Peritoneal Dialysis in Patients 75 Years of Age and Older—A 22-Year Experience

Ana E. Taveras,1 Ameneve M. Bekui,1,2 Nancy Gorban–Brennan,3 Radu Raducu,1 Fredric O. Finkelstein1–3

The role of peritoneal dialysis (PD) in the treatment of end-stage renal disease in elderly patients remains unclear. In the United States, PD is used only to a limited extent in that population. There are concerns about technique failure, including physical and psychosocial limitations and the risks of peritonitis. Thus, we retrospectively reviewed our 22 years of experience with patients 75 years of age and older who started on PD. Basic demographic data were collected, and mortality, technique failure, and peritonitis rates were determined. Quality of life (QOL) was assessed using the SF-36 questionnaire, a global QOL assessment, and a depression questionnaire.

Among the 235 patients identified (mean age: 79 ± 4 years; 51% white; 49% female; mean time on PD: 15.8 ± 11.5 months), technique failure rates at 12 months were not significantly different for the patients 75 years of age older compared with the patients less than 75 years of age. Mortality rates were significantly higher in elderly patients. The peritonitis rate in patients 75 years of age and older was 1 episode in 23.6 patient–months compared with 1 episode in 23 patient–months in younger patients. The most common gram-positive organisms isolated were Staphylococcus epidermidis (38%) and S. aureus (5%); gram-negative organisms accounted for 22%, and yeasts, 5% of peritonitis episodes. Reasons for transfer to hemodialysis included psychosocial problems (42%) and peritonitis (25%). Not surprisingly, physical component scores on the SF-36 were lower in the older than in the younger patients, but mental component scores on the SF-36 were slightly better in older than in younger patients, and global QOL and depression scores were not different between the groups.

Our data suggest that PD is a reasonable modality for elderly patients.

Key words
End-stage renal disease, geriatric patients

Introduction
The prevalence of chronic kidney disease in elderly patients has been rising since about the year 2000, and increasing numbers of older patients are requiring renal replacement therapy (1). Most of these patients have multiple comorbidities and physical and psychosocial limitations that can significantly influence the modality of renal replacement therapy that patients might choose (2,3).

Peritoneal dialysis (PD) is a modality that is widely used around the world, but only 7% of prevalent end-stage renal disease (ESRD) patients in the United States are maintained on PD (1). The percentage of elderly patients maintained on PD is even lower, despite the fact that some investigators have suggested that PD is a viable treatment option for elderly patients (4). The PD option is particularly pertinent for patients who are nondiabetic and who have few comorbidities, good family support, and a functional status that allows them to perform PD by themselves (4,5).

One major concern in elderly patients is the problem of peritonitis. Peritonitis is the major cause of technique failure and still represents a significant cause of morbidity and mortality in patients undergoing maintenance PD (6,7). The reported rates of peritonitis in elderly patients have varied in the literature. Rates have been reported to be higher, the same, or lower than rates seen in younger patients (8–14).

From: 1Hospital of Saint Raphael, 2Yale University, and 3Renal Research Institute, New Haven CAPD, New Haven, Connecticut, U.S.A.
Psychosocial factors are also an important consideration in assessing the role of PD in elderly patients. Psychosocial problems can contribute to technique failure and can negatively affect patient perception of quality of life (15,16).

In the present study, we aimed to review the experience of PD in elderly patients (≥75 years of age) at a single large dialysis center over 22 years. We evaluated the rates of peritonitis and technique failure and the psychosocial status of patients, comparing the results with those obtained in younger PD patients.

**Methods**

Over the last 22 years, New Haven Home Dialysis has cared for 235 patients who started PD at 75 years of age or older. The organization and structure of our dialysis facility have previously been described (12,15,16).

Basic demographic data were collected for all patients. Patient mortality was determined by counting all deaths that occurred during ongoing PD, within 1 month of transfer to hemodialysis, or as a complication of PD. Technique failure rates were determined using death and transplantation as censored events. Life-table analyses used the standard life-table methodology in the Stata software package (version 10: StataCorp LP, College Station, TX, U.S.A.).

Peritonitis was defined as the presence of cloudy effluent with a white blood cell count exceeding 100/mL, with a differential showing more than 50% polymorphonuclear cells. Peritonitis rates were determined as previously reported (12). Since the early 1990s, the many changes in the PD technique have reduced peritonitis rates. Thus, we decided to focus our analysis on peritonitis rates and causative pathogens from the year 2001 to the present.

Quality-of-life assessments performed since 1996 used instruments previously reported by our group (12). The SF-36 questionnaire was used as a generic health-related quality of life (QOL) instrument. The patient global quality-of-life assessment questionnaire was used to globally assess health-related QOL. Depressive symptoms were assessed using the Beck Depression Inventory or Patient Health Questionnaire 9. Initial quality-of-life assessments were performed not sooner than 3 months after the start of PD therapy. For the purposes of the present study, only the results of the initial QOL assessment in each patient after the start of PD were included in the analyses.

**Results**

Table I summarizes the demographic data for the 235 elderly patients. Most were white, and their mean age was 79 ± 4 years. The mean and median times on PD were 15.8 ± 15.5 months and 11.5 months respectively. The longest duration of PD therapy was 83.7 months. More than two thirds of the patients were living with their families and were able to perform PD by themselves when therapy was initiated. More than 90% of the patients were dialyzed using automated cyclers.

As shown in Figure 1, patient survival was limited; few patients were alive at 5 years, and 42% were alive at 2 years. There was no statistically significant difference between the sexes with respect to mortality. Technique survival rates after 12 months were approximately 84% in these elderly patients compared with 88% in younger patients (Figure 2). Major reasons for technique failure in the elderly

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men/women</td>
<td>119/116</td>
</tr>
<tr>
<td>Caucasian/African American</td>
<td>211/24</td>
</tr>
<tr>
<td>Living with family</td>
<td>204</td>
</tr>
<tr>
<td>Autonomy performing PD</td>
<td>178</td>
</tr>
<tr>
<td>Diabetes</td>
<td>92</td>
</tr>
<tr>
<td>Cardiovascular disease</td>
<td>185</td>
</tr>
</tbody>
</table>

PD = peritoneal dialysis.
patients were psychosocial problems (41%), followed by peritonitis (25%).

Univariate analysis (log-rank test for life-table survival) showed no statistically significant difference in technique failure by various demographic factors such as sex or race. However, the technique survival rate was significantly lower in patients 85 years of age and older than in patients 75 – 84 years of age \( [\chi^2(1) = 6.01 \text{ Pr } \chi^2 = 0.0142] \).

From 2001 to 2010, the peritonitis rate for patients 75 years of age and older was 1 episode in 23.6 patient–months compared with 1 episode in 23.0 patient–months for all younger patients (Table II). The spectrum of causative organisms was similar in both groups. Gram-positive organisms were responsible of 53% of peritonitis episodes in elderly patients compared with 51% in younger patients. Staphylococcus epidermidis (38%) and S. aureus (5%) were the most common gram-positive organisms isolated. Gram-negative bacteria accounted for 22% of cases in elderly patients compared with 16% in younger patients. Escherichia coli was the most common gram-negative bacterium in elderly patients. Fungal peritonitis accounted for 5% of peritonitis episodes in elderly patients and 7% in younger patients.

Health-related QOL data from patients 75 years of age and older were compared with those from younger patients (Table III). In the elderly patients, the physical component scores of the SF-36 were lower, but the mental component scores were higher. The global QOL assessments were not different between younger and elderly patients. Depression scores as assessed by the Beck Depression Inventory and the Patient Health Questionnaire 9 were not different in the two groups.

### Discussion and conclusions

Recent registry data from both Europe and the United States indicate a dramatic increase in incident dialysis patients more than 75 years of age (1,17). Treating those patients involves handling challenges such as multiple comorbidities and physical disabilities that can limit the ability to cope with the burden of dialysis (15,16). Controversy therefore exists about the best treatment option for elderly patients with ESRD.

Some authors suggest that PD is a good dialysis option in this group (4,12). Several studies have shown that clinical outcomes, functional status, and QOL do not differ significantly in elderly patients maintained on PD or on hemodialysis (18,19). However, in the United States, PD utilization remains low in elderly ESRD patients (1).

### Table II

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Group 1 (≥75 years)</th>
<th>Group 2 (&lt;75 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall rate (ep/pt–mos)</td>
<td>1/23.6</td>
<td>1/23</td>
</tr>
<tr>
<td>Gram-positive episodes (%)</td>
<td>53</td>
<td>51</td>
</tr>
<tr>
<td>Gram-negative episodes (%)</td>
<td>22</td>
<td>16</td>
</tr>
<tr>
<td>Fungal episodes (%)</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Culture-negative episodes</td>
<td>19</td>
<td>26</td>
</tr>
<tr>
<td>and others (%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ep = episode; pt–mos = patient–months.

### Table III

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group 1 (≥75 years)</th>
<th>Group 2 (&lt;75 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (years)</td>
<td>81±5</td>
<td>66±6</td>
</tr>
<tr>
<td>SF-36 MCS</td>
<td>54.8±10.0</td>
<td>47.4±7.4</td>
</tr>
<tr>
<td>SF-36 PCS</td>
<td>33.0±9.9</td>
<td>36.7±8.6</td>
</tr>
<tr>
<td>PA-QOL</td>
<td>6.8±1.7</td>
<td>6.7±1.3</td>
</tr>
</tbody>
</table>

MCS = mental component score on the SF-36; PCS = physical component score on the SF-36; PA-QOL = patient global quality-of-life assessment.
The reason for this lower PD utilization in elderly patients is most likely multifactorial (20). Concern has been expressed about the problems of technique failure, increased peritonitis rates, physical and mental disabilities, and poorer QOL in elderly PD patients. The present study clearly suggests those domains do not present problems for elderly patients. In the first year, technique survival rates were not significantly worse in patients 75 years of age and older than in younger patients. Peritonitis rates also were not different in older and younger patients.

Some authors have suggested that bowel translocation of enteric organisms might occur more commonly in elderly patients. Our findings indicate that gram-negative pathogens might account for a slightly higher percentage of peritonitis episodes in the elderly. That finding should be examined more closely in a larger cohort.

Measures of QOL in the present study suggest that the psychological adjustment to PD therapy is similar in elderly and in younger patients. Scores on the depression, global QOL, and SF-36 questionnaires were similar or slightly better in elderly patients. Those findings support results from other studies, which have suggested that perception of QOL in elderly patients on PD is in fact a reason to consider PD therapy in this group of ESRD patients (12,18).

Disclosures
The authors have no financial conflicts of interest to declare.

References


Corresponding author:
Ana E. Taveras, MD, Hospital of Saint Raphael, 1450 Chapel Street, New Haven, Connecticut 06511 U.S.A.
E-mail: anataveras@hotmail.com, ataveras@srhs.org