A Different Kind Of Sleepover
In-center nocturnal programs offer good outcomes, flexibility for patients

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In-center nocturnal offers good outcomes, flexibility

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About 1% of dialysis patients now choose the night shift - but not at home. More and more dialysis programs are leaving the lights on for patients who want more dialysis but still want care from professional staff. Over 250 clinics now offer in-center nocturnal dialysis. Our special section this month looks at outcomes, patient recruitment, and the logistics of establishing an in-center nocturnal program

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Dialysis overnight: In-center nocturnal hemodialysis programs showing growth

Editor's note: A survey completed recently among renal providers in the United States indicates that approximately 1% of patients are being treated at in-center nocturnal hemodialysis (INHD) programs. These programs vary in size around the country, along with the length of treatment time they offer. But all of them have shown consistently good outcomes, such as reduction in medication use, improved quality of life, and improved clinical indicators. This special section looks at how the modality has expanded since NN&I did its first cover story on this subject in February 2009.

An alternative to conventional HD: Logistics and outcomes
Sheila Doss, BSN, RN, CNN, CCRA • Brigitte Schiller, MD, FACP, FASN

Abstract
Toxin and fluid removal are the main goals of dialysis therapy for patients with end-stage renal disease. Recent data indicate that the BUN-centered delivery of dialysis therapy with high efficiency, conventional, thrice-weekly hemodialysis therapy may fall short on the likewise critically important fluid control. Extended hour, in-center nocturnal HD (INHD) emerges as one of the alternative therapies for patients whose clinical needs are not met with conventional HD or who are seeking a dialysis therapy less interfering with daytime activities. We report the logistic requirements for a nocturnal program evaluated in a pilot at a midsize non-profit dialysis provider.

In-center nocturnal hemodialysis provides longer dialysis sessions similar to the thrice-weekly 8-10 hour dialysis treatments originally prescribed in the early days of dialysis. INHD allows for a more flexible lifestyle-oriented dialysis schedule and enables patients to maintain routine daytime activities. It also offers an alternative schedule for patients who require extended-hour dialysis for various medical reasons.

Improving the ‘standard’
Conventional thrice-weekly hemodialysis (CHD) with shorter treatment time was implemented after the Medicare Act of 1973 in order to accommodate growing numbers of patients with end-stage renal disease (ESRD) in an outpatient setting. Technological advances over the last three decades have allowed maximizing efficient dialysis therapy by delivering target Kt/V. However this BUN-centered dialytic therapy has resulted in little or no improvement in outcomes in patients undergoing hemodialysis (HD).

Recently attention has shifted towards longer and more frequent dialysis. The Frequent Hemodialysis Network (FHN) short daily dialysis study demonstrated significant improvements for both combined primary outcomes of death/left ventricular mass as well as the death/physical health component. Average time on HD in the six days per week group was 12.7 ± 2.2 hours.

Prior to this trial, the Canadian nocturnal dialysis study showed significant improvement in left ventricular mass in patients who underwent 5-6 nocturnal HD treatments at home, averaging 30 plus hours per week. The dialysis program in Tassin, France has consistently demonstrated superior morbidity and mortality outcomes with long hours, thrice weekly HD compared to our standard approach in the U.S. Similar positive results have been reported by others studying extended time dialysis therapy. Mounting evidence from observational studies suggests that longer time on dialysis improves outcomes and quality of life.

As it is unlikely that future studies will soon unravel the “enigma of the optimal dialysis prescription,” the emerging theme leads towards a more personalized ESRD care approach utilizing a variety of modalities, frequencies, and settings. This tactic includes both home modalities, peritoneal dialysis (PD) and home hemodialysis (HHD), but also new ways of optimizing in-center therapies.

The current in-center HD model does not meet the needs of all patients and requires adherence to rigid schedules. While HHD clearly improves many symptoms and allows adjusting dialysis therapy to the patient’s lifestyle, the burden associated with it limits acceptance among patients and partners.

INHD has emerged as a potential “in-between CHD and...
HHD* therapy by providing more flexibility for patients during the day and offering clinical advantages such as faster recovery after dialysis and better phosphate and blood pressure control. Physician and patient interest in this therapy has increased over the last decade. Approximately 1% of the ESRD population in the U.S. underwent INHD at the end of 2010, according to a nationwide survey (data presented at Annual Dialysis Conference, February 2011, R. Lockridge). INHD is also attractive for providers as it expands the capacity of existing facilities.

Pilot program launched

In January 2009, a pilot program was started with the aim to demonstrate feasibility and acceptance of INHD in Northern California by both patients and referring physicians. Eighteen stations in an HD facility were utilized to evaluate the feasibility of a INHD program as well as the clinical benefits and outcomes of eight-hour treatments. Another aim was to determine if it could serve as a bridge to and/or offer respite care for home therapies.

Table 1. Initial Admission Criteria

| Willing to dialyze between 8:00 pm and 6:00 am for 8 hours | Hemodynamic stability on HD |
| Interest in self-care | Compliant and ambulatory |
| | Psychologically stable |

Table 1 includes the initial criteria for admission into this pilot program. Although the criteria were established, each patient was individually evaluated by the Medical Director and staff prior to admission, thus allowing for exceptions. After consideration of the workload and acuity of the patients to be admitted, an alternative staffing model was developed with one registered nurse and two patient care technicians for 18 patients. The program initially operated on a Monday, Wednesday and Friday night schedule from 8:00 pm to 6:00 am with patients starting at staggered times between 8:00 pm and 10:00 pm. Twelve months into the program the schedule was changed to Sunday, Tuesday, and Thursday nights at the request of patients and staff to free up weekend time. The dialysis prescription was adopted from the Tassin clinic (see Table 2). A variety of outcome measures, including adequacy and nutritional markers, routine laboratory analysis, ESA, iron usage, and KDQOL SF36 responses, were studied.

Program logistics

Facility

In preparation for the program, several facility issues needed to be addressed. Safety of both patients and staff was a primary concern. Lighting inside and outside the facility was evaluated. Alterations were made to ensure adequate lighting in the parking area for patients' arrival and departure. The internal lighting was adjusted to allow the nurse's station to remain lit while the perimeter of the unit could be dimmed to allow patients to sleep. Facility maintenance schedules needed to be adjusted, including water softener regeneration times. Water treatment protocols were evaluated to adjust sterilization for the machines and the acid, bicarbonate, and water central delivery systems. The schedule for janitorial services had to be changed to avoid conflicts with the nighttime shift. Computer systems and programs were evaluated to determine that extended hours of operation were functional and would not complicate downtime required for software updates or servicing.

Staffing

We anticipated that staffing the program would be challenging and has indeed remained an issue. Registered nurses who enter the field of dialysis adapted to a specialty that typically avoids night and weekend hours. They are often reluctant to work at night. In contrast, patient care technician staffing proved to be easier. A team approach has been emphasized with all members working together to provide a consistent approach to care delivery. In contrast to the often task-oriented care approach in dialysis, the nocturnal program was created with the intention of fostering a comprehensive care model where all caretakers share responsibility for the well-being of their patients. Due to the absence of hectic patient turnover, nighttime dialysis allows for continuity of care by one care team assisted by ancillary services. Ideally, dietitians and social workers do monthly rounds in the late evening or early morning and also communicate with patients and staff by phone conference and email.

Scheduling

The nocturnal program required us to extend facility operating hours. All staff needed to be trained in the opening and/or closing procedures for the facility. Schedules for dialyzer reuse were adjusted to the extended hours of operation. If ancillary staff were not available during the nocturnal shift, arrangements were made to meet with patients at alternate times. More flexible scheduling during the night allow patients to make dialysis part of their lives rather than having their lives revolve around dialysis.

Supplies

Several additional supplies were found to be necessary.
over the first year of the program. As the night shift was an add-on to an already operational unit, the available dialysis chairs were maintained. Difficulty sleeping was felt to be overwhelmingly due to the lack of comfort in a chair with a leg support separated from the main frame of the chair. "Nap mats," commonly used for preschool nap time, were added to the chairs to alleviate discomfort. Memory foam single mattresses covered with a suitable cover to disinfect could serve as an alternative and was recommended in some of the narrower chair models. Murphy beds, which fold up into the chase against the wall when not in use, would be a viable option in new units but difficult to install in a fully functional unit with a central delivery system built into a chase.

In order to protect against needle dislodgement and the risk of blood loss, we utilize enuresis devices placed on the arm below the needle insertion sites. While facilities have call lights, patients voiced reluctance in utilizing them out of fear of disturbing their fellow patients. Small flashlights were purchased allowing patients to attract the attention of the staff with "light signals" instead.

Thus, longer sessions, such as in an in-center, eight-hour, thrice weekly nocturnal hemodialysis program (INHD), have been postulated to address these other factors.

We described our experience with INHD previously in NN&I. We reported an improvement in serum phosphorus levels and demonstrated that serum phosphorus is removed steadily throughout this eight-hour treatment. We also have shown that INHD patients have a lower ultrafiltration rate of $< 10$ cc/min/kg body weight. Quality of life measures have improved with a lower time to recovery for patients maintained on in-center nocturnal hemodialysis.

Despite those positive outcomes from the therapy, what is our success with the patients enrolled in this program? We have had 29 patients in our INHD program since May 2005; nine remain, including two of the initial patients who started six years ago. Of the patients no longer in this program, 10 transferred back to traditional in-center hemodialysis. Most of these patients cited trouble sleeping either due to the uncomfortable chair or from insomnia.

Ms. Troldle is with Metabolism Associates, New Haven, Conn. She is also a member of NN&I's Editorial Advisory Board.
few mentioned missing being at home with their families. Seven patients received a renal transplant and two moved away and have transferring to another in-center nocturnal program. Only one patient expired.

Of the 10 patients transferring back to in-center hemodialysis, none have expressed a desire to return for the longer treatments even when reminded of the option and its benefits. That said, the current nocturnal patients have been on the therapy for a range of one to five years without any interest in returning to conventional hemodialysis. In fact, four of the current patients work full-time. Each has the flexibility to return to conventional hemodialysis, but state that they feel much better with the nocturnal program. Interestingly, only one of the 10 patients transferring back to conventional hemodialysis had a full-time job.

The reasons for the lack of growth of our program are unclear, but may be related to a general unawareness among both the prevalent ESRD and advanced CKD patient populations about the existence of the program as well as its benefits. Also, the reported lack of comfort of reporting to a center and sitting in a chair for eight hours has influenced some of our patients to switch back to conventional hemodialysis.

In-center nocturnal hemodialysis offers patients longer treatments that are associated with improved phosphorus control, a lower ultrafiltration rate, and a suggestion for an improved quality of life. Despite these significant findings, the program is not expanding. Greater attempts to make all prevalent dialysis and CKD patients aware of the potential benefits of thrice weekly in-center nocturnal hemodialysis, in addition to addressing the barriers of insomnia and uncomfortable chairs, may encourage more patients to choose this promising therapy.

References

Monitorin

Our experience with nocturnal home HD provided insight into monitoring patients on INHD. While hourly vital sign monitoring was implemented at the start of the program, the frequency of monitoring was gradually decreased as patients' hemodynamics were found to be stable. Thorough assessment at pre- and post-dialysis, and when deemed necessary by the patient and staff, were performed. Frequent evaluation of the dry weight, antihypertensive medications, potassium, phosphorus, and sodium were performed during the first three months. Routine laboratory analysis, ESA and Vitamin D dosing were administered per protocol as is standard of care in all patients. Dry weight and antihypertensive medications needed frequent adjustment.
Program experience

The success of the initial pilot program from the patient, nephrologist, and care-team perspective resulted in the establishment of four more programs. Currently five INHD programs care for a total of 71 patients including 48 males and 23 females with a median age of 57 years (24 - 89) and a median vintage of 49 ± 62 months. Thirty-six patients are diabetic. All types of vascular accesses are in use, with 56 fistulas (cannulated using the buttonhole technique) five grafts and 10 catheters. Patients comply with treatments lasting eight hours per night. Reasons to join the program vary: patient perception of not doing well on CHD and of the benefits of longer dialysis, physician initiated referral, excess fluid gains, employment, and transfer from other nocturnal programs or a home therapy. Three patients died, including two withdrawals from dialysis due to co-morbid, non-ESRD conditions and one sudden death at home. No death occurred in-center. Three patients underwent transplantation.

The hypothesis that INHD may serve as a bridge to HHD has only been true for one patient, lasting less than nine months. Drop out from the program (n = 6) were due to one moving out of the area, three switching back to conventional HD due to medical instability unrelated to nocturnal therapy, and two due to the lack of comfort in the chairs/inability to sleep. Transportation logistics are very similar to conventional HD with patients choosing close proximity to their homes. This resulted in a few patients changing centers as new locations were opened.

Outcomes

Table 3 summarizes the laboratory results comparing data from patients enrolled in the initial pilot program while undergoing conventional HD and INHD. While maintaining Hb in a target range of 10 - 12 g/dL utilizing the standard anemia protocol. Epogen utilization decreased by 63% over 16 months compared to the 6 months prior when patients underwent conventional HD (see Figure 1). Iron utilization was unchanged. Quality of life assessed by the KDQOL SF36 questionnaire revealed marked improvements at six months compared to baseline in energy/fatigue (p = 0.04), improvement in effect of kidney disease (p = 0.05) and improvement in patient satisfaction with delivery of ESRD care (p = 0.009).

Table 3. Laboratory comparison: Conventional lab results in patients undergoing conventional HD and subsequently INHD

<table>
<thead>
<tr>
<th></th>
<th>CHD (n = 20)</th>
<th>INHD (n = 23)</th>
</tr>
</thead>
<tbody>
<tr>
<td>stdKt/V</td>
<td>2.45 ± 0.37</td>
<td>2.82 ± 0.30</td>
</tr>
<tr>
<td>K (mEq/L)</td>
<td>5 ± 0.4</td>
<td>4.8 ± 0.1</td>
</tr>
<tr>
<td>CO2 (mEq/L)</td>
<td>23 ± 1.8</td>
<td>23 ± 0.4</td>
</tr>
<tr>
<td>BUN (mg/dL)</td>
<td>67 ± 12.4</td>
<td>64 ± 1.2</td>
</tr>
<tr>
<td>Ca2 (mg/dL)</td>
<td>8.7 ± 0.7</td>
<td>9.1 ± 0.2</td>
</tr>
<tr>
<td>PO4 (mg/dL)</td>
<td>6 ± 1.1</td>
<td>5.7 ± 0.1</td>
</tr>
<tr>
<td>Alb (g/dL)</td>
<td>4 ± 0.2</td>
<td>4.1 ± 0.1</td>
</tr>
<tr>
<td>Hb (g/dL)</td>
<td>12 ± 1.0</td>
<td>11.5 ± 0.2</td>
</tr>
<tr>
<td>β-2 microglobulin (mg/L)</td>
<td>46 ± 14.7</td>
<td>22 ± 0.1</td>
</tr>
<tr>
<td>PTH (pg/mL)</td>
<td>770 ± 499</td>
<td>544 ± 138</td>
</tr>
<tr>
<td>alk phosphatase (IU/L)</td>
<td>116 ± 69</td>
<td>63 ± 2.1</td>
</tr>
</tbody>
</table>

No conventional HD data available on three patients.
Conventional HD = means of 12 months pre INHD
INHD = means of each patient’s duration on INHD therapy

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Conclusions

INHD was found to be a practical and attractive dialysis therapy for patients willing to alter their lifestyle. Improvements in outcomes and quality of life provide benefits thus far mainly experienced in the home dialysis setting. The majority of the slightly younger patients on INHD experience significant clinical improvement, which offsets any inconvenience occurring with thrice-weekly nighttime dialysis. Logistical issues as outlined can be addressed. RN staffing, the only persistent issue, has improved as familiarity with the program increases. Acceptance and support among the referring physicians has been very positive despite the added burden of rounding at night to fulfill the Conditions for Coverage requirement. Any ensuing challenges have been outweighed by the improved functional status and patient satisfaction with the program.

Thriving for a more personalized ESRD care approach, INHD holds promise to be part of a more integrated chronic kidney disease continuum of care approach.

References

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Resources


Conference Preview

ANNA Fall Conference

The American Nephrology Nurses' Association (ANNA) Fall Meeting 2011 was created to educate nephrology nurses in their specific concentrations. Different areas of interest will be categorized into tracks such as Advanced Practice, Clinical Practice, Management/Leadership, Current “Hot” Topic or Issues, and Pharmacology Content. Throughout this event, the nurses can earn nursing education contact hours along with knowledge of the new technology that will be displayed in the exhibit hall.

Program details

On September 23, three full day preconference workshops are offered, followed by two half-day choices on Saturday; all are available for elective additional learning. "Defusing potentially violent situations," the first half-day session, is presented by Paul Green, MS, RN, who will teach about how to watch out for and how to decrease injury due to violence in the health care industry. The other half-day presentation, "Preserving residual renal function," is offered by Toros Kapioian, MD. The official welcoming to the conference on Sept. 24 will be presented by Jean Jenkins, PhD, RN, who will discuss the impact of genomics in nursing.

Other topics include:

- Professionalism in the Workplace
- Assessing Competency to Consent to Treatment
- Moral Courage and the Nurse Leader
- Immunizations
- Reading and Using Research to Improve Practice
- Common Dermatologic Conditions in Chronic Kidney Disease
- Renal Transplantation and Delayed Graft Function NN&I

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