



Nocturnal hemodialysis: dialysis for the new millennium

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Technology: Nocturnal hemodialysis

Use: Typically, patients who require hemodialysis receive it 3 times a week for 4 hours at a time. Nocturnal hemodialysis¹ is a new, radically different form of hemodialysis; it can be done at home 6 or 7 nights a week while the patient is sleeping. Dialysis is accomplished via an internal jugular catheter or an arteriovenous fistula or graft. A trained professional can monitor the performance of the system remotely through a computer–telephone or Internet connection.

History: Nocturnal hemodialysis was conceived by the late Dr. Robert Uldall. The first patient was trained to use the nocturnal hemodialysis system in April 1994 at the Wellesley Hospital in Toronto, Ont. Research continued after Uldall's death in 1995, and the Nocturnal Hemodialysis Project, which has been relocated to Humber River Regional Hospital in Toronto, now includes 30 patients.

Promise: This technology offers unparalleled quality of dialysis. Urea clearance can be as good as it is with normal kidneys, compared with 15–20% clearance with conventional hemodialysis.² Phosphate binders are not required because the procedure provides good phosphate removal,³ and patients become anabolic.^{4,5} Hemodynamic stability is ideal for compromised patients, blood pressure control is excellent, erythropoietin requirements are reduced and most patients no longer require antihypertensive medications.

Nocturnal hemodialysis has been found to improve the quality of sleep and daytime cognitive functioning.^{6,7} On quality-of-life questionnaires patients have reported significant improvement in most areas.⁸ Patients have noted increased energy levels, better appetites and improved skin colour and condition. Diet is not restricted, and most patients are able to return to work.

The cost for this procedure is two-thirds of that of conventional hemodialysis done in a medical centre, but it is higher than conventional hemodialysis at home. However, a decrease in average medical expenses, including the cost of prescription drugs and hospital admissions, and societal benefits from increased employment are anticipated.

Programs in Kingston and London, Ont., now offer nocturnal hemodialysis, and there are approximately 20 patients receiving the treatment in the United States. To be implemented on a larger scale nocturnal hemodialysis must become a recognised treatment and qualify for government reimbursement.

Problems: Complications we have encountered with the procedure include clotting of the central venous catheter (treated with low-dose warfarin) and catheter infections. Most problems have been resolved, and the method can now be safely implemented in the mainstream.



Courtesy of Macleod's

Nocturnal hemodialysis in the home.

An obstacle for the routine use of nocturnal hemodialysis is the complexity of the equipment. Currently, only 20% of the dialysis patients have the abilities required to be trained in its proper use. Simpler hemodialysis machines are now in development. Also, with the high dialysis dose provided with this procedure, patients should be monitored for deficiency syndromes; none have been identified to date, however.

Prospects: It is expected that nocturnal hemodialysis will take its place among the treatment modalities offered to patients. It has all of the elements necessary — improved outcome, patient and provider satisfaction and lower cost — to have a major impact on the delivery of dialysis.

Competing interests: None declared.

References

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