

SECTION THREE:

Fluid Overload

The very intermittency of traditional intermittent dialysis leads to fluctuations in patient fluid volume and, potentially, significant fluid overload. Daily dialysis can reduce fluid overload and its ill effects, even with liberalized fluid intake.

OVERVIEW

ESRD patients depend on renal replacement therapy to regulate body fluid levels. During the interdialytic period, extracellular water volume (ECW) increases and body weight may increase by several kilograms.²³ To avoid excessive weight gain, patients may be required to follow a strict diet and limit fluid intake despite the importance of good nutrition in maintaining health. Non-compliance with such strict recommendations is high.

The most obvious result of fluid overload is hypertension, which is a significant risk factor for cardiovascular mortality (see previous section on Hypertension). Studies have shown that hypertensive ESRD patients have significantly higher ECW than normotensive patients³⁹ and high blood pressure has been correlated with high levels of ECW in other studies.³⁶⁻³⁸ Fluid overload may also contribute to pulmonary edema.

The intermittent nature of conventional hemodialysis therapy can cause the development of intradialytic and postdialytic hypotension. When patients have gone for 3 days without treatment, they develop the greatest fluid overload. An analysis of the USRDS database revealed that the highest rate of sudden death in hemodialysis patients occurs after the weekend. Sudden removal of this excess fluid during dialysis can initiate significant hypotensive events.¹ Rapid fluid removal can cause symptoms during treatment such as cramping, headaches, joint pains, nausea and even loss of consciousness.

POTENTIAL BENEFITS OF DAILY THERAPY

Beyond the obvious benefits in blood pressure control (see section on Hypertension), more frequent therapy reduces a patient's exposure to fluid overload and could minimize the dangerous effects of intradialytic hypotension. More frequent treatment may also allow for a liberalization of diet/fluid intake

and improve nutritional status. A reduction in intradialytic symptoms may improve compliance with a prescribed dialysis regimen.

SUMMARY OF PUBLISHED RESULTS

Significant improvements in fluid overload were reported for groups of patients receiving daily hemodialysis treatment.

- ECW, as measured by bioimpedance analysis, was 7-10% lower in patients during daily treatment as compared to conventional hemodialysis.^{18,49}
- Interdialytic weight gain was 39.5 to 50% less in patients during daily treatment as compared to conventional hemodialysis.^{19, 23, 31, 62}
- Although the total weekly cumulative interdialytic weight gain was greater with some shorter daily hemodialysis treatments, patients tolerated the higher ultrafiltration rate well without hypotension or headaches.²³

TABULATED STUDY FINDINGS ON FLUID OVERLOAD

Study & Design	Supporting Points
<p>Nesrallah, G. Am J Kid Dis. 2003; 42:S13 ⁴⁹</p> <p>Daily HD 11 pts Nocturnal HD 12 pts; 1.5 yr Prospective</p>	<ul style="list-style-type: none"> • Lower interdialytic weight gains occurred in the daily group (1.73 kg) but not in the nocturnal group as compared to baseline values on conventional HD (2.92 kg) ($p < 0.0005$) • Extracellular fluid volume as percent of total body water was lower in daily HD patients ($40.8 \pm 1.1\%$) compared to patients on conventional HD ($45.3 \pm 1.2\%$) and those on nocturnal HD ($42.1 \pm 1.6\%$) ($p < 0.05$)
<p>Odar-Cederlof, IE. J Am So Nephrol. 2001;12:404A ³¹</p> <p>Daily HD 10 pts Prospective</p>	<ul style="list-style-type: none"> • Interdialytic weight gain decreased from $3.8\% \pm 1.9\%$ of body weight on conventional HD to $2.3\% \pm 1.4\%$ of body weight on daily HD
<p>Fagugli, RM. Am J Kid Dis. 2001; 38:371 ¹⁸</p> <p>Daily HD 12 pts; 1 yr (6 mo random crossover)</p>	<ul style="list-style-type: none"> • Extracellular water content on short daily HD decreased as compared to a crossover period on conventional HD from $52.7\% \pm 11.4\%$ to $47.6\% \pm 7.5\%$ ($p < 0.02$)
<p>Galland, R. J Am Soc Nephrol. 2001;12:265A ¹⁹</p> <p>Daily HD 14 pts; 1 yr Prospective</p>	<ul style="list-style-type: none"> • Interdialytic weight gains decreased with daily HD compared to conventional HD from 2.95 ± 0.8 to 1.4 ± 0.7 kg ($p < 0.01$)
<p>Williams, AW. Sem Dial. 1999;12:431 ⁶²</p> <p>Daily HD 5 pts; 8 wk Prospective</p>	<ul style="list-style-type: none"> • Interdialytic weight gains were less with daily HD than conventional HD
<p>Traeger, J. Artif Org. 1998;22:558 ²³</p> <p>Daily HD 4 pts; 1 yr Prospective</p>	<ul style="list-style-type: none"> • Mean weight gain between 2 dialysis sessions was 1.7 kg during daily HD and 2.9 kg on conventional HD

