Patient Ratings of Dialysis Care
With Peritoneal Dialysis vs Hemodialysis

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EARLY 100,000 PATIENTS WITH incidental end-stage renal disease (ESRD) in the United States must choose between hemodialysis and peritoneal dialysis each year in light of a limited number of donor kidneys for transplantation.1 Since the 1970s, patients have had the choice of these 2 modalities. Hemodialysis is usually performed in an outpatient dialysis facility 3 times a week for 3 to 4 hours, where trained nurses and technicians carry out the prescribed treatment using a dialysis machine under the direction of a physician.

In contrast, peritoneal dialysis is most commonly performed every day at home by the patient after receiving training by dialysis facility staff. Physicians can prescribe peritoneal dialysis using manual exchanges of dialysate fluid (continuous ambulatory peritoneal dialysis [CAPD]) 4 to 5 times a day or automated exchanges in which a cycler is used to fill and drain the peritoneum with dialysate fluid usually at night while asleep (continuous cycling peritoneal dialysis). Because peritoneal dialysis is done at home, patients do not have to visit the facility as often (eg, once per month), although they may be in contact with dialysis facility staff. Hemodialysis requires establishing access to the vasculature through an arteriovenous fistula, graft, or catheter, whereas peritoneal dialysis requires establishing access to the peritoneal cavity using a peritoneal catheter.

Research has yielded conflicting results about mortality differences between the 2 modalities; studies with better adjustment for comorbidities have found either no mortality differences or better survival with peritoneal dialysis, especially in the first 2 years after starting dialysis.2-4 On a per-treatment basis, both hemodialysis and peritoneal dialysis are efficacious in remov-

Context In light of conflicting evidence of differential effects of dialysis modality on survival, patient experience becomes a more important consideration in choosing between hemodialysis and peritoneal dialysis.

Objective To compare patient satisfaction with hemodialysis and peritoneal dialysis in a cohort of patients who have recently begun dialysis.

Design and Setting Cross-sectional survey at enrollment in a prospective inception cohort study of patients who recently started dialysis at 37 dialysis centers participating in the Choices for Healthy Outcomes in Caring for End-stage Renal Disease (CHOICE) study, a national multicenter study of dialysis outcomes, from October 1995 to June 1998.

Patients Of 736 enrolled incident dialysis patients, 656 (89%) returned a satisfaction questionnaire after an average of 7 weeks of dialysis.

Main Outcome Measure Data collected from a patient-administered questionnaire including 3 overall ratings and 20 items rating specific aspects of dialysis care.

Results Patients receiving peritoneal dialysis were much more likely than those receiving hemodialysis to give excellent ratings of dialysis care overall (85% vs 56%, respectively; relative probability, 1.46 [95% confidence interval, 1.31-1.57]) and significantly more likely to give excellent ratings for each specific aspect of care rated. The 3 items with the greatest differences were in the domain of information provided (average of information items: peritoneal dialysis [69% excellent] vs hemodialysis [30% excellent]). The smallest differences were in ratings of accuracy of information from the nephrologist, response to pain, amount of fluid removed, and staff availability in an emergency. Adjustment for patient age, race, education, health status, marital status, employment status, distance from the center, and time since starting dialysis did not reduce the differences between peritoneal dialysis and hemodialysis patients.

Conclusions After several weeks of initiating dialysis, patients receiving peritoneal dialysis rated their care higher than those receiving hemodialysis. These findings indicate that clinicians should give patients more information about the option of peritoneal dialysis.

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PATIENT RATINGS OF PERITONEAL DIALYSIS VS HEMODIALYSIS

The Choices for Healthy Outcomes in Caring for End-stage Renal Disease (CHOICE) study is a prospective cohort study to investigate treatment choices and outcomes of dialysis care among patients beginning dialysis. Eligibility criteria for enrollment included initiation of chronic outpatient dialysis in the preceding 3 months, ability to give informed consent for participation, age older than 17 years, and the ability to speak English or Spanish. The Johns Hopkins University School of Medicine institutional review board and the review boards for the clinical centers approved the study protocol. All patients provided written informed consent.

From October 1995 to June 1998, 1041 participants were enrolled at 81 dialysis centers associated with Dialysis Clinic, Inc (Nashville, Tenn; n=923), New Haven CAPD (New Haven, Conn; n=86), or Saint Raphael’s Hospital (New Haven, Conn; n=32). As part of the baseline evaluation, we obtained patient ratings of their dialysis care. Of the 81 participating dialysis centers in the CHOICE study, 37 centers in 14 states offered both hemodialysis and peritoneal dialysis and were included in this comparison.

Methods

Study Design and Sample

The Choices for Healthy Outcomes in Caring for End-stage Renal Disease (CHOICE) study is a prospective cohort study to investigate treatment choices and outcomes of dialysis care among patients beginning dialysis. Eligibility criteria for enrollment included initiation of chronic outpatient dialysis in the preceding 3 months, ability to give informed consent for participation, age older than 17 years, and the ability to speak English or Spanish. The Johns Hopkins University School of Medicine institutional review board and the review boards for the clinical centers approved the study protocol. All patients provided written informed consent.

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Measures and Data Collection

Dialysis modality at baseline was defined as the modality at 4 weeks after enrollment in the study. All forms of peritoneal dialysis were combined as a single category. Measures included a validated, chart-based comorbidity and severity of illness measure, the Index of Coexistent Disease (ICED), as well as self-administered questionnaires containing demographic and health status measures and evaluations of care. Health status measures included the Medical Outcomes Study 36-Item Short-Form Health Survey (MOS SF-36), incorporating both physical and mental health status domains, as well as scales developed specifically to supplement the MOS SF-36 for ESRD patients that have been described elsewhere. The developmental and final versions of the questionnaire assessing patient evaluations and satisfaction of care have been described elsewhere. Briefly, the 23-item instrument was developed using focus groups of patients receiving hemodialysis and peritoneal dialysis. From the focus groups, more than 100 items were prioritized by a sample of 86 dialysis patients to construct the instrument. Domains included nephrologists’ availability, technical quality, interpersonal treatment, information, and coordination; nurses’ and dialysis center staff’s availability, technical quality, interpersonal treatment, response to pain, and information; and social worker availability. Three global questions on overall quality were also included. For each question the response set consisted of 5 categories: poor, fair, good, very good, and excellent.

The printed questionnaire in English or Spanish including health status and patient evaluation measures was given to patients to complete during their enrollment visit. Patient names were not written on the survey and an envelope was provided for the patients to seal their completed surveys to protect the confidentiality of their response.

Data Analysis

Differential completion by dialysis modality could bias results if questionnaire respondents were more or less satisfied than nonrespondents. Therefore, we compared demographic and clinical characteristics of respondents and nonrespondents. In bivariate analyses, we compared demographic and clinical characteristics of peritoneal dialysis and hemodialysis respondents using differences in proportions with 95% confidence intervals (CIs) for categorical variables and differences in means with 95% CIs for continuous variables.

In bivariate analyses, the proportions of excellent ratings of each item were compared for patients receiving hemodialysis and peritoneal dialysis. We also examined the relationship of other patient characteristics to the proportion of excellent ratings to explore potential confounders of the relationship between modality and ratings of care. In multivariable analyses, we used
multiple logistic regression analysis to examine the presence, strength, and independence of the relationship between modality and patient ratings of their care. We used the generalized estimating equation model to take into account potential dialysis center effects on patient ratings of care. \(^4\) Patient age, sex, race, educational level, marital status, occupational status, comorbidity (ICED), self-rated health status (the 2 component subscales of the MOS SF-36, the Mental Component Score [MCS] and the Physical Component Score [PCS]), distance from dialysis center, and time since starting dialysis were used as adjustment variables. Adjusted probabilities of excellent ratings for peritoneal dialysis compared with hemodialysis were calculated from the logistic regression analyses, adjusting to distribution of patient characteristics present in the hemodialysis sample.

We performed sensitivity analyses under various conditions to test the robustness of our analysis: (1) using propensity scores calculated from all independent variables rather than all variables to calculate adjusted probabilities of an excellent rating; (2) grouping very good and excellent vs all other scores, rather than excellent vs all other scores; (3) using ordinal logistic regression analyses rather than logistic regression; and (4) including all clinics regardless of modalities offered in- ducing distribution of patient characteristics present in the hemodialysis sample.

We also conducted these analyses within various subgroups to determine if the relationships held for all types of patients. Subgroups were created dichotomizing each patient characteristic in the model and included the following: those younger than 65 years, those 65 years or older, males, females, whites, nonwhites, those employed, those not employed, those with MOS SF-36 MCS scores less than 47.2 (median value), those with MCS scores of 47.2 or higher, those with lower ICED scores (0-1), those with higher ICED scores (2-3), those who lived at least 48 km from the dialysis center, those who lived less than 30 miles from the dialysis center, those who had been receiving dialysis less than 43 days, and those who had been receiving dialysis for 43 days or more. The level of significance was \(P = .05\) and Stata software version 7.0 (Stata Corp, College Station, Tex) was used for all analyses.

RESULTS

Patient Characteristics

Among the 736 patients receiving both dialysis modalities, 95% agreed to complete surveys and 656 (89%) responded, 521 (71%) with complete questionnaires and an additional 135 (18%) with partially complete questionnaires. These responding patients had been receiving dialysis an average of 7 weeks (range, 0-26 weeks) at the time they completed the baseline satisfaction questionnaire. Among the 480 eligible hemodialysis patients, 336 (92%) responded; 107 (22%) of those eligible returned partially complete questionnaires. There were no statistically significant differences between hemodialysis respondents and nonrespondents, although there was a marginally significant finding that respondents were more likely to be high school graduates (68.0% of respondents vs 51.9% of nonrespondents, \(P = .08\)).

Among 256 peritoneal dialysis patients, 189 (85%) responded, 28 (11%) with partially complete questionnaires. Among peritoneal dialysis patients, respondents were more likely than nonrespondents to be white (80.2% vs 60.5%, \(P = .004\)), and there were marginally significant differences in mean age (respondents, 54.6 years; nonrespondents, 49.9 years; \(P = .06\)) and ICED score (score of 2-3: respondents, 51.6%; nonrespondents, 37.2%; \(P = .08\)).

A greater proportion of peritoneal dialysis patients than hemodialysis patients were white, married, high school graduates, working full- or part-time, and living more than 30 miles from the dialysis center (TABLE 1). Although self-reported health status scores were similar among patients receiving the 2 modalities, patients receiving peritoneal dialysis were much less likely than hemodialysis patients to have comorbidity, as measured by the ICED score, at the start of dialysis.

Characteristics Associated With Excellent Ratings and Center Recommendation

Bivariate analyses of relationships of patient characteristics to ratings showed that age, education, marital status, employment, time since starting dialysis, and self-reported health status scores were not statistically significantly associated with the likeli-
hood of giving excellent overall ratings. Whites were more likely to rate care excellent overall than nonwhites were (69% vs 57%, respectively, \(P = .003\)). Those who lived 48 km or more from dialysis centers were also more likely to rate care excellent overall than those who lived less than 48 km away (75% vs 63%, respectively, \(P = .03\)). Those with less vs more comorbidity/disease severity (73% vs 61%, respectively, \(P = .002\)) were more likely to rate care excellent overall.

There were fewer associations between patients’ characteristics and their indicating that they would definitely recommend their dialysis centers to others. A greater percentage of working than nonworking respondents (87% vs 78% respectively, \(P = .04\)) would definitely recommend their center. Those who had started dialysis more recently (<43 days) were more likely to report that they would recommend their center to others than those who had been receiving dialysis for a longer time (70% vs 61%, respectively, \(P = .03\)). In addition, 86% of those with better than average mental health (MOS SF-36 MCS scores = 47.2) vs 74% of those with poorer mental health \((P < .001)\) indicated that they would definitely recommend their center to others.

**Item Rankings for Hemodialysis and Peritoneal Dialysis Patients**

The best rated (unadjusted) items overall were similar for both modalities: “caring and concern of nurses,” “caring and concern of dialysis center staff,” “attention to cleanliness,” “response to pain,” and “availability in emergencies” (Table 2). Four of the 5 worst-rated items overall were the same for peritoneal dialysis and hemodialysis patients: “coordination among nephrologists and other doctors,” “how often the nephrologist sees you,” “the amount of fluid removed during dialysis,” and “the accuracy of nephrologist’s information.” For peritoneal dialysis patients, the other item rated in the 5 worst was “ease of reaching the nephrologist,” whereas this item ranked 14/20 in hemodialysis patients’ ratings. For hemodialysis patients, the other item in the 5 worst (17/20) was “the amount of information given to help choose hemodialysis or peritoneal dialysis”; this item was ranked 8/20 by peritoneal dialysis patients.

**Ratings for Peritoneal Dialysis and Hemodialysis Respondents**

Peritoneal dialysis patients gave much higher ratings of care than hemodialysis patients (Table 2). Overall care was rated excellent by 85% of peritoneal dialysis vs 56% of hemodialysis patients. The specific items with the largest differences between the 2 modalities were “information given to help choose modality” and “the amount of dialysis information from staff.”

After adjustment to reflect the patient characteristics of the hemodialysis population including age, sex, education, employment, health status, comorbidity, time since beginning dialysis, distance from dialysis center, and dialysis center, a higher adjusted percentage of patients receiving peritoneal dialysis gave an excellent rating than those receiving hemodialysis for every one of the 23 items on the survey (Table 2). The items with the greatest adjusted ratio of probabilities of an excellent rating for peritoneal dialysis relative to hemodialysis patients concerned information given by dialysis staff. For the 3 items pertaining to information, on average, peritoneal dialysis patients would be 2.2 times as likely to give an excellent rating as similar hemodialysis patients. Items rated most similarly by peritoneal dialysis and hemodialysis patients were “response to pain,” “staff availability in emergency,” and “caring of dialysis staff.”

No patient demographic or health status variables were statistically significantly associated with overall excellent ratings of the quality of dialysis care, after adjustment for dialysis modality and center identity (data not shown). For the 22 other rating items, there also were few such associations; higher mental health scores (MOS SF-36 MCS) were associated with better ratings on 12 items, younger age on 8 items, white race on 3 items, high school graduate on 2 items, high school graduate on 3 items, and male sex on 1 item.

**Sensitivity Analyses**

Results of the 4 sensitivity analyses conducted were all consistent with the original analysis. For example, using all clinics rather than only clinics that provided both modalities, the relative probability of an excellent overall rating for those receiving peritoneal dialysis relative to hemodialysis was 1.40 (95% CI, 1.28-1.50), compared with the original analysis result of 1.46. Using propensity scoring and ordinal logistic regression, the odds ratios for excellent overall ratings for peritoneal relative to hemodialysis patients were also almost identical to those derived in the original analyses (3.59 and 3.55, respectively, vs 3.61). Collapsing very good and excellent ratings together provided a less sensitive measure of differences in opportunities for improvement, but this grouping maintained the higher relative probability of positive ratings among peritoneal patients than among hemodialysis patients (1.13 [95% CI, 1.05-1.17]).

**Subgroup Analyses of Patient Ratings**

Adjusted percentages of excellent overall quality ratings were higher for peritoneal dialysis than hemodialysis patients in all 16 subgroups examined, ranging from 1.14 to 1.79. This relative probability of an excellent rating was statistically significantly greater than 1 in all but 2 of the 16 subgroups: employed patients and those who lived 48 km or more from the dialysis center. These 2 subgroups each had fewer than 90 patients and limited power.

**COMMENT**

Patients receiving peritoneal dialysis were 1.5 times as likely to rate their dialysis care excellent overall than were patients receiving hemodialysis. This was true for patients with different demographic and health status charac-
teristics. In addition, peritoneal dialysis patients more often rated their care for many specific aspects more highly than hemodialysis patients did. This finding is important in light of the diminishing proportion of dialysis patients in the United States who are beginning renal replacement therapy with peritoneal dialysis.¹

This study highlights the need to improve information provided to patients, particularly information to help patients choose between hemodialysis and peritoneal dialysis. Information about choosing a dialysis modality was the single item rated most differently by patients in the 2 groups and was rated much higher by peritoneal dialysis patients. This suggests that more informed patients choose peritoneal dialysis more often, as has also been noted in the United Kingdom.¹⁵

We had hypothesized that peritoneal dialysis patients would rate some items less favorably than hemodialysis patients would, for example, ease of reaching their nephrologist. Peritoneal dialysis patients who visit the dialysis center less frequently might often make contact with their physician by telephone, whereas hemodialysis patients who visit a facility typically 3 times a week might be expected to have more opportunity to reach their physician in person. However, this item ranked in the bottom 5 ratings for peritoneal dialysis patients but was still rated higher by peritoneal dialysis than hemodialysis patients. Thus, despite

<p>| Table 2. Probabilities of Excellent Ratings by Hemodialysis (HD) and Peritoneal Dialysis (PD) Patients |
|-----------------|-----------------|-----------------|-----------------|</p>
<table>
<thead>
<tr>
<th>Satisfaction Domain and Item</th>
<th>No. of Excellent Ratings/No. of Respondents (%)*</th>
<th>PD Adjusted % (95% CI)†</th>
<th>Unadjusted Relative Probability (95% CI)</th>
<th>Adjusted Relative Probability (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nephrologist</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Correct amount of dialysis</td>
<td>123/384 (32) 110/187 (59)</td>
<td>56 (46-65)</td>
<td>1.84 (1.56-2.10)</td>
<td>1.75 (1.44-2.04)</td>
</tr>
<tr>
<td>Caring and concern</td>
<td>138/396 (35) 113/190 (60)</td>
<td>54 (44-63)</td>
<td>1.70 (1.45-1.94)</td>
<td>1.54 (1.26-1.81)</td>
</tr>
<tr>
<td>Availability</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Ease of reaching</td>
<td>122/396 (31) 98/191 (51)</td>
<td>46 (37-56)</td>
<td>1.67 (1.38-1.95)</td>
<td>1.49 (1.19-1.81)</td>
</tr>
<tr>
<td>Frequency of seeing</td>
<td>88/387 (23) 84/189 (44)</td>
<td>42 (33-52)</td>
<td>1.92 (1.50-2.37)</td>
<td>1.86 (1.43-2.31)</td>
</tr>
<tr>
<td>In mood to talk</td>
<td>140/392 (36) 112/192 (58)</td>
<td>55 (45-64)</td>
<td>1.63 (1.39-1.87)</td>
<td>1.53 (1.25-1.79)</td>
</tr>
<tr>
<td>Information</td>
<td></td>
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<tr>
<td>Accuracy of information</td>
<td>98/380 (26) 104/188 (35)</td>
<td>51 (41-61)</td>
<td>2.14 (1.79-2.49)</td>
<td>1.97 (1.58-2.35)</td>
</tr>
<tr>
<td>Accuracy of instructions</td>
<td>118/398 (30) 106/191 (56)</td>
<td>50 (40-60)</td>
<td>1.82 (1.53-2.11)</td>
<td>1.65 (1.33-1.97)</td>
</tr>
<tr>
<td>Coordination with other physicians</td>
<td>81/386 (21) 78/190 (41)</td>
<td>37 (28-48)</td>
<td>1.95 (1.54-2.40)</td>
<td>1.77 (1.33-2.26)</td>
</tr>
<tr>
<td>Dialysis Staff</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Interpersonal</td>
<td></td>
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<tr>
<td>Caring of nurses</td>
<td>226/396 (57) 160/193 (83)</td>
<td>80 (69-87)</td>
<td>1.44 (1.29-1.55)</td>
<td>1.39 (1.21-1.52)</td>
</tr>
<tr>
<td>Caring of staff</td>
<td>226/397 (57) 157/193 (81)</td>
<td>76 (66-84)</td>
<td>1.41 (1.26-1.53)</td>
<td>1.33 (1.15-1.48)</td>
</tr>
<tr>
<td>Response to pain</td>
<td>213/396 (54) 138/191 (72)</td>
<td>67 (56-76)</td>
<td>1.34 (1.17-1.48)</td>
<td>1.25 (1.05-1.42)</td>
</tr>
<tr>
<td>Technical aspects</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Amount of fluid removed</td>
<td>100/377 (27) 85/191 (45)</td>
<td>38 (29-48)</td>
<td>1.68 (1.35-2.02)</td>
<td>1.44 (1.10-1.81)</td>
</tr>
<tr>
<td>New medical problems</td>
<td>134/390 (34) 126/191 (66)</td>
<td>61 (51-70)</td>
<td>1.96 (1.67-2.20)</td>
<td>1.76 (1.48-2.02)</td>
</tr>
<tr>
<td>Attention to cleanliness of access site</td>
<td>213/392 (54) 152/192 (79)</td>
<td>75 (65-83)</td>
<td>1.47 (1.31-1.59)</td>
<td>1.39 (1.19-1.54)</td>
</tr>
<tr>
<td>Availability</td>
<td></td>
<td></td>
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<tr>
<td>Ease of reaching staff</td>
<td>185/396 (47) 140/192 (73)</td>
<td>68 (57-77)</td>
<td>1.57 (1.38-1.73)</td>
<td>1.45 (1.23-1.64)</td>
</tr>
<tr>
<td>Staff available in emergency</td>
<td>200/395 (51) 132/190 (70)</td>
<td>67 (56-75)</td>
<td>1.36 (1.18-1.52)</td>
<td>1.31 (1.11-1.49)</td>
</tr>
<tr>
<td>Ease of seeing social worker</td>
<td>145/392 (37) 130/192 (68)</td>
<td>64 (55-73)</td>
<td>1.83 (1.60-2.03)</td>
<td>1.74 (1.48-1.97)</td>
</tr>
<tr>
<td>Information</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Amount of information on choosing HD or PD</td>
<td>99/382 (26) 134/193 (69)</td>
<td>69 (57-78)</td>
<td>2.72 (2.35-3.04)</td>
<td>2.65 (2.21-3.02)</td>
</tr>
<tr>
<td>Information about fluid removal</td>
<td>126/392 (32) 127/193 (66)</td>
<td>62 (52-71)</td>
<td>2.05 (1.78-2.29)</td>
<td>1.92 (1.62-2.20)</td>
</tr>
<tr>
<td>Amount of dialysis information</td>
<td>129/394 (33) 137/193 (71)</td>
<td>68 (58-76)</td>
<td>2.18 (1.91-2.41)</td>
<td>2.07 (1.78-2.32)</td>
</tr>
<tr>
<td>Overall Ratings</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Quality of dialysis care</td>
<td>224/398 (56) 163/193 (85)</td>
<td>82 (74-89)</td>
<td>1.50 (1.36-1.59)</td>
<td>1.46 (1.31-1.57)</td>
</tr>
<tr>
<td>How much could be better?‡§</td>
<td>155/394 (39) 112/186 (60)</td>
<td>67 (55-77)</td>
<td>1.59 (1.31-1.83)</td>
<td>1.70 (1.39-1.95)</td>
</tr>
<tr>
<td>Would you recommend your center?§</td>
<td>298/400 (75) 175/192 (91)</td>
<td>90 (83-94)</td>
<td>1.22 (1.15-1.27)</td>
<td>1.20 (1.11-1.26)</td>
</tr>
</tbody>
</table>

Abbreviation: CI, confidence interval.

*The number of respondents included complete and partially complete questionnaires.

†Models for each item are adjusted for age (<40, 40-65, >65 years), sex (male vs female), education (high school degree vs not), marital status (currently married vs not married), employment status (currently employed full-time or part-time vs not employed), Index of Coexistent Disease score (0-1 vs 2-3), and Medical Outcomes Study Short-Form 36 Mental Component and Physical Component scores, distance from center (<48 km vs not), and time since starting dialysis.

‡Percentages and probabilities of the best possible response, “nothing at all.”

§Percentages and probabilities of the best possible response, “definitely yes.”

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seeing the same nephrologists and social workers in most cases and having fewer in-person contacts with them, peritoneal dialysis patients rated the same clinicians higher than their counterparts receiving hemodialysis at the same center. This may be because patients value availability whether by telephone or in person, but may also reflect intensive early interactions with nephrologists and social workers that diminish over time. At least in this early period, it is likely that clinicians do give better care to peritoneal dialysis patients in the dimensions of information and interpersonal treatment that patients value most highly, perhaps because patients must be better educated and supported by their clinicians to learn and accomplish home dialysis.

Dialysis patients often look to their nephrologists as their principal care provider, yet their substantial and growing burden of comorbidity necessarily involves the input of other physicians such as surgeons and radiologists for vascular access, cardiologists for the common occurrence of cardiovascular disease, emergency physicians for urgent after hours care, and sometimes primary care physicians for routine screening and preventive services. Our results suggest that coordination between nephrologists and other physicians needs improvement for all patients. This is a concern particularly for hemodialysis patients for whom it was the lowest-rated item on the survey. Coordination of care involves planning care; assigning and communicating clear responsibility for roles, tasks, and priorities by all involved persons; and sharing information across time, persons, and settings. Dialysis patients have a chronic illness for which they require evaluation and treatment by many physicians across multiple settings including hospitals, physicians’ offices, and dialysis facilities. Coordination is a challenge in light of the complexity of this illness and payment policy that may foster compartmentalization of care. To date, although the importance of coordinated care has been acknowledged,16,17 systemic changes to address this concern have been unsuccessful.18-21

In contrast to the pattern often seen in patient evaluations of inpatient care,22 nurses and center staff were rated much higher than physicians by both groups. This is probably a result of the regular involvement of staff in the care of dialysis patients at freestanding, often community-based, facilities and indicates how dependent patients may be on such staff. Current nursing shortages could pose a threat to the satisfaction of a growing number of dialysis patients in the United States.

Comparisons of dialysis modalities are difficult because randomized controlled trials in which clinicians and patients can be masked to treatment group are not feasible. Therefore, careful attention to case-mix adjustment is important. We found many differences between patients. In particular, the measure of the burden of comorbid diseases and their severity, the ICED, was greater in hemodialysis patients than peritoneal dialysis patients. We used multivariable methods to assess the effect of treatment modality on patient ratings independent of sociodemographics or health status. In addition, stratified analyses showed similar findings to our overall results in almost all of the subgroups analyzed.

Limitations of this study deserve comment. First, surveys can be biased if there is differential nonresponse in the groups being compared. The adjusted and stratified analyses make it less likely that response bias influenced our results, but this concern cannot be entirely dismissed. Peritoneal dialysis patients choose an active form of therapy and may be those with a greater sense of control over their lives preceding their choice of dialysis. This may translate to greater satisfaction with all their choices. However, one of the largest differences observed between patients receiving the 2 modalities was that peritoneal dialysis patients gave much higher ratings of the information they were given about the choice of modalities. This suggests that there is an opportunity to inform and encourage more patients to begin with peritoneal dialysis rather than hemodialysis, which may translate into patients feeling more in control of their lives.

Second, this study determined patients’ evaluations of dialysis care after an average of several weeks of dialysis. Ratings during this initial period are important because they could guide initial decisions about modality. Having highly rated care early in treatment can ease the lifestyle adjustments that patients often must make in living with a severe chronic illness and in their transition to dialysis care. However, it will be important to compare ratings of the 2 modalities later in dialysis once patients have had a chance to experience some of the complications of their chosen modality, and the data presented here do not address these later impressions.

Third, patient ratings are but one aspect of the quality of dialysis care; quality of life and measures of clinical performance established by health professionals are important supplements to this study. The importance of our results is predicated on previous re- search indicating that the modalities are comparable in clinical effectiveness as described earlier. Patient ratings, however, do predict change in clinicians23,24 and evaluate dimensions of care such as communication and interpersonal treatment that are not evaluated by any other method.

Fourth, although we adjusted our results to the hemodialysis population, inferences from observational studies must be made cautiously because of the possibility of selection and nonresponse biases referred to earlier.

Finally, our study was not a pure comparison of hemodialysis and peritoneal dialysis modalities, because what we have really compared is center-based hemodialysis with home-based peritoneal dialysis. The advantages of home-based peritoneal dialysis over center-based hemodialysis may also apply to home or limited care hemodialysis, and this is worthy of future study.

The results of this study may be of particular interest because peritoneal dialysis may be less costly than hemodialysis...
when all societal costs are considered. This might imply that the Medicare program in the United States could curtail costs substantially if more patients were started on peritoneal dialysis, while aligning care better with consumer preferences. Medicare’s current ESRD payments system, which pays similarly for each modality,25 may not achieve this result. For facilities, the components contributing to cost include capital (eg, facility and equipment), labor (eg, nurses, technicians), and supplies (eg, dialysate fluids, tubing). The capital and labor costs of hemodialysis are more expensive because patients receive care in a treatment facility 3 times a week under the supervision of staff. Medicare financial incentives currently may encourage clinicians to choose hemodialysis because once substantial investment in a hemodialysis facility has been made, the marginal costs of treating an additional patient are likely lower for a new hemodialysis patient than for a new peritoneal dialysis patient. Recent proposed changes in physician payment policy for home and in-center dialysis would pay physicians by the number of in-person contacts or visits and thus may create the unintended consequence of an even greater disincentive for physicians to provide home dialysis treatment, particularly in rural areas.26

Thus, changes in current and planned payment policies would need to occur for the Medicare program to realize the potential cost savings of more patients choosing peritoneal dialysis. On the other hand, in revising payment policies, care must be taken not to penalize physicians for fully informed patients who choose hemodialysis or for choosing hemodialysis when peritoneal dialysis is contraindicated.

In conclusion, our results that peritoneal dialysis patients rate their care more highly than hemodialysis patients suggest that nephrologists and primary care physicians should give greater consideration to peritoneal dialysis when patients are eligible for either modality, especially in light of no clear superiority in survival. More thorough information about choice of modality prior to the start of renal replacement therapy may lead more patients to choose peritoneal dialysis and lead to better patient satisfaction.

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REFERENCES


