Utility of the "Surprise" Question to Identify Dialysis Patients with High Mortality

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Background and objectives: Dialysis patients are increasingly characterized by older age, multiple comorbidities, and shortened life expectancy. This study investigated whether the "surprise" question, "Would I be surprised if this patient died in the next year?" identifies patients who are at high risk for early mortality.

Design, setting, participants, & measurements: This prospective cohort study of 147 patients in three hemodialysis dialysis units classified patients into "yes" and "no" groups on the basis of the "surprise" question response and tracked patient status (alive or dead) at 12 mo. Demographics, Charlson Comorbidity Index score, and Karnofsky Performance Status score were measured.

Results: Initially, 34 (23%) patients were classified in the "no" group. Compared with the 113 patients in the "yes" group, the patients in the "no" group were older (72.5 ± 12.8 *versus* 64.5 ± 14.9), had a higher comorbidity score (7.1 ± 2.3 *versus* 5.8 ± 2.1), and had a lower performance status score (69.7 ± 17.1 *versus* 81.6 ± 15.8). At 12 mo, 22 (15%) patients had died; the mortality rate for the "no" group was 29.4% and for the "yes" group was 10.6%. The odds of dying within 1 yr for the patients in the "no" group were 3.5 times higher than for patients in the "yes" group, (odds ratio 3.507, 95% CI 1.356 to 9.067, $P = 0.01$).

Conclusions: The "surprise" question is effective in identifying sicker dialysis patients who have a high risk for early mortality and should receive priority for palliative care interventions.

Incident dialysis patients are increasingly characterized by older age, a large number of comorbid illnesses, and a high symptom burden (1). They have a significantly shortened life expectancy and an overall mortality rate more than eight times that of the general Medicare population (2). Researchers and an expert panel have noted the need for improved palliative care for the US dialysis population (3–6). Palliative care begins with establishing the goals of care (7), and estimating the prognosis of dialysis patients sets the context for discussing goals (8–10).

The "surprise" question, "Would I be surprised if this patient died in the next 12 mo?" has been recognized as an innovation to improve end-of-life care by identifying patients who have a poor prognosis and who are appropriate for palliative care (11–13). The "surprise" question has been tested and found to be effective in a primary care population in the Franciscan Health System in Tacoma, WA (11), but not in chronic disease populations such as those with kidney disease. The purpose of this study was to study the clinical characteristics of dialysis patients who were classified into a "no, I would not be surprised" group in response to the "surprise" question and to determine the effectiveness of the use of the "surprise" question to identify a subset of dialysis patients who have a high risk for early death and should receive priority for palliative care interventions.

Materials and Methods

Patients

Between December 2005 and December 2006, we recruited 147 consecutive patients in three hemodialysis units in North Central West Virginia directed by nephrologists from the Section of Nephrology of the West Virginia University School of Medicine. To be eligible for inclusion, patients were required to be ≥18 yr of age, possess decision-making capacity, be able to speak English, and have been on dialysis for at least 3 mo. Informed consent was obtained from the patients before participation in this study. This research protocol was approved by the West Virginia University Institutional Review Board for the Protection of Human Subjects.

Clinical and Prognostic Factors

Previous systematic literature reviews have indicated that functional status and comorbidities are independent risk factors for early mortality in dialysis patients (8). At baseline, we recorded demographics, treatment parameters, Charlson Comorbidity Index (CCI) (14), Karnofsky Performance Status (8), McGill Quality of Life Single-Item Question (QOL) (15,16), and pain scores on a 10-cm visual analogue scale anchored at 0 (no pain) and 10 (worst pain imaginable). The pain score was calculated by measuring the distance from the 0 end of the scale and recording it numerically rounded off to the nearest centimeter. The

QOL question, "Considering all parts of my life—physical, emotional, social, spiritual, and financial—over the past 2 wk, the quality of my life has been very bad (0) to excellent (10)," has been validated in dialysis patients (15,16).

The demographics that were collected on each patient included age, gender, race, cause of ESRD, and duration of dialysis. Clinical parameters that were recorded for each patient were serum hemoglobin, serum albumin, and dialysis adequacy index (Kt/V) with each value based on the 3-mo average before the patient interview.

Study Design

Patients were enrolled in the study after providing informed consent. Face-to-face interviews were conducted during routine hemodialysis treatments of patients who gave consent. For each patient at the beginning of the study, the nurse practitioner who was primarily involved in the patient's long-term care in the dialysis unit, one from each of the three units, answered the "surprise" question on the basis of the patient's recent clinical course and overall well-being. The nurse practitioners classified patients into a "no, I would not be surprised" group and a "yes, I would be surprised" group. The nurse practitioners had been nurses for an average of 19 yr and nurse practitioners for an average of 9 yr. The benefits of nephrology nurse practitioners' functioning as primary care providers for dialysis patients as they did in this study have been described, and they have been noted to augment dialysis patient care and improve patient satisfaction with it (17). We followed patients for 1 yr and noted patient status (dead or alive) at 12 mo according to their "surprise" question classification at baseline.

Statistical Analysis

The data were divided into two independent groups on the basis of the response to the "surprise" question ("yes"/"no"). χ^2 analysis was used to compare the percentage of patients in the "yes" and "no" groups who were alive at 12 mo. T tests were used to compare the means of several continuous variables by "surprise" question grouping. Univariate and multivariate logistic regression models were used to determine variables that were most highly associated with patient status at 12 mo, alive or dead. Twelve variables were considered: Karnofsky Performance Status score, QOL score, visual analogue score, "surprise" question response group, CCI score, serum albumin, dialysis index, serum hemoglobin, gender, race, duration of dialysis (months), and age. The univariate results showed the effect of each variable as a stand-alone predictor of status at 12 mo, whereas the multivariate results showed which variables were the best predictors of status at 12 mo in the presence of the other variables. The Kaplan-Meier method was used to display the survival curves in mean days alive in 12 mo for

three variables: The "yes" and "no" groups in response to the "surprise" question, lower (<8) and higher (≥8) CCI score groups, and lower (<70) and higher (≥70) Karnofsky Performance Status score groups. For this analysis, the CCI score and the Karnofsky Performance Status score groups were bifurcated at the 25th percentile to approximate the 23% of patients who were classified into the "no" group in response to the "surprise" question. The Wilcoxon test was used to compare the survival in mean days alive between the two groups for each of the three variables. SPSS 15.0 for Windows (Chicago, IL) was used to perform the statistical analyses. $P < 0.05$ was considered statistically significant. Data are presented as means ± SD unless otherwise noted.

Results

Of 150 consecutive hemodialysis patients in three dialysis units, 147 (98%) agreed to participate in the study. Eighty-one (55%) patients were male; 88% were white and 12% were black. The cause of ESRD was diabetes for 40% of the patients, hypertension for 19%, glomerular disease for 6%, renal artery stenosis for 6%, polycystic kidney disease for 5%, interstitial nephritis for 3%, and unknown or the other for 21%. For 34 (23%) of the patients, the nurse practitioners said that they would not be surprised if the patient died within the next year. Compared with the "yes" patient group, the "no" patient group was older and had lower mean serum albumin and Karnofsky Performance Status scores and a higher mean CCI score (Table 1).

At 12 mo, 22 of the 147 patients had died, for an overall mortality of 15%. The mortality rate for the "no" group was 10 (29.4%) of 34 patients and for the "yes" group was 12 (10.6%) of 113 ($P = 0.032$).

In univariate logistic regression analysis, the "surprise" question response, the CCI score, and the Karnofsky Performance Status score were significantly associated with patient status at 12 mo (Table 2). For those for whom the "surprise" question was answered "no," the odds of dying within 1 yr were 3.507 times the odds of dying for those for whom the "surprise" question was answered "yes." For each 1-point increase in the CCI score, the odds of dying were 1.417 times higher than for those whose score was 1 less. In the multivariate analysis, only the CCI score was significantly associated with patient status at 12 mo (Table 3).

In the survival analyses, there was a significant difference in mean days alive at 12 mo between the "no" and "yes" response

Table 1. Demographics, quality of life, and prognostic factor scores[a]

Variable	All (n = 147)	"Yes" (n = 113)	"No" (n = 34)	P
Age (yr)	66.4 ± 14.8	64.5 ± 14.9	72.5 ± 12.8	0.005
Time on dialysis (mo)	38.9 ± 38.8	39.5 ± 41.0	36.7 ± 30.4	0.728
Serum albumin	3.9 ± 0.3	3.9 ± 0.3	3.7 ± 0.4	0.046
Pain visual analogue score	2.6 ± 3.2	2.7 ± 3.3	2.3 ± 3.0	0.575
McGill Quality of Life Question	6.7 ± 2.1	6.8 ± 2.1	6.4 ± 2.0	0.394
CCI score	6.1 ± 2.2	5.8 ± 2.1	7.1 ± 2.3	0.004
Karnofsky Performance Status score	80.0 ± 16.8	81.6 ± 15.8	69.7 ± 17.1	<0.001

[a]"Yes" indicates patients in the "yes, I would be surprised" group; "No" indicates the "no, I would not be surprised" group. CCI, Charlson Comorbidity Index.

Table 2. Univariate logistic regression analysis to predict status at 12 mo[a]

Predictor	OR (95% CI)	P
"Surprise" question response (reference = "yes")	3.507 (1.356 to 9.067)	0.010
CCI score	1.417 (1.099 to 1.826)	0.007
Karnofsky Performance Status score	0.964 (0.937 to 0.992)	0.012
Quality of Life score	0.859 (0.693 to 1.065)	0.166
Visual analogue scale	1.109 (0.962 to 1.279)	0.153
Serum albumin	0.329 (0.080 to 1.350)	0.123
Mean Kt/V	1.242 (0.238 to 6.489)	0.797
Serum hemoglobin	1.084 (0.692 to 1.699)	0.724
Gender	0.974 (0.392 to 2.420)	0.955
Race	0.324 (0.041 to 2.580)	0.287
Time on dialysis (mo)	1.006 (0.995 to 1.016)	0.293
Age	1.012 (0.980 to 1.045)	0.469

[a]CI, confidence interval; OR, odds ratio. For those for whom the "surprise" question was answered "no," the odds of dying within 1 yr were 3.507 times the odds of dying for those for whom the "surprise" question response was "yes." CCI indicates Charlson Comorbidity Index.

Table 3. Multivariate logistic regression analysis to predict status at 12 mo

Predictor	OR (95% CI)	P
"Surprise" question (reference = "yes")	2.448 (0.653 to 9.170)	0.184
CCI score	1.511 (1.047 to 2.181)	0.027
Karnofsky Performance Status score	0.985 (0.949 to 1.024)	0.449
Quality of Life score	0.972 (0.720 to 1.313)	0.854
Visual analogue scale	1.080 (0.908 to 1.283)	0.384
Serum albumin	0.681 (0.111 to 4.165)	0.677
Mean Kt/V	1.470 (0.216 to 10.014)	0.694
Serum hemoglobin	1.344 (0.699 to 2.582)	0.376
Gender	0.826 (0.225 to 3.028)	0.773
Race	0.442 (0.044 to 4.423)	0.488
Time on dialysis	1.010 (0.997 to 1.023)	0.122
Age	0.962 (0.911 to 1.016)	0.160

groups for the "surprise" question and the higher and lower groups for the CCI score (Figure 1). There was no difference in mean days alive at 12 mo for patients in the lower and higher Karnofsky Performance Status score groups (351.0 ± 33.6 *versus* 354.3 ± 32.0; $P = 0.473$).

Discussion

The dialysis patient population is among the sickest of patient populations. Dialysis patients have a high number of comorbid illnesses and a symptom burden comparable to that of cancer patients (18,19). They have a known shortened life expectancy, an annual mortality rate approaching 25%, and a high in-hospital mortality rate (2,3). Dialysis patients have been recognized as a patient population for whom palliative care is appropriate (1). There would be great utility in a simple screening assessment tool that would identify a subset of dialysis patients who are at the highest risk for early death. This study was conducted to assess whether the "surprise" question would be such a tool that would identify the sickest dialysis patients, those who unquestionably should receive priority for palliative care.

The intent of the "surprise" question is to counter the tendency of physicians to overestimate prognosis (11). The "surprise" question prompts clinicians to think about their patients in a new way. Instead of asking clinicians whether the patient *will* be dead in 1 yr, it asks them to consider whether they think that the patient's death in 1 yr is enough within the realm of possibility that it would not surprise them. In this respect, the "surprise" question is unlike other predictors of prognosis, such as the Acute Physiology and Chronic Health Evaluation II (APACHE II) system in which a derived score is associated with a particular likelihood of 1-yr survival (20). The "surprise" question has been found to be effective in helping physicians identify patients in a primary care population who are terminally ill and for whom palliative care referral is appropriate (11). It has not been previously tested in a rigorous manner in chronic disease populations (21), and, to our knowledge, this is
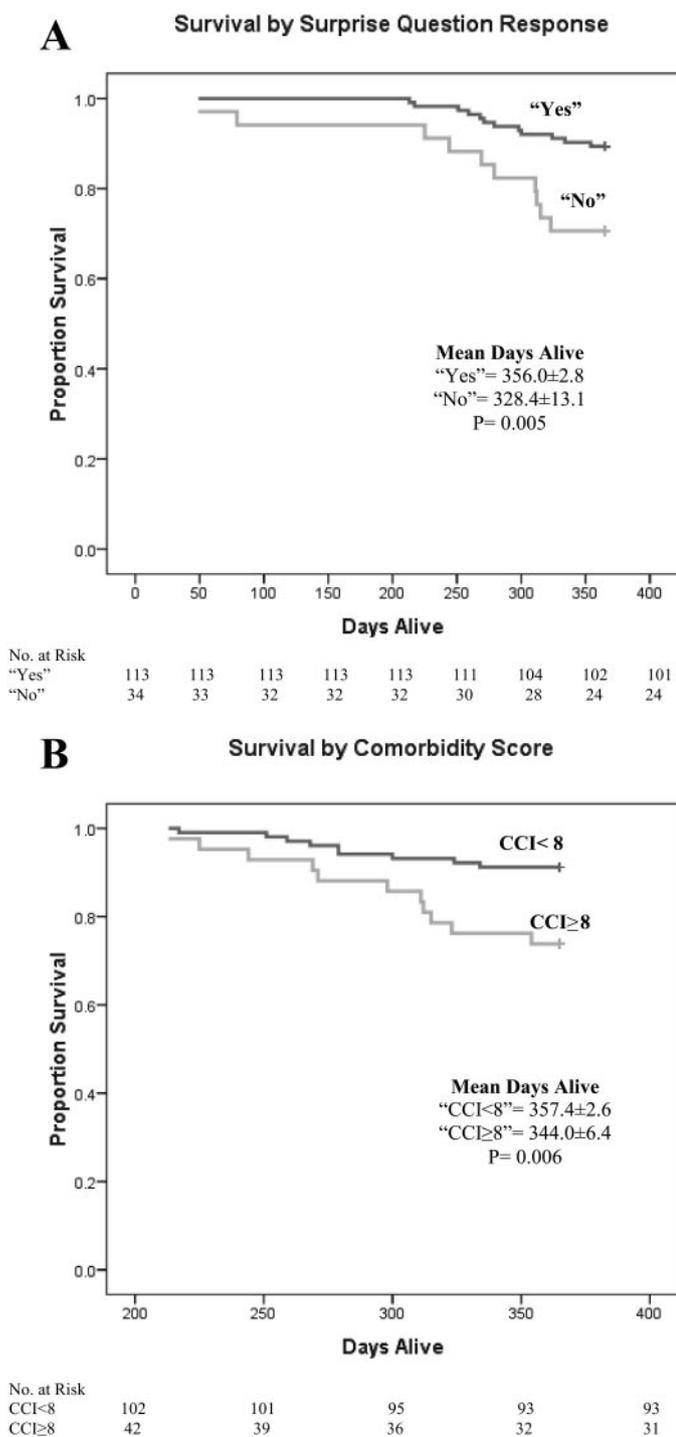
A

Survival by Surprise Question Response

Mean Days Alive
"Yes"= 356.0±2.8
"No"= 328.4±13.1
P= 0.005

No. at Risk									
"Yes"	113	113	113	113	113	111	104	102	101
"No"	34	33	32	32	32	30	28	24	24

B

Survival by Comorbidity Score

Mean Days Alive
"CCI<8"= 357.4±2.6
"CCI≥8"= 344.0±6.4
P= 0.006

No. at Risk					
CCI<8	102	101	95	93	93
CCI≥8	42	39	36	32	31

Figure 1. Survival curves for "surprise" question response and comorbidity score in days alive at 12 mo. Data are means ± SE. (A) Curves of "yes" and "no" response groups to the "surprise" question, "Would I be surprised if this patient died in the next year?" (B) Curves of the lower (<8) and higher (≥8) Charlson Comorbidity Index (CCI) score groups.

the first report of the use of the "surprise" question in dialysis patients.

In this study of dialysis patients, use of the "surprise" question was effective in identifying a subgroup of dialysis patients who were significantly sicker than the majority of dialysis patients who were being treated in the three dialysis units. At baseline, compared with the "yes" group, the "no" group was older, had more comorbid conditions, had a lower functional status, and had a worse nutritional status as reflected by a lower serum albumin level (Table 1). The odds of dying within 1 yr for the patients in the "no" group were 3.5 times higher than for patients in the "yes" group. In the univariate logistic regression analysis, the "surprise" question along with functional status and comorbidity score were the only three variables that were significantly associated with prediction of patient death at 12 mo. In a previous systematic literature review of dialysis patient studies, functional status and comorbidity along with age and nutritional status were the only variables that were independently associated with poor prognosis (8).

An answer to the "surprise" question is simpler to obtain than calculation of the CCI, which requires a chart review. Asking the "surprise" question is something that nephrologists and other nephrology clinicians could institute monthly on rounds to screen patients and identify those to refer for immediate palliative care consultation. Palliative care consultants are experts in pain and symptom management and advance care planning (7). Pain is known to be undertreated in dialysis patients (22,23), and in their training, most nephrologists are not prepared to manage pain in their patients (24). Because of the debilitated health state of patients in the "no" response group, advance care planning is particularly important to help these patients articulate and prioritize their goals of care in the context of their health state and to express their preferences regarding a proxy medical decision-maker, cardiopulmonary resuscitation, intubation and mechanical ventilation, tube feeding, circumstances in which they would want to stop dialysis, and dying at home with hospice care (25).

The "surprise" question identifies patients who are at highest risk for death, but because of their shortened life expectancy and high symptom burden, most dialysis patients are good candidates for palliative care. In absolute numbers, more patients in this study in the "yes" group died than in the "no" group. Nonetheless, the "surprise" question performed quite well because our dialysis population had an annual gross mortality of only 15%, significantly less than the average gross mortality of 24% reported for the ESRD dialysis population in the US Renal Data System (2). Despite this low mortality, it classified close to one quarter of patients in the "no" group. By all parameters known to predict mortality in ESRD, these patients in the "no" group were sicker than the patients in the "yes" group.

This study has several limitations. First, it was conducted in a dialysis patient population that is not as ethnically diverse as the US ESRD population. Only 12% of the patients in this study were black compared with 37% in the December 31, 2005, point prevalent dialysis population in the United States (2). Second, the study was conducted only of hemodialysis patients in three dialysis units in the same geographic region. Third, the study was conducted on the basis of the responses to the "surprise" question of a small number of clinicians: Three nurse practitio-

ners. Although the "surprise" question has been shown to be effective in helping primary care clinic–based physicians identify patients who are appropriate for palliative care (11), it is possible that the accuracy of the clinicians in our study might not be matched by others. It is also possible that physicians may be more accurate in classifying patients according to the "surprise" question than nurse practitioners. In favor of the approach used in our study is the finding of the efficacy and simplicity of the use of another single screening question—"Are you depressed?"—to identify patients who are appropriate for palliative care intervention in another patient population (26). This study also offers a simple way to distinguish better those patients whose death is not unexpected from those who "are not supposed to die," a major challenge to our health care system that is struggling with providing and measuring quality care at the end of life (27).

Conclusions

The "surprise" question worked quite well to identify a subset of hemodialysis patients with a high risk for early death in the next year. It identified those with older age, more comorbid illnesses, lower functional status, and lower serum albumin levels, factors that all have been independently determined to be predictors of mortality in dialysis patients (8). This study validates the use of the "surprise" question by nephrology nurse practitioners. Further research is needed to determine whether (1) the "surprise" question will work equally well or better in the hands of nephrologists as compared with nephrology nurse practitioners, (2) the "surprise" question will work in more ethnically diverse dialysis patient populations, and (3) use of the "surprise" question will lead to interventions that improve the quality of end-of-life care for dialysis patients.

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Disclosures

None.

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