DIALYSIS

High-frequency dialysis offers clear benefits—but at what cost?

Patients who have frequent in-center hemodialysis do better than those on standard protocols, according to the Frequent Hemodialysis Network (FHN) Trial Group. The benefits of frequent dialysis include prolonged survival, improved control of hypertension and phosphate levels and a reduction in left ventricular mass, Chertow and colleagues report on behalf of the group. However, these authors advise that further research is needed before this strategy can become widely accepted.

Hemodialysis three times per week is the standard protocol at most dialysis centers around the globe. Extended intervals between dialysis sessions are preferred by patients because they minimize disruption to their lives, but this choice is a double-edged sword. The less frequent the dialysis sessions, the greater the gradient between peak (predialysis) and trough (postdialysis) solute and water levels. Large, rapid changes contribute to patients feeling ‘washed out’ after dialysis. Shorter, but more frequent sessions could improve clinical outcomes as well as patient-reported physical health scores.

The FHN trial was a prospective, multicenter, randomized, controlled study that compared conventional (three times weekly) with frequent (six times weekly) in-center hemodialysis regimens. 378 patients with end-stage renal disease requiring long-term renal replacement therapy were recruited, of whom 245 were randomly allocated to 12 months of either conventional or frequent hemodialysis. Patients were aged ≥ 13 years and ≥ 30 kg in weight, with a minimum mean equilibrated Kt/V_{urea} of 1.0 (last two dialysis sessions). Patients with vascular access via a nontunneled catheter, pregnant women, and those who required hemodialysis more than three times weekly for medical reasons, were excluded.

The results show that composite outcomes of death or 12-month changes

from baseline in left ventricular mass, as assessed by MRI, were better in patients on frequent dialysis than in those on the conventional regimen. Hazard ratios for death or a decrease in physical health composite scores—as assessed by the RAND 36-item health survey—were also better in the frequent-dialysis group. Frequent hemodialysis was associated with superior control of systolic blood pressure and phosphate levels, compared with predialysis values. Episodes of hypotension also decreased. “...frequent hemodialysis ... may more closely approximate the capacity of a native or transplanted kidney to regulate extracellular volume and solute composition [than does conventional hemodialysis],” write the authors.

The researchers did, however, identify problems related to the increased numbers of cannulations required when hemodialysis is done six times weekly. Rates of adverse events related to fistulas, grafts, and catheters, respectively, were 51%, 32% and 17% in the frequent-dialysis group versus 48%, 38% and 14% in the conventional-dialysis group. However, the FHN Trial Group report provides no information on the vascular access techniques used. In an editorial on the implications of the FHN trial in the same issue of the *New England Journal of Medicine*, Zbysław Twardowski and Madhukar Misra emphasize the importance of cannulation technique for patients who require frequent dialysis: “...it is particularly important to use the buttonhole method of needle insertion into the fistula with a single puncture, since there are fewer complications ... a scar-tissue tunnel tract develops that allows the needle to follow the same path to the blood vessel on each cannulation.” Twardowski and Misra also point out, “The patients in the [FHN] study were in better health than are those in the general US population who are undergoing

hemodialysis ... the rate of death in the control (thrice-weekly) group at 1 year was only 7.5%, whereas the rate of death in the wider US population undergoing hemodialysis is more than 18.5%”.

Several important issues still await assessment: dialysis is expensive, and the cost to health-care providers resulting from doubling the frequency of dialysis is not insignificant. Additional research or standardization of puncture technique is clearly needed to tackle the high rate of vascular access problems associated with daily cannulation. Probably the most pertinent of the cost-benefit considerations relates to assessing the impact of frequent dialysis on the patient's quality of life—an outcome that wasn't measured in the FHN study.

“Before major changes in practice can be recommended, the net effects of frequent hemodialysis will need to be balanced against the added burden for the patient and societal cost,” the authors write.

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Original articles Chertow, G. M. *et al.* In-center hemodialysis six times per week versus three times per week. *N. Engl. J. Med.* **363**, 2287–2300 (2010) | Twardowski, Z. J. & Misra, M. “Daily” dialysis—lessons from a randomized, controlled trial. *N. Engl. J. Med.* **363**, 2363–2364 (2010)