Cross-Sectional Comparison of Quality of Life and Illness Intrusiveness in Patients Who Are Treated with Nocturnal Home Hemodialysis versus Peritoneal Dialysis

Edwin Fong, Joanne M. Bargman, and Christopher T. Chan
Toronto General Hospital–University Health Network, Toronto, Ontario, Canada

Background and objectives: Nocturnal home hemodialysis provides excellent biochemical and metabolic control of uremia; however, extensive training is necessary and technical barriers exist for intensive home hemodialysis compared with the relative simplicity of peritoneal dialysis. It was hypothesized that nocturnal home hemodialysis is associated with improved quality of life but higher illness intrusiveness compared with peritoneal dialysis.

Design, setting, participants, & measurements: All home dialysis patients at the University Health Network were approached to complete the Kidney Disease Quality of Life-Short Form, Beck Depression Inventory, and Illness Intrusiveness Survey during February to June 2006.

Results: Sixty-nine percent of all eligible patients completed the survey. Of the three domains derived from the Kidney Disease Quality of Life-Short Form, there was no difference in the kidney disease component summary, physical component summary, and the mental component summary between the two groups. There was a trend toward better sexual function in the nocturnal home hemodialysis group; however, nocturnal home hemodialysis patients experienced less social support than the peritoneal dialysis group. There was no difference between the nocturnal home hemodialysis and peritoneal dialysis patients with respect to the Beck Depression Index. Total illness intrusiveness score was similar between the nocturnal home hemodialysis and peritoneal dialysis patients.

Conclusions: This study suggests that nocturnal home hemodialysis is not perceived as a more intrusive treatment and demonstrates that patients who are on peritoneal dialysis have similar perceived symptomatic control of their kidney disease.

Concise Methods

This protocol was approved by the Research Ethics Board of the Toronto General Hospital–University Health Network. All patients who had ESRD and were undergoing NHD or PD were deemed eligible for this study when they remained on either NHD or PD for a minimum of 3 mo. All patients were required to have a working knowledge...
of English. None had any acute illness or was hospitalized. Written informed consent was obtained from each patient. Surveys were mailed to our patient cohorts during February to June 2006. At 3 wk, a follow-up telephone call was placed to ascertain whether patients had received their survey. A repeat mailing was sent after our telephone reminder. Survey results were included in the study when they were returned within 4 mo of mailing. All dialysis-related blood tests were obtained via standardized protocols, and their results were stored in an electronic database. All responses were anonymous.

Instruments

Health-related QOL was measured using Kidney Disease Quality of Life-Short Form (KDQOL-SF) Version 1.3. The KDQOL-SF includes 36 items derived from a generic, validated instrument (SF-36) as well as 43 kidney disease-targeted items and one overall health-rating item. This instrument has been validated in the ESRD population (16). The patient responses to the KDQOL-SF were used to determine scores for the kidney disease component summary (KDCS), mental component summary, and the physical component summary. The KDCS was derived from 11 subscales: Symptoms, effects of kidney disease, burden of kidney disease, work status, cognitive function, quality of social interaction, sexual function, sleep, social support, dialysis staff encouragement, and patient satisfaction.

The Beck Depression Inventory (BDI) was used to ascertain depressive symptoms in our patient populations. The BDI was previously validated in the ESRD population (17). (17) The patient responses to the BDI were used to determine a score for depression.

Perceived intrusiveness of ESRD was measured using the intrusive symptoms rating scale, which is composed of a 13-item index divided into five subscales: Physical well-being and diet; work and finances; marital, family, and sexual relations; recreation and social relations; and other aspects of life (18). Patients’ comorbid status was quantified using the modified Charlson Index (19).

Statistical Analyses

Data are presented as means ± SE. \( \chi^2 \) test was used for between-group comparisons for categorical variables. An unpaired \( t \) test was used for between-group comparisons for normally distributed variables. Multivariate regression analysis was used to adjust for potential confounding variables. A two-tailed \( P < 0.05 \) (SAS 8.2; SAS Institute, Cary, NC) was required for significance.

For ascertainment of the influence of residual renal function on QOL, PD patients were stratified \textit{a priori} according to their documented creatinine clearance (>3 ml/min per d) closest to the time of the survey. ANOVA was then applied to test for significant differences among PD patients (with or without residual renal function) and NHD patients.

Results

The study population consisted of 93 patients with ESRD (36 NHD and 57 PD). Of the eligible patients with ESRD, 69% (72% NHD and 67% PD) responded. Their baseline characteristics are summarized in Table 1.

Overall, the majority of NHD and PD patients were male (67 [NHD] \textit{versus} 55% [PD]; \( P = 0.28 \)) and had similar comorbid status as assessed by the modified Charlson Index (1.14 ± 0.25 [NHD] \textit{versus} 1.82 ± 0.33 [PD]; \( P = 0.14 \)). NHD patients were younger (49 ± 2 [NHD] \textit{versus} 61 ± 2 yr; \( P = 0.001 \)), although they had a similar renal replacement vintage as PD patients (10.8 ± 1.7 [NHD] \textit{versus} 7.6 ± 1.0 yr [PD]; \( P = 0.1 \)). There was a trend toward increased frequency of renal transplants in NHD patients (31 [NHD] \textit{versus} 14% [PD]; \( P = 0.08 \)). NHD patients also tended to be more educated than PD patients. There were no differences in the frequency of patients who lived alone (25 [NHD] \textit{versus} 18% [PD]; \( P = 0.41 \)).

Compared with NHD, plasma urea and creatinine concentrations were higher in PD patients. NHD patients had higher hemoglobin concentration than the PD population (124 ± 117 [NHD] \textit{versus} 117 ± 2 g/L [NHD]; \( P = 0.026 \)). Plasma albumin and calcium were higher in the NHD cohort in comparison with the PD patients (39 ± 2 [NHD] \textit{versus} 37 ± 2 g/L [PD]; \( P < 0.001 \)) and (2.41 ± 0.30 mmol/L [NHD] \textit{versus} 2.27 ± 0.30 mmol/L [PD]; \( P = 0.002 \)), respectively. Plasma phosphate was lower (1.11 ±

<table>
<thead>
<tr>
<th>Table 1. Baseline patient characteristics(^a)</th>
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<tbody>
<tr>
<td>Variable</td>
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<tr>
<td>Age (yr; mean ± SD)</td>
</tr>
<tr>
<td>Male (%)</td>
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<tr>
<td>Race (%)</td>
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<tr>
<td>white</td>
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<td>black</td>
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<tr>
<td>Asian</td>
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<td>other</td>
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<tr>
<td>Highest education level (%)</td>
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<tr>
<td>elementary school</td>
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<td>high school</td>
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<tr>
<td>college/undergraduate</td>
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<tr>
<td>postgraduate</td>
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<tr>
<td>Previous kidney transplant (%)</td>
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<tr>
<td>Living alone (%)</td>
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<tr>
<td>Charlson Index (mean ± SD)</td>
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<tr>
<td>Years of renal replacement (yr; mean ± SD)</td>
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\(^a\)NHD, nocturnal home hemodialysis; PD, peritoneal dialysis.
the two patient groups (11.0 versus 17.0 [NHD] versus 15.0 [PD]; P = 0.092). There was a trend toward better sexual function in the PD population (36.0 versus 22.7 [NHD] versus 33.0 [PD]; P = 0.002). There was also a trend toward less burden of kidney disease, an emotional reaction to the effect of kidney disease, in the PD patients (66.0 versus 54.1 [NHD] versus 71.9 [PD]; P = 0.17).

Among the subcategories of the KDCS, the perceived amount of social support remained lower in the NHD group versus the PD patients (64.9 ± 5.2 [NHD] versus 76.0 ± 2.8 [PD]; P = 0.04). We did not discern additional differences among our patients by stratifying according to residual renal function (data not shown).

### Discussion

Patients’ perceived level of wellness is arguably the most important health outcome for those who undergo renal replacement therapy. In addition, there is an emerging body of literature that associates poor QOL with nutritional status, dialysis adherence, hospitalizations, and survival of patients with ESRD (20). Although QOL is an important aspect of the assessment of a patient with ESRD, the balance between intrusion and efficacy of dialysis therapy must be weighed carefully. This study was the first to compare QOL, depressive symptoms, and illness intrusiveness of both kidney disease and treatment modalities in patients who were undergoing NHD versus PD. Our results suggest that well patients who undergo home dialysis (NHD and PD) have similar overall QOL, illness intrusiveness scores, and BDI values. Less social support was perceived by NHD patients relative to the PD cohort. Our data do not support the notion that augmented solute clearance alone determines the perceived health-related QOL of an individual. For patients who have the option to dialyze at home, this study suggests that NHD is not perceived as a more intrusive treatment while also demonstrating that patients who are on PD have similar subjective symptomatic control of their kidney disease.
Table 4. Comparisons of illness intrusiveness score between NHD and PD patients

<table>
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<tr>
<th>Variable</th>
<th>NHD</th>
<th>PD</th>
<th>P</th>
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</thead>
<tbody>
<tr>
<td>Physical well-being and diet</td>
<td>3.81 ± 0.3</td>
<td>3.98 ± 0.20</td>
<td>0.65</td>
</tr>
<tr>
<td>Work and finance</td>
<td>3.77 ± 0.35</td>
<td>3.30 ± 1.64</td>
<td>0.27</td>
</tr>
<tr>
<td>Marital, sexual, and family relations</td>
<td>3.32 ± 0.31</td>
<td>2.78 ± 0.22</td>
<td>0.16</td>
</tr>
<tr>
<td>Recreation and social relations</td>
<td>3.23 ± 0.28</td>
<td>3.11 ± 0.18</td>
<td>0.72</td>
</tr>
<tr>
<td>Other aspects of life</td>
<td>2.46 ± 0.25</td>
<td>2.47 ± 0.20</td>
<td>0.96</td>
</tr>
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Relationships among QOL, morbidity, and dialysis dosage was first ascertained by the National Cooperative Dialysis Study (21); however, subsequent randomized, controlled trials failed to show any dramatic increase in QOL associated with an augmentation in solute clearance. Indeed, the Hemodialysis (HEMO) study did not yield any “clinically meaningful benefits” in QOL of either the dosage or the flux intervention arm, despite a clear separation in fractional urea and β2-microglobulin clearances (22). Similarly, the investigators from the Adequacy of Peritoneal Dialysis in Mexico study found no long-term beneficial effect in QOL by increasing peritoneal small solute clearance in their study population (23). In contrast, enthusiastic reports of improved QOL with intensive hemodialysis have been observed using before-and-after designs (24,25). In the context of the results of this study, how does one reconcile the lack of increased benefits in QOL for patients who undergo NHD compared with PD? First, the potential beneficial effect of NHD versus conventional in-center hemodialysis was not the principal focus of the study and could not be dismissed. Second, we used a cross-sectional study design to ascertain at one point in time the QOL in home dialysis patients; we did not compare the sustainability of the reported QOL among PD and NHD patients. To our knowledge, QOL tends to diminish over time in patients with ESRD (26,27), especially in PD patients with a decline in residual renal function (15). It is possible that NHD patients are able to maintain their QOL scores better than PD patients or vice versa.

Finally, the ultimate derivation of QOL perceived by an individual is complex, so it is reasonable to suggest that augmentation of uremic solute alone should not be considered the principal determinant of QOL in the ESRD population. Given that the human cost of chronic disease management must include an appropriate balance among illness intrusion, therapeutic efficacy, and QOL, it is important to acknowledge the similarity in illness intrusive score between PD and NHD patients. It has been widely supposed that NHD would be a more intrusive therapy compared with the simplicity of PD. It is therefore interesting to note that our results do not support this assumption. Rather, our data were consistent with previous literature indicating that there was little difference among patients who underwent dialysis at home (28). In contrast, conventional in-center hemodialysis patients have uniformly the worst illness intrusiveness score (28). Taken together with our data, it is tempting to propose that the quantification of illness intrusiveness in ESRD cannot be simply be a reflection of the complexity of the technology but rather the sum of patients’ coping strategies (29), social support (30,31), and illness behavior (32) in addition to the technical challenges of the medical intervention. In light of this hypothesis, it is important to comment that NHD patients exhibited a lesser degree of perceived social support in comparison with the PD cohort, perhaps reflecting the demand of intensive home hemodialysis. The determinants of perceived intrusion and control over one’s illness requires further exploration, especially given the present momentum in allocating patients with ESRD toward home-based dialysis regimens.

Although perceived QOL is an important determinant of well-being of patients with ESRD, the actual therapeutic efficacy of intensive hemodialysis should not be minimized. In this respect, we were able to discern multiple biochemical differences between NHD and PD patients. The clinical benefits of higher albumin and hemoglobin levels in conjunction with normalization of phosphate are beyond the scope of this study; however, on the basis of published literature, each of these indicators has been robustly validated to provide survival benefits in dialysis patients (33–35). The clinical advantages of intensive hemodialysis continue to be of great interest among various investigating groups, which will require ultimate substantiation by randomized, controlled trials (36).

Conclusions
Choosing a dialysis modality is a difficult decision to make for most patients with ESRD. Our study showed that among well NHD and PD patients, similar QOL, depressive symptoms, and illness intrusiveness scores were observed. This study also highlights two important points: The complexity in determining subjectively derived parameters in a chronic disease population and that the increase in solute clearance alone is insufficient in determining QOL. Our study is limited by its cross-sectional observational nature. We also did not account for the impact of duration of home therapy alone on QOL and illness intrusiveness. To our knowledge, these are the only available data comparing two home dialysis modalities in the present era. Additional research is required to delineate the interactions among complex medical interventions (dialysis modality) and patients’ illness behavior, coping strategies, and social support so as to individualize best the delivery of optimal ESRD care in the home setting (37,38).

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Disclosures
None.

References


