis. This makes PD a more viable option given prior concerns about worse outcomes with PD. The impact of facility size on mortality and transitions to in-center hemodialysis is important to emphasize. Given the improvement in mortality and technique survival and a decrease in in-center hemodialysis transitions, why is the use of PD in the United States below where the nephrology community thinks it should be? Understanding and addressing this will be essential for growing PD in the future and optimizing kidney care in the United States.

**ARTICLE INFORMATION**

**Authors’ Full Names and Academic Degrees:** Joni H. Hansson, MD, and Fredric O. Finkelstein, MD.

**Authors’ Affiliations:** Yale University School of Medicine, New Haven Home Dialysis, New Haven, CT.

**Address for Correspondence:** Joni H. Hansson, MD, New Haven Home Dialysis, 136 Sherman Ave, New Haven CT 06511. E-mail: [joni.hansson@ynhh.org](mailto:joni.hansson@ynhh.org)

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