

In-Center Dialysis Versus Extended Home Hemodialysis: More Evidence to Support Extended Dialysis



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Choosing a dialysis modality for patients who have end-stage kidney disease requiring dialysis initiation is a complex task. Informed decision-making is crucial and can only be achieved with a solid foundational dialysis education provided by the clinician and nephrology care team each step along the way. It is about tailoring the treatment and management to each individual patient's clinical and social situation. Sometimes it is also influenced by the circumstances of their care partners. However, one question always remains and looms large in both patients' and clinicians' minds: Which option is the best? This is an important part of the counseling process and requires an honest reflection. The argument has always been that there is no one option that is definitively better than the rest.

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A dialysis prescription is more than just a checkbox for modality choice; treatment location, treatment duration, blood and dialysate flow rates, treatment frequency and so on and so forth are all important components.

There have been hypothesized and proven benefits for longer hemodialysis sessions. After all, native kidneys are working 24 hours a day. These benefits include reduced intradialytic hypotension, improved volume, phosphate, and blood pressure control as well as a reduction in left ventricular hypertrophy parameters. One would, therefore suspect that treatment modalities that provide longer session would be associated with greater long-term survival.

Using a representative cohort of Canadian patients on home hemodialysis (HHD), Tennankore *et al.*¹ found no difference in death or treatment failure rates between short-daily, nocturnal, and conventional HHD. Two prior studies had set out to examine death rates, left ventricular mass regression, and physical health outcomes in

patients using conventional in-center hemodialysis compared to patients using (i) frequent in-center hemodialysis (Frequent Hemodialysis Network Daily trial²) and (ii) nocturnal HHD (Frequent Hemodialysis Network Nocturnal trial³). Neither study definitively demonstrated the superiority of one option over the other. In fact, an analysis of the long-term effects of the Frequent Hemodialysis Network Nocturnal trial found higher mortality rates in the nocturnal HHD group.⁴ However, context is important, the follow-up study revealed unusually low death rates in the conventional in-center group, small sample size, and variations in dialysis prescriptions after the end of the study period. This is why we should not be hasty in interpreting study results.

There are many limitations to studies attempting to differentiate between hemodialysis options, some of which are unavoidable. These include the lack of randomized controlled trials (patient recruitment, moral, and ethical implications), inconsistent definitions of conventional and intensive hemodialysis (differ based on study design and practices across the world), varying dialysis prescriptions, delivery location, and its implications (home vs. in-center), as well as the lack of the generalizability of findings.⁵

Patient Survival With Thrice Weekly Extended HHD Versus In-Center HD

There will continue to be attempts at answering this elusive question. In their latest manuscript, Ok *et al.*⁶ set out to determine the overall survival differences between patients on thrice weekly HHD and those on thrice weekly in-center HD (ICHHD). Secondary outcomes

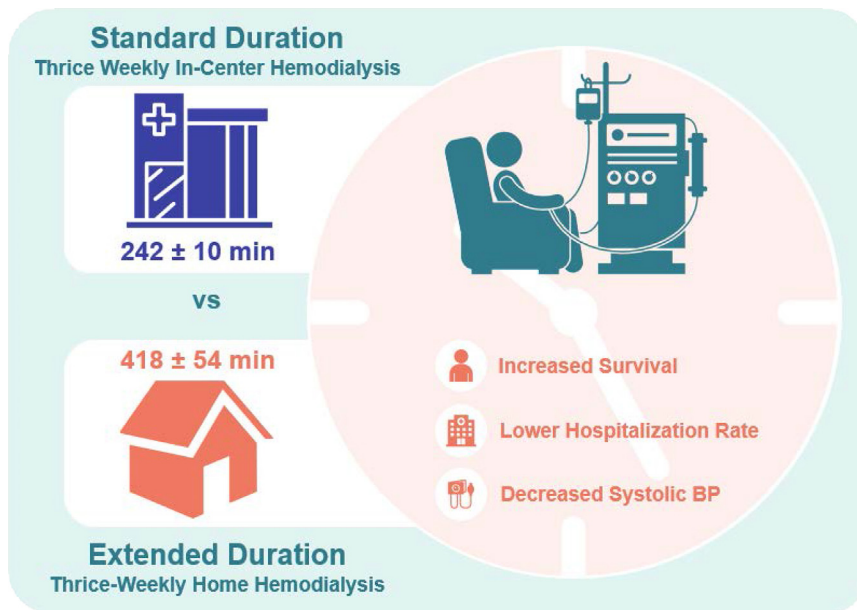


Figure 1. Extended thrice-weekly home dialysis treatments are associated with better outcomes in dialysis patients compared to thrice-weekly in-center dialysis.

included technique survival, composite of death and technique survival, hospitalization, and changes in clinical parameters. This was a retrospective observational study performed from June 2010 to December 2014 using a clinical database from a single large dialysis organization from several dialysis clinics across Turkey. Patients included in the study were those age 18 or older and on hemodialysis greater than 3 months. Patients who started HHD therapy ($n = 349$) were grouped and propensity score-matched to a cohort of patients on ICHD ($n = 1047$). The parameters used for matching were age, sex (male/female), diabetes, body mass index, end-stage kidney disease vintage, serum albumin, systolic blood pressure, and vascular access type.

The average session duration was 418 ± 54 minutes for HHD treatments and 242 ± 10 minutes for ICHD treatments ($P < 0.001$). The median follow-up time was 55.4 months for the HHD group and 54.8 months for the ICHD group. Intent-to-treat analysis showed a statistically significant lower all-cause mortality in the HHD group

(3.76 per 100 patient-years) compared to the ICHD group (6.27 per 100 patient-years). The overall survival at the end of the study period was 79.3% and 59.1% in the HHD and ICHD groups, respectively ($P < 0.001$). This amounted to a 40% reduced risk of death for the HHD group versus the ICHD group (hazard ratio 0.6, 95% confidence interval 0.45–0.80, $P < 0.001$).

The rate of hospitalization was lower in the HHD cohort at 2.2 hospital days/yr compared to the ICHD cohort at 4.6 hospital days/yr ($P < 0.001$). Discontinuation of HHD occurred in 40 (11.5%) patients. Compared to those who continued HHD, these 40 patients had longer end-stage kidney disease duration (101 ± 81 vs. 76 ± 69 months, $P = 0.04$) and higher rates of cardiovascular disease (40.0% vs. 19.1%, $P = 0.01$).

It is important to note that 14 HHD patients (4% of the HHD cohort) had varying dialysis prescriptions or had 4 times a week hemodialysis. Most of the study patients on HHD were on nocturnal HHD. Moreover, confounding factors such as differences between the

groups in employment, education, income, mobility, or social support may have gone undetected. Additionally, there was no information on residual kidney function, nor whether it may have been different between the study groups.

Reviewing the Findings in Context

These study findings are in-line with prior studies that compared outcomes in ICHD to nocturnal HHD. Since most of the patients in Ok *et al.*⁶ study were on nocturnal HHD, it is important to mention that other reported benefits of nocturnal HHD that were not discussed earlier include decreased pill burden, partial restoration of melatonin rhythm, cost effectiveness, as well as improved pregnancy outcomes and higher employment rates.⁷ In a meta-analysis of in-center nocturnal HHD patients and conventional ICHD patients, those on nocturnal HHD were found to have improved systolic blood pressures, higher hemoglobin levels, and lower serum phosphate levels.⁸

This study provides insight into the effect of varying hemodialysis treatment lengths on outcomes of a matched group of patients performing hemodialysis the same number of times a week (96% of the HHD group performed treatments 3 times a week), using similar blood flow rates, and similar dialysis accesses among other things. However, it does not factor in patient selection for home versus in-center location of hemodialysis. This bias is unavoidable whenever comparisons of home versus in-center hemodialysis are made—unless a randomized controlled trial is conducted, which is difficult for the reasons described earlier. Patients on HHD tend to be younger (as was the case in this study) and with fewer comorbidities. Multiple prior studies have not been able to delineate whether the improved

outcomes are due to physiologic reasons or due to the location of the dialysis itself. The issue of limited generalizability of the study outcomes remains—most patients on HHD (be it nocturnal, short-daily, etc) are performing treatments more frequently than thrice weekly. Finally, and to a lesser extent, is the issue that we are not comparing like-to-like in terms of hemodialysis prescription parameters. Nocturnal HHD treatments are longer, so the ultrafiltration rate will always be lower when compared to ICHD. Furthermore, HHD prescriptions tend to use lower dialysate flow rates compared to ICHD owing to a combination of supply, cost, and water supply issues. What effect, if any, that this has on patient outcomes remains to be seen.

In summary, Ok *et al.*⁶ have provided further evidence to support improved patient survival on extended HHD over conventional ICHD—adjusting for dialysis frequency (see Figure 1). Mitigating the effects of patient selection bias, the effects of dialysis location

(home vs. in-center), dialysis prescription parameters remain to be seen and would require a randomized controlled trial.

DISCLOSURE

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