Recent studies have suggested a relationship between depression—as assessed by the Beck Depression Inventory (BDI)—and mortality in end-stage renal disease (ESRD) patients. A recent study from the Dialysis Outcomes and Practice Patterns Study (DOPPS) indicated an association between mortality in a large cohort of hemodialysis patients and the patients' responses in the preceding 4 weeks to two questions on the Kidney Disease Quality of Life, Short Form (KDQOL-SF36): “Have you felt downhearted and blue?” and “Have you felt so down in the dumps that nothing could cheer you?”

A BDI score $\geq 11$ and a score $\leq 3$ for the two questions on the SF36 were considered to suggest the presence of depressive symptoms; both scores have been associated with increased mortality in hemodialysis patients. We aimed to examine the relationship of the two SF36 questions with depressive symptoms as assessed by the BDI.

All patients on chronic peritoneal dialysis (CPD) therapy and daily hemodialysis therapy in our units between June 2000 and January 2002 were asked to complete a BDI and an SF36. We recorded 135 tests in 80 CPD patients, and 76 tests in 17 daily hemodialysis patients. Correlation coefficients ($r^2$ values) of the responses to the two questions on the SF36 and the BDI scores demonstrated a significant relationship between the scores. The $r^2$ values for the CPD patients’ two SF36 responses and the BDI scores were $0.622$ and $0.506$; the $r^2$ values for the daily hemodialysis patients were $0.363$ and $0.317$. The sensitivity and specificity for each SF36 response to be $\leq 3$ when the BDI was $\geq 11$ were $82.4\%$ and $68.6\%$ for the “downhearted and blue” question and $65\%$ and $67\%$ for the “down in the dumps” question.

Whether the two questions on the SF36 that suggest depression can replace the BDI as a screening tool requires further study. Furthermore, it is unclear if the two questions on the SF36 are predictive of mortality because of their association with clinical depression or because of other issues.

**Key words**
Depression, BDI, SF36, sensitivity, specificity, correlation

**Introduction**
Depression is the fourth most disabling disease affecting people worldwide and the most common psychological disorder among patients with end-stage renal disease (ESRD) (1,2). Several studies by our group and others have suggested that moderate-to-severe depression occurs in 25%–50% of patients maintained on dialysis therapy (3,4). Our group has shown that depression, when recognized, can be successfully treated (5).

We have used the Beck Depression Inventory (BDI) as a self-administered screening tool for depression, and we have shown that patients with a BDI score $\geq 11$ had an 85% likelihood of meeting the standard criteria for clinical depression as given in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) (5). Thus, the BDI has become the standard instrument employed in our unit to screen patients for depression, as it has for many clinicians studying depression in ESRD patients.

Recent studies have suggested a relationship between depression and mortality in a wide variety of medical illnesses (6–9) and in patients with ESRD (10,11). Kimmel et al. (11) demonstrated that clinical depression, as assessed by the BDI, was associated with increased mortality in patients maintained on hemodialysis. Lopes et al. (10) similarly linked mortality with depressive symptoms in a large cohort of hemodialysis patients. Rather than using the BDI as the screening tool for depression, Lopes recorded a patient’s self-reported response to two questions on the Kidney Disease Quality of Life, Short Form (KDQOL-SF36): “Have you felt downhearted and blue?” and “Have you...
felt so down in the dumps that nothing could cheer you?” Patients who responded feeling that way “a good bit of the time” or more frequently were noted to have a 40% increased mortality.

We decided to examine if the patient’s response to the two questions used by Lopes et al. on the SF36 correlated with a BDI score ≥ 11. The purpose of the present study was to examine the correlation of the responses to the two SF36 questions with the BDI score, and to assess the specificity and sensitivity of those two questions as compared with a BDI score ≥ 11.

Patients and methods
Between June 2000 and January 2002, we prospectively asked patients in our unit maintained on either continuous peritoneal dialysis (CPD) therapy or daily hemodialysis therapy to complete a BDI and an SF36. The patients maintained on CPD therapy completed both assessments at 6-month intervals; the daily hemodialysis patients completed the assessments at 3-month intervals. All of the results are included in the present study.

The CPD patients were maintained on peritoneal dialysis therapy in our unit in New Haven, Connecticut. The daily hemodialysis patients were maintained on daily hemodialysis 6 days per week (except Sunday) in our unit in Branford, Connecticut. The structure and function of each unit’s operation have been described elsewhere (12 and unpublished data).

The BDI is a self-administered assessment. It asks patients to rate their response to 21 different statements on a scale of 0 – 3. The maximum score for the BDI is 64. The SF36 includes the two questions—“Have you felt downhearted and blue?” and “Have you felt so down in the dumps that nothing could cheer you?”—that are indicative of depressive symptomatology (10). Patients rated each question, choosing a number between 1 and 6 to best describe their response. A response of 6 means that the patient feels this way “none of the time.” A response of 3 means that patient feels this way “a good bit of the time”; a 2, “most of the time”; and a 1, “all of the time.”

In this study, a BDI score ≥ 11 and an SF36 response ≤ 3 on the two questions at issue were accepted as suggesting the presence of depressive symptomatology. We used a BDI score ≥ 11 because our group showed that patients with a BDI score ≥ 11 had an 85% increased likelihood of having clinical depression (5). A patient’s self-reported response ≤ 3 for each of the two questions on the SF36 was used because of recent work by Lopes et al. (10) indicating that scores in that range were associated with an increase in mortality in a large cohort of patients maintained on hemodialysis.

The BDI and the SF36 assessments were both completed independently by the patient at the same time. The BDI was scored and the SF36 responses to the two questions were recorded by the social worker at the facility. The social worker did not assist any patient in the completion of either assessment.

Correlation coefficients ($r^2$ values) were determined using Microsoft Excel for Windows XP. A BDI score ≥ 11 was compared to the two questions on the SF36 to determine the sensitivity and specificity of those two questions to detect depression when BDI ≥ 11 was used as our standard test for diagnosing depression.

Results
Eighty CPD patients completed 135 BDI assessments and SF36 responses. Seventeen daily hemodialysis patients completed 76 BDI assessments and SF36 responses. Table I shows the demographic features of the patients maintained on CPD therapy and daily hemodialysis therapy. No significant differences were observed in any feature among the patients in the two groups.

Correlation coefficients ($r^2$ values) between the two SF36 questions and the BDI assessments demonstrated a significant relationship between the scores (Table II). Table III outlines the sensitivity and specificity of a patient’s response < 3 to either question on the SF36 with a BDI score ≥ 11.

Discussion
The BDI has become the standard screening instrument used to evaluate patients for depression (4,5). Kimmel et al. (11), using the BDI assessment, showed that hemodialysis patients with BDI scores ≥ 11 have a significantly higher mortality than patients with BDI scores < 11. Previous studies by our group showed that patients with a BDI score ≥ 11 have an 85% likelihood of having clinical depression when assessed by direct interview and diagnosed by DSM-IV criteria (5).

Recently, Lopes et al., as part of the Dialysis Outcomes Quality Initiative, showed that a patient’s self-reported response to two questions on the
KDQOL-SF—“Have you felt downhearted and blue?” and “Have you felt so down in the dumps that nothing could cheer you?”—were associated with mortality in a very large cohort of hemodialysis patients (10). Lopes did not use the BDI as the screening tool for depression; the responses to the two KDQOL-SF questions were interpreted as suggesting the presence of depressive symptoms.

Conclusions
Our results clearly show a strong correlation between a BDI score \( \geq 11 \) and a response \( \leq 3 \) for the two questions on the KDQOL-SF. However, what is being measured with the two KDQOL-SF questions is debatable. The sensitivity and specificity of those questions for identifying patients with depression is uncertain. The questions are 82% and 65% sensitive, but only 69% and 67% specific, in identifying patients with BDI scores \( \geq 11 \).

Depression is the fourth most disabling disease worldwide, the most common psychological disorder among patients with ESRD, and a condition strongly associated with morbidity and mortality among patients with ESRD (1,2). Our current screening strategy using the BDI appears to be useful for screening for clinical depression in those patients. Whether the two questions that suggest depression on the SF36 can replace the BDI as a screening instrument for clinical depression requires further study. Furthermore, it remains to be determined if the predictive value, in terms of mortality, of the two questions that suggest depression in dialysis patients on the SF36 is due to the effects of depression or to other factors.

References
6 Frasure-Smith N, Lesperance F, Talajic M. Depres-


Corresponding author:
Fred Finkelstein, MD, New Haven CAPD, 136 Sherman Avenue, New Haven, Connecticut 06511 U.S.A.
Despite overwhelming evidence of enhanced survival and quality of life among end-stage renal disease (ESRD) patients treated with home hemodialysis (HHD) and home peritoneal dialysis (PD), use of those two modalities is decreasing. Our analysis of data obtained over the past 6 years reveals that, at the same time as the national ESRD population has grown by more than 33%, the fraction of those patients on home dialysis has decreased by 36%. Similar trends are observable in the State of Texas. At our institution, the percentage of ESRD patients receiving home dialysis dropped by 52% in 6 years. Our capture rate during the same interval ranged from 1% to 9% (mean ± standard deviation: 3.66% ± 2.64%). To improve the capture rate and to strengthen our home dialysis program, we adopted these measures: Nephrologists participated in dialysis education and explained renal replacement therapy (RRT) options to each patient and to accompanying family members. The home dialysis coordinator later met with the patients individually. The new patients were then encouraged to meet with patients already enrolled in the home dialysis program. Finally, patients choosing home dialysis were given a questionnaire to rank their reasons for selecting that modality.

From April 2001 to July 2002, we initiated 136 patients onto dialysis. Of those patients, 118 selected in-center hemodialysis and 18 chose home dialysis, representing a capture rate of 13% and resultant growth of 117% in our home dialysis program. Our survey revealed that the prime reason for selection of home dialysis was independence (31%), followed by physician guidance, coordinator education, and work schedule (17% each). Familial assistance, familial employment, and privacy were less important (7%, 7%, and 3% respectively).

We conclude that, by devoting more time to patient education and discussion of RRTs, nephrologists and dialysis coordinators can significantly increase home dialysis enrollment.

Promoting Use of Home Dialysis

Key words
Home dialysis, home hemodialysis, dialysis education

Introduction
Home dialysis, including both home hemodialysis (HHD) and peritoneal dialysis (PD), has repeatedly been shown to be advantageous as compared with in-center dialysis. Studies have reported higher survival rates, enhanced quality of life, and overall cost-effectiveness among patients on home-based modalities (1). Challenges to those claims have been made based on a supposed selection bias, whereby the patient population undergoing home dialysis was younger and healthier. However, controlled studies matched for age, race, sex, diabetes, and comorbidities continue to support the use of home dialysis (2–5). Subjectively, patients undergoing home dialysis lead happier and more independent and productive lives. Still, PD and HHD remain underutilized at our institution, nationally, and worldwide. Even more worrisome is the fact that home-based modalities are used less with each passing year (6). Given the advantages of home dialysis, it is imperative that we identify the reasons why PD and HHD are underused and that we develop strategies to overcome those reasons.

A study conducted at our institution noted a significant decrease in enrollment in the PD program from 1996 to 2001 (7). That trend was similar to statewide and national trends in PD utilization (8). Comprehensive patient education programs have been shown to increase patient selection of home dialysis modalities (9). In response to the above findings and in an attempt to strengthen our home dialysis program, providers at our institution began to offer more rigorous patient education at the time of dialysis initiation and before modality selection. Nephrologists actively participated in dialysis education and discussion of renal replacement therapies (RRTs) with each patient. Treatment options included in-center hemodialysis (ICH), HHD, PD, and the choice to forgo treatment. The advantages and disadvantages of each choice were explained. The home dialysis coordinator later met with the patients individually. At that encounter, each mo-
dality was again described and demonstrations were provided when available. The current study was designed to assess the effectiveness of those endeavors.

Patients and methods
From April 2001 to July 2002, nephrologists and the home dialysis coordinator counseled all patients who presented to University of Texas Medical Branch potentially requiring RRT. The attending nephrologist explained in detail all of the available dialysis modalities, including ICHD, HHD, and PD. Patients who opted for PD were made aware that the possibility of continuous cycling peritoneal dialysis (CCPD) or continuous ambulatory peritoneal dialysis (CAPD) depended on peritoneal transport properties.

Pre-dialysis education by the attending nephrologist
In a relaxed manner, at every office visit, the attending nephrologist explained the advantages and disadvantages of all modalities to the patient and to the patient’s immediate family members. The patient and the family members were then introduced to the home dialysis coordinator, who further continued the education process.

Dialysis education by the home dialysis coordinator
The home dialysis coordinator met individually with the patient and the family members. The coordinator demonstrated the technique of PD on a mannequin. An educational video that demonstrates all the available RRTs was then shown to the patient and family members. The nurse–educator was available at all times to clear any doubts that they might have.

Meeting with current home dialysis patients
New patients were encouraged to meet with patients who were already performing PD and who were willing to meet with and to educate the new patients. Usually, such meetings were also encouraged among the patients who consented to participate in our education process.

Disposition meeting
The disposition team comprised the physician, nurse, social worker, technician, coordinator, and dietician, who met collectively with the patient and the family. The patient and the family members were all encouraged to express their expectations and concerns, if any, and the patient was thus accepted into the program.

Once the patient was enrolled in the chronic home dialysis program, a telephone survey of those who selected either PD or HHD was conducted to determine the most influential factor in the decision-making process. The survey was a 10-item questionnaire created by the dialysis nursing staff. Patients were asked to review and rank a list of seven criteria in order of importance to their decision to begin home dialysis. The decision factors listed included physician presentations, nurse–coordinator demonstrations, familial assistance, personal employment, familial employment, independence, and privacy. Additionally, patients were given the opportunity to provide reasons not listed in the survey.

Ranking was accomplished in three distinct ways. Participants were first asked to individually grade each factor based on how much it had influenced their decision to undergo home dialysis. Next, patients were asked to list the top three most influential factors. Finally, patients were asked to choose the single most important factor of the top three.

Results
From April 2001 to July 2002, we initiated 136 patients onto dialysis. Of those patients, 118 selected in-center hemodialysis, and 18 chose home dialysis, representing a capture rate of 13% and resultant growth of 117% in our home dialysis program. All patients who opted for home dialysis were surveyed for the present study. They were given a questionnaire that was used to rank the factors influencing their decision to opt for home dialysis. In addition to the 18 newly recruited home dialysis patients who received the questionnaire, other home dialysis patients received the same questionnaire to determine the factors that influenced their decision in favor of home dialysis. Patients placed in distant in-center dialysis facilities could not be surveyed because of ethical and confidentiality concerns.

Our patients rated education by the dialysis coordinator, autonomy, and familial support as the top three reasons for their selection of home dialysis; but, when asked to select the single most important factor for selecting home dialysis, they listed perceived autonomy as the most important, followed by instruction by the nurse–coordinator, education by the nephrologist, and ability to retain employment. Our survey revealed that the prime reason for selection of home dialysis was autonomy (31%), followed by phy-
sician guidance, coordinator education, and work schedule (17% each). Familial assistance, familial employment, and privacy were less important (7%, 7%, and 3% respectively; Figure 1). Owing to the small number of patients surveyed, the differences were not significant.

**Discussion**

The nephrology community universally agrees that PD remains underutilized, although most nephrologists concur that quality of life and survival on PD is superior to that on ICHD. Several surveys reveal that nephrologists perceive that utilization of PD remains suboptimal and that they would prefer to see greater use of home dialysis (10–15). The incidence and prevalence of patients with renal failure have been steadily growing. At the same time, the relative fraction of patients on home dialysis modalities remains very low and has seen a downward trend over the past 6 years (Figure 2). The cost of care for patients with renal failure is disproportionately increasing, mainly because most of those patients are being treated by ICHD. As compared with ICHD, PD is proven to be far less expensive without compromising quality of life (16–19).

Several concerns have been raised and several strategies have been proposed to arrest the decline of the trend of PD (20–23). Analysis of data from our center before the year 2000 revealed a steep decline in the trend of utilization of home dialysis (7). To halt that decline, we implemented the practices outlined in “Patients and Methods.” Among 136 patients initiated onto dialysis, 118 selected in-center hemodialysis and 18 chose home dialysis. As a result, our prevalent PD population rose to 33, up from 12 in 2000 and 15 in 2001 (Figure 3), representing a capture rate of 13% and resultant growth of 117% in our home dialysis program. That change is in contradistinction to prior capture rates of 1% – 3% (Figure 4).

Although we were convinced that the growth of our program was attributable mainly to the extra edu-
cation and counseling by the attending nephrologist, the individual instructions given by the nurse coordinator, and perhaps the sympathetic advice given by other patients, we wanted to know, from our patients’ perspective, what had most influenced them to select PD or HHD. The survey results, albeit small in number, reveal that the prime reason for selection of home dialysis was autonomy (31%), followed by physician guidance, coordinator education, and work schedule (17% each). Familial assistance, familial employment, and privacy were less important (7%, 7%, and 3% respectively).

Conclusions
We would like to conclude that to facilitate the growth of PD and HHD, which unquestionably are cost-effective and are probably the most preferred dialysis modalities, a concerted team effort by the attending nephrologist, the dialysis coordinator, and the home dialysis team, with the help of home dialysis patients, is obligatory. Our study concludes that, although our patients perceived autonomy to be the most important factor, the combined efforts of the attending nephrologist and the dialysis coordinator played an important role in facilitating our patients’ decision in favor of PD and HHD.

References
15 Thamer M, Hwang W, Fink NE, et al. U.S. nephrologists’ recommendation of dialysis modality:
Promoting Use of Home Dialysis


21 Oreopoulos DG, Blake P. Declining utilization of peritoneal dialysis: time to stop imposing our biases on the patients and let them be dialyzed with the modality of their choice. ASAIO J 2001; 47:312–15.


Corresponding author:
Mahendra Agraharkar, MD FACP, Nephrology Division, Department of Medicine, 4.200 John Sealy Annex, UTMB, 301 University Boulevard, Galveston, Texas 77555-0562 U.S.A.