Does Temporary Hemodialysis Before Peritoneal Dialysis Initiation Affect Patient Outcomes?

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Global trends in the treatment of patients with end-stage kidney disease, the factors that determine modality choice, and reported patient outcomes help shape practices and policies. The prevalence of dialysis correlates strongly with national income. Many studies have been carried out comparing patient outcomes across the different dialysis modalities, as well as when transitioning from one modality to another. Randomized controlled trials in this field are difficult to conduct because of the importance of incorporating patient modality choice, and the many ethical and practical dilemmas involved.

The vast majority (approximately 89%) of end stage kidney disease patients are on hemodialysis (HD) with over 90% of them residing in high income or upper-middle income countries. Among incident dialysis patients in the United States in 2017, approximately 80% initiated dialysis using a catheter and over 68% were still using a catheter 90 days after initiation. This happens despite the Centers for Medicare and Medicaid Services Center for Clinical Standards and Quality targeting long-term catheter rates of no >25% per dialysis-providing facility.

This trend in catheter utilization is not specific to the United States. Worldwide, approximately 33% to 63% of incident dialysis patients start dialysis in an unplanned fashion, often-times under urgent circumstances. This event is coined “crashing” into dialysis. Many of these patients are initiated on HD using a central venous catheter, with some then converting to alternative dialysis modalities such as peritoneal dialysis (PD) on stabilization of their medical condition. Whereas this is less likely to occur in patients who are regularly following up with their nephrologist, it does still happen in a large proportion of this cohort.

PD Landscape and Urgent Start
Overall, approximately 11% of dialysis patients worldwide are on PD, with over 50% of those patients residing in China, the United States, Mexico, and Thailand. PD offers patients the opportunity to undertake a home-based therapy, with comparable and sometimes better clinical outcomes, and requires minimal to no supervision. From a government policy perspective, PD is often more cost-effective than HD. Costs tend to vary based on multiple factors, including the price of consumables, whether solution production is local or imported, taxes on imported supplies, and financial incentives for providers. Some countries such as Hong Kong, Denmark, Latvia, Mexico, Thailand, the Philippines, and Malaysia have adopted a PD-first policy for their incident dialysis patients.

One way to increase PD utilization is by implementing urgent start PD protocols that would increase the uptake of the modality among incident dialysis patients as demonstrated in previous studies and experiences. This requires a multifaceted approach that includes the implementation of an objective method of patient selection and education, healthcare professional and organizational education, PD catheter placement, nursing support, hospital administrative support, protocol driven orders, and continuous monitoring and quality improvement metrics. Large scale expansion of PD using this multidisciplinary, integrated approach was proven to be possible in a large healthcare delivery system in the United States.

Effect of Temporary HD Before PD Initiation
To determine the effect of temporary HD before PD initiation, Parapiboon et al. conducted a
multicenter open label randomized controlled trial across 30 tertiary hospitals in Thailand. They identified adult patients who required dialysis initiation with no prior access placement between November 2018 and February 2020, with the implementation of both urgent start PD and HD protocol implementation. Patients who were started on HD had non-tunneled central venous catheters placed and a median of 5 HD sessions before conversion to PD.

Little is known about the effect of this transient period of HD on overall patient outcomes. What is known is that when compared with arteriovenous accesses, previous studies found that greater all-cause mortality, fatal infections, and cardiovascular events in patients with central venous catheters.\(^5\) There have been numerous studies comparing urgent start PD patients’ survival and risk of infection to their urgent start HD counterparts that demonstrated comparable survival and higher rates of bacteremia and dialysis complications in the HD cohort.\(^8\)–\(^11\)

Parapiboon et al.\(^5\) found that when compared with their temporary HD counterparts, urgent start PD patients had lower composite 1-week and 6-week complication rates; mainly driven by dialysis-related complications. Twenty-four patients in the temporary HD group developed intradialytic hypotension, which is defined as a decrease in systolic blood pressure by 20 mmHg or more, or a decrease in mean arterial pressure by 10 mmHg with associated symptoms, as defined by the 2002 Kidney Disease Outcomes Quality Initiative Clinical Practice Guidelines. Moreover, 2 patients in the temporary HD group developed clinically diagnosed disequilibrium syndrome. It is important to note that when dialysis-related complications were excluded from the analysis, the 2 groups had comparable composite complication rates. Finally, the groups had comparable patient and technique survival rates (Figure 1).

**Conclusions**

Whereas this study sheds some light on an important issue that has been discussed by nephrologists in the past, studying it has been difficult. The emphasis on a patient-centered approach and the ever-growing value of patient reported outcomes by clinicians, national and international societies, makes conducting truly randomized controlled trials very difficult. In Thailand, the PD-first policy allowed for the facilitation of this study with patients being randomly allocated in a 1:1 ratio to either group. Reproducing this study may have ethical and practical constraints in other settings, and thus verifying its outcomes in other settings and with a different patient population is challenging.

The study results are skewed by dialysis complication rates, which introduces concerns for methodological bias. Whereas the maximum net ultrafiltration rate for patients in the study was 0.8 liters per hour, the mean weight of patients included in the study was approximately 59.5 kg. This means that ultrafiltration rates could be $>13$ ml/hr/kg, which has been shown to be associated with an increased risk of intradialytic hypotension.\(^1\) It is also difficult to generalize the study findings given that the average body mass index of the patients was 23 kg/m\(^2\), and the relatively low HD blood and dialysate flow rates used, 150 to 250 ml/min and

| Dialysis-related complications | 25 (24%) | 4 (4%) | < 0.001 |
|--------------------------------|---------|-------|---------|
| Composite complications (excluding intradialytic hypotension) | 20 (19%) | 19 (18%) | 0.83 |
| Composite complications (including intradialytic hypotension) | 38 (37%) | 20 (19%) | 0.005 |
| Mortality | 5 (5%) | 4 (4%) | 0.72 |
| Technique survival | 96 (93%) | 95 (91%) | 0.62 |

**Figure 1.** Outcomes of urgent start PD with and without temporary HD. HD, hemodialysis; PD, peritoneal dialysis.
300 ml/min, respectively. Another issue to consider is the nature of the urgent start PD prescription with exchanges being performed over a period of 4 hours to 8 hours per day. This differs from most practices where the minimum number of hours on PD for urgent start is 8 hours, and thus can affect the dialysis-related complication rates reported in the study.

The placement of a central venous catheter and use of intermittent HD before PD initiation in patients whose ultimate modality of choice is PD should be reserved for life-threatening volume overload, electrolyte and/or metabolic abnormalities that cannot be acutely and urgently resolved with PD initiation. The number of HD sessions in these cases should be kept at a minimum before transitioning to HD. One way to minimize the need for temporary HD before PD initiation is for patients to have close follow-up with their nephrologists. This allows for adequate preparation for PD initiation when appropriate, thereby avoiding the need for a transition from HD to PD.

Reflecting on dialysis practices worldwide, and the nature of transitioning from one modality to another will always be skewed by the heterogeneity of clinical practice at both the local and national levels. Understanding the implications of such transitions can help clinicians, especially at the local level where practices tend to be more similar. Government policy, cost, and supply restrictions may affect the course of patient care and clinical decisions. Reconciling reported clinical outcomes with a patient-centered approach to therapy has been the focus of the medical community. This is only possible with adequate patient education as well as objective and impartial clinician input, thus allowing for informed shared decision-making.

**DISCLOSURE**

The author declared no competing interests.

**SUPPLEMENTARY MATERIAL**

Supplementary File (PDF)

Supplementary References.

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