Barriers, Shortfalls, and Dangers of Frequent Hemodialysis

By Nalinee Saiprasertkit and Christopher T. Chan

Intensive home hemodialysis (IHHD) has become an apparent alternate treatment option for ESRD patients with several clinical benefits. Several studies have shown that, compared with in-center hemodialysis (HD), IHHD provided survival advantage, improvements in BP regulation, re-regression of left ventricular hypertrophy, restoration of left ventricular ejection fraction, normalization of phosphate control, better quality of life related to kidney disease, decreased recovery time from dialysis treatments, and improved pregnancy outcomes. Quality of sleep and sleep apnea have also been improved, especially in the case of nocturnal home HD (1, 2). Moreover, with more frequent therapies, it also eliminates the weekly 2-day gap between dialysis sessions over the weekends that can adversely affect patient outcomes (3).

In the latest US Renal Data System annual report, more than 80% of chronic patients with ESRD were treated with in-center HD in the majority of reporting countries (4–9). The highest rates of home HD were reported in New Zealand and Australia, with 18% and 9% of dialysis patients, respectively (4–9). Rates of 3% to 6% were seen in Canada, Denmark, Finland, the United Kingdom, Sweden, and The Netherlands (4–9). Despite its noteworthy benefits, the utilization rate of home HD has been low (4). In the latest US Renal Data System annual report, the overall use of home HD in the majority of reporting countries remains low. The highest rates of home HD were reported in New Zealand and Australia, with 18.3% and 9.4% of dialysis patients, respectively (5). Home HD was also used by 3.0% to 6.0% of dialysis patients in Canada, Denmark, Finland, The Netherlands, Sweden, the United Kingdom, and Scotland. However, in all other countries, home HD either was not provided or was used by fewer than 3% of dialysis patients (5). There are several barriers to the implementation of home HD, including the lack of accessibility, physician experience, patient awareness, and caregiver burnout (1).

Barriers to home HD

Physician-related factors

Despite increasing evidence of benefits of home HD, physician interest in promoting home therapies remains an important challenge. In a recent survey of over 400 health care professionals from all over the world, 56% of respondents had no home HD patients in their units (8). The lack of adequately trained staff members and appropriate funding were identified as major barriers (8). Despite increasing evidence of benefits of home HD, it still remains an uncommon therapy, which is not an accessible option for patients in all countries. Physician interest in promoting home therapies is an important challenge. Nephrologists who lack experience with IHHD might have misconceptions concerning which patients are suitable for this therapy, resulting in IHHD not being offered as an option to the potential patients.

In Australia and New Zealand, where the prevalence of home HD is the highest, all nephrology trainees are required to have both peritoneal dialysis and home HD exposure (7). In contrast, a survey of recent nephrology trainees in the United States showed that only 15.8% of responders felt competent in the care of home HD patients (8). Furthermore, in a United States survey of practicing nephrologists, physicians who were practicing for less than 10 years were more likely to treat patients with home HD, perhaps as a result of more recent publications about the benefits of home HD (9). Adequate home HD exposure should thus be incorporated into all training programs. Indeed, if physicians are not adequately trained or exposed to home HD, they may not be able to effectively promote home therapies.

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Patient-related factors

Patient-related factors are divided into two major categories: situational and psychological barriers (10). Situational barriers included inadequate housing or water or inadequate family support; these barriers are difficult or impossible to overcome, even if patients are motivated by the incentives of IHHD. In contrast, psychological barriers may include lack of confidence in their ability to conduct HD at home, fear of self-cannulation, fear of a catastrophic event, and quality of care at home; many studies have shown that these barriers could be settled with more thorough education and preparation as patients approach the need for dialysis (11–15). It is reasonable to assume that all patients are confronted to some degree with multiple concerns. These concerns are almost always surmountable with appropriate support (16).

Psychosocial barriers were also found to determine training and technique outcomes in IHHD. The burden of performing dialysis at home contributed to 16% of failures (17). This finding was also consistent with the finding of the Frequent Hemodialysis Network (FHN) Trial that the most common reason for dropping out was lack of partner/family support followed by patient-perceived burden of performing dialysis at home and inadequate dwelling (10, 18). It is tempting to hypothesize that development of targeted psychological support services could lower feelings of fear and burden and potentially facilitate the successful adoption of home HD.

Caregiver burden

The majority of home HD patients require the help of a family member, partner, or friend, referred to as the caregiver. Analyses of questionnaire data from the FHN Trial identified a high level of perceived caregiver burden as a concern among patients receiving IHHD; more than one half expressed worries about the burden of IHHD on their caregivers (19). This perceived high caregiver burden also significantly associated with low self-reported health-related quality of life scores and depression (19). The findings highlight the need to develop support networks for patients on IHHD that can readily aid the caregiver, reduce the levels of this perceived burden, and step in at times of potential crisis (20).

Risks of IHHD

Despite its important clinical advantages, IHHD also holds the same potential risks of other treatments, including increased vascular access-related events, high rate of buttonhole infection, and rapid decline of residual renal function (RRF).

Vascular access-related events

The increased rates of vascular access interventions and adverse events were shown in the FHN Trial. Patients receiving (in-center) short daily HD had a significantly shorter time to first vascular event (repair, loss, or access-related hospitalization) compared with those in the CHD group (hazard ratio [HR], 1.76; 95% confidence interval [95% CI], 1.11 to 2.79; p = 0.017). Most of these events were vascular access repairs or losses, and a higher risk was observed for patients dialyzing with an arteriovenous fistula (HR, 1.90; 95% CI, 1.11 to 3.25; p = 0.002) (21, 22). A similar trend was observed in the nocturnal cohort, although the time to first access-related event did not reach statistical significance (HR, 1.81; 95% CI, 0.94 to 3.48; p = 0.076) (18, 21). An association between dialysis frequency and vascular access-related events (infections and interventions) was also reported in an observational Australian study (23).

Buttonhole infection

Self-cannulation of arteriovenous access is a challenge for IHHD patients. Given the benefits of ease of delivery, decreased pain, and lower risk of hemoptasia, the buttonhole cannulation (BH) technique is widely used in IHHD. However, these benefits must be balanced against the increased risk of infection and septic complications. A randomized, controlled trial evaluating BH versus rope ladder cannulation in 140 patients on CHD found a higher rate of Staphylococcus aureus bacteriaemia and fistula abscesses requiring intravenous antibiotics in the group using the BH technique (p = 0.003) (24). An Australian cohort study in nocturnal HD patients also found that patients using the BH technique had an increased risk of septic dialysis-related events compared with those in the CHD group (incidence rate ratio, 3.0; 95% CI, 1.04 to 8.66; p = 0.04) (23). Furthermore, a systemic review in intensive HD also highlighted the infection risks of BH cannulation (25). Given the increased risk of infection, the patients should be informed and re...
Rapid decline of RRF

It has been documented that preservation of RRF in dialysis patients improves quality of life as well as survival. A significant decline in RRF is appreciated during the first year of dialysis, especially in patients undergoing HD (27). The main contributor was dialysis hypotension, and the reduction in RRF might be even more pronounced among IHHD patients. In the FHN Trial, nocturnal HD seemed to promote a more rapid loss of RRF (18, 28). Nonetheless, the RRF in this study may have been underestimated because of differences in the timing of collections. It is unclear whether this effect would have been observed if RRF was measured by other means.

There are several potential barriers to the implementation of home HD, including among patients, physicians, and health care providers. Increased physician education along with appropriate workforce development and infrastructure might be key to success in expansion of home HD programs. Properly identifying suitable patients for HD should equally be a priority for health care providers. In spite of multiple significant clinical benefits, IHHD also carries potential risks, such as other types of renal replacement therapy. Notwithstanding, these risks must be weighed against the potential advantages and should not be considered a limitation for considering IHHD in an appropriate candidate. Properly identifying suitable patients for HD should equally be a priority for health care providers. III

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References

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