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ORIGINAL ARTICLE

Quality of Life, Outcomes

Discrepancy in responses to the surprise question between hemodialysis nurses and physicians, with focus on patient clinical characteristics: A comparative study

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Abstract

Introduction: The surprise question (SQ) "Would I be surprised if this patient died within the next xx months" can be used by different professions to foresee the need of serious illness conversations in patients approaching end of life. However, little is known about the different perspectives of nurses and physicians in responses to the SQ and factors influencing their appraisals. The aim was to explore nurses' and physicians' responses to the SQ regarding patients on hemodialysis, and to investigate how these answers were associated with patient clinical characteristics.

Methods: This comparative cross-sectional study included 361 patients for whom 112 nurses and 15 physicians responded to the SQ regarding 6 and 12 months. Patient characteristics, performance status, and comorbidities were obtained. Cohen's kappa was used to analyze the interrater agreement between nurses and physicians in their responses to the SQ and multivariable logistic regression was applied to reveal the independent association to patient clinical characteristics.

Findings: Proportions of nurses and physicians responding to the SQ with "no, not surprised" was similar regarding 6 and 12 months. However, there was a substantial difference concerning which specific patient the nurses and physicians responded "no, not surprised", within 6 ($\kappa = 0.366$, $p < 0.001$, 95% CI = 0.288–0.474) and 12 months ($\kappa = 0.379$, $p < 0.001$, 95% CI = 0.281–0.477). There were also differences in the patient clinical characteristics associated with nurses' and physicians' responses to the SQ.

Discussion: Nurses and physicians have different perspectives in their appraisal when responding to the SQ for patients on hemodialysis. This may reinforce the need for communication and discussion between nurses and physicians to identify the need of serious illness conversations in patients approaching the end of life, in order to adapt hemodialysis care to patient preferences and needs.

KEYWORDS
comparative study, multi-professional, palliative care, renal dialysis, surprise question

1 | INTRODUCTION

The number of older and frail patients on maintenance hemodialysis with complex comorbidities has risen during the last decade.[1,2] Long-term survival with hemodialysis in this vulnerable group is poor and repeated hospitalizations common.[1–3] One year mortality after initiating hemodialysis for old and frail patients has been reported to be up to 50%.[4,5] In the last months of life many of these patients go through repeated surgical procedures, intensive care unit admissions, and dying in hospital is common, with unsatisfactory palliative care services.[6]

The Kidney Disease: Improving Global Outcomes (KDIGO) initiative has provided evidence-based guidelines for hemodialysis[7] and adherence to these treatment targets is associated with lower risk of mortality.[8] However, treatment goals in frail patients may not accord with recommendations based on findings in clinical trials.[9] Serious illness conversations can help patients on hemodialysis to identify and share their goals and preferences and assist healthcare professionals in adapting an individual plan to ensure good quality care.[10] These conversations are associated with increased palliative care utilization and likelihood that death will occur out of hospital,[11] but they occur infrequently in patients on hemodialysis.[12] Several predictors for mortality in hemodialysis have been evaluated,[13–15] and some have focused explicitly on prognosis in elderly patients.[16–20] The Charlson comorbidity index (CCI)[21] has been validated in a hemodialysis context and is widely used in longitudinal studies.[22] Also, scoring systems to predict outcomes in dialysis have been created.[23–26]

The surprise question (SQ) "would I be surprised if this patient died within twelve months" was originally developed to identify patients with palliative care needs.[27] It has thereafter been evaluated in different contexts and with different time frames.[28,29] It has also been evaluated for predicting mortality, as well as to identify patients approaching the end of life and being in need of serious illness conversations.[28,29] In a recent review,[29] the SQ, as a single question or in combination with other variables, was found to be the most common way to identify patients for serious illness conversations. It has also been proposed to be used by different professions in foreseeing the need of serious illness conversations and end of life dialogs.[28–30] In the hemodialysis context the SQ has been evaluated regarding 6[31] and 12 months[23,32–34] emanating from both nurses and physicians' perspectives.[31,32,35] An advantage of the SQ is that it readily captures a global assessment of patients' functional activity and disease severity[32,34,35] and significantly predict short-term mortality.[28,31,32,34,35] However, although the SQ is the most common way to identify patients in need of serious illness conversations there is little known about what nurses and physicians base their judgment on, and what patient clinical characteristics they take into account in their appraisal when answering the SQ.[29] Differences in perspectives regarding the need for serious illness conversations have also been described as challenging in communication between nurses and physicians.[36] An increased understanding of their different perspectives may promote interprofessional dialog and collaboration in identifying patients in need of serious illness conversations. This is important since, serious illness conversations in patients approaching the end of life is prerequisite for individualized hemodialysis treatment and care more consistent with patient preferences and needs. The aim of this study was therefore to explore responses to the SQ from nurses and physicians regarding patients on hemodialysis, and to investigate how these answers are associated with patient clinical characteristics.

2 | MATERIALS AND METHODS

In this comparative cross-sectional study data was collected between January 2020 and October 2021, from eight in-center hemodialysis facilities located at three university hospitals in Sweden. The study is part of a larger ongoing multicenter prospective project aiming to develop and evaluate an instrument to support the initiation of serious illness conversations with patients on hemodialysis approaching the end of life. At each in-center facility 20–90 patients with chronic kidney disease is treated with hemodialysis. At all facilities patients are treated in accordance with KDIGO guidelines and the alignment to these recommendations is documented monthly with routine local clinical evaluation and registered at least annually in the Swedish Renal Registry.[37]

Data were collected from hemodialysis nurses, physicians, and from the Swedish Renal Registry. In Sweden, trained registered nurses have the overall nursing responsibility for the patient including conducting the hemodialysis procedure. Registered nurses have access to medical records and are trained to understand medical guidelines for dialysis outcomes and to interpret and handle symptoms that may occur from medical conditions as well as the treatment. Each registered nurse usually has a primary responsibility for three to four patients on hemodialysis. No nurse practitioners or dialysis technicians have primary patient responsibility. Primary responsible physicians have special training in nephrology and have the medical responsibility for a larger group of patients treated with hemodialysis at the facility. Nurses and physicians have regular meetings where they have a dialog about the patients' health status and the patient's fulfillment to dialysis guidelines. Eligibility criteria regarding patients for which nurses and physicians responded to the SQ were all patients ≥18 years old, treated with in-center hemodialysis for ≥3 months at one of the eight hemodialysis facilities participating in the study.

2.1 | Variables

In the present study, nurses with special training in hemodialysis as well as physicians responded to the SQ both regarding the time frame of 6 and 12 months, that is, "Would I be surprised if this patient died within six months", and "Would I be surprised if this patient died within twelve months?". The response alternatives were "Yes, I would be surprised" or" No, I would not be surprised", coded as *yes*, *surprised*, and *no, not surprised* in the results.

Comorbidities were assessed with a modified version of CCI[21] and, in this study, registered by physicians for each patient for whom they had primary responsibility. Each comorbidity is weighted and the total CCI is scored from 0 to 29, where higher scores indicate a higher comorbidity burden. In the present study we used a version where lymphoma and leukemia are included in "any malignancy." For the statistical analyses the CCI was dichotomized by the median value (=5) into ≤5 and >5.

Patient performance status was scored by nurses using the ECOG/WHO Performance Status Scale,[38] indicating the patients' physical capability. ECOG/WHO Performance Status ranging from: 0 (Fully active) to 4 (completely disabled).[38] For the statistical analyses, performance status was categorized into 0, 1–2, and 3–4.

Patient characteristics were obtained from the Swedish Renal Registry. The selection of variables in the regression analysis was restricted to variables that have previously been shown to significantly associate with risk of mortality in patients on hemodialysis: older age, anemia (hemoglobin), chronic kidney disease mineral bone disorder (parathyroid hormone, phosphorus), degree of comorbidity, patients' lower physical capability, lower nutrition status (albumin), lower dialysis efficacy (Kt/V), and type of vascular access.[39–41] Dialysis time and urea pre- and post-dialysis are included in the calculation of std Kt/V and were therefore not included in the regression model.

2.2 | Study procedure

Physicians and nurses received a list of all patients that met the inclusion criteria and for whom they were primarily involved in the care. For each patient at the list, physicians and nurses were asked to give a written response to the SQ. Thus, each patient on hemodialysis was evaluated through the SQ by one nurse and one physician. In addition, physicians registered CCI,[21] and nurses recorded patient performance status using the ECOG/WHO Performance Status.[38]

The SQ was presented to nurses and physicians within ±1 month from the routine registration of clinical and laboratory data to the Swedish Renal Registry. Nurses and physicians were asked to respond to the SQ before assessing performance and CCI status, respectively, to avoid being overly affected by these certain aspects in their responses to the SQ. In addition, nurses and physicians were instructed to not discuss their respective responses with each other, as not to influence the answers.

2.3 | Statistical methods

Descriptive statistics are used to present characteristics of patients, nurses, and physicians. Mean values and standard deviation (SD) were applied for normally distributed continuous data, for non-normally distributed data median and interquartile range (IQR) are presented, and for categorial data frequencies and percentages were calculated. Comparisons of frequencies between nurses' and physicians' ratings of the SQ are presented in crosstabs. The interrater agreement was calculated using Cohens' kappa statistics and is interpreted as 0.00–0.19 nonagreement, 0.2–0.39 minimal agreement, 0.40–0.59 weak agreement, 0.60–0.79 moderate agreement, 0.80–0.90 strong agreement, and 0.9–1.00 almost perfect agreement.[42] To explore the independent associations between the SQ and patient clinical characteristics unadjusted and adjusted multivariable logistic regression with conditional backward selection and 95% confidence interval (CI) were applied. In the conditional backward regression modeling, variables with the highest *p*-value were stepwise eliminated and stopped when no further effect could

TABLE 1 Patient demographics, performance status, comorbidities, and clinical characteristics (n = 361).

Variable		**n = 361**
Sex		
Men	64%	n = 230
Missing		n = 1
Age (years)	67	± 14
18–<55	36%	n = 130
55–<75	28%	n = 101
75–100	35%	n = 128
Missing	1 %	n = 2
BMI (kg/m^2)	26	± 6
ECOG/WHO Performance Status		
0	23%	n = 84
1	18%	n = 66
2	29%	n = 103
3	18%	n = 65
4	5%	n = 18
Missing	7%	n = 25
Comorbidities (+)		
Diabetes	45%	n = 164
Congestive heart failure	38%	n = 137
Myocardial infarction	26%	n = 94
Peripheral vascular disease	24%	n = 88
Malignancy	22%	n = 78
Cerebrovascular disease	18%	n = 66
Chronic pulmonary disease	13%	n = 48
Rheumatologic disease	9%	n = 32
Peptic ulcer disease	7%	n = 27
Liver disease	6%	n = 21
Dementia	4%	n = 16
Hemiplegia	3%	n = 12
HIV	1%	n = 4
Charlson comorbidity index (CCI)	5	(4–6)
Time with renal replacement therapy (months)	38	(16–81)
Weekly treatment time (min)	741	± 156
Vascular access		
Fistula	43%	n = 155
Graft	12%	n = 44
HD-CVC	36%	n = 131
Missing	9%	n = 31
Laboratory test results		
Kt/V	2.3	± 0.5
Albumin (g/L)	31.9	± 4.5
Hemoglobin (g/L)	112.9	± 13.4
Phosphorus (mmol/L)	1.6	± 0.5
Parathyroid hormone (pmol/L)	35.1	± 28.8

(Continues)

TABLE 1 (Continued)

Variable		n = 361
Calcium (mg/L)	2.3	± 0.2
Urea (mmol/L)	18.2	± 5.2
Potassium (mmol/L)	4.8	± 0.7

Note: Normally distributed values are reported as mean and standard deviation (±), non-parametric values are reported as median and interquartile range, and frequencies as percentages and numbers (n). ECOG/WHO Performance Status: 0, fully active, able to carry on all pre-disease performance without restriction; 1, restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature, for example, light housework office work; 2, ambulatory and capable of all selfcare but unable to carry out any work activities; up and about more than 50% of waking hours; 3, capable of only limited selfcare; confined to bed or chair more than 50% of waking hours; 4, completely disabled; cannot carry on any selfcare; totally confined to bed or chair.[38]
Abbreviation: BMI, body mass index.
[Correction added on 10 July 2023, after first online publication: In Table 1, "Carlson comorbidity index" and "Cognitive heart failure" were changed to "Charlson comorbidity index" and "Congestive heart failure" in this version.]

be added to the analysis. All statistical analyses were performed using SPSS software, version 27.

2.4 | Ethics

The study was approved by the Swedish Ethical Review Authority, Dnr: 2019-03877. The Swedish law permit data from health care quality registries to be used in research. Patients are entitled to opt out, but no additional patient informed consent for specific studies is needed. This is in accordance to the Declaration of Helsinki.

3 | RESULTS

3.1 | Patient demographics, comorbidities, performance status, and clinical characteristics

The mean age of the 361 included patients was 67 ± 14 years and 35% were 75 years or above (Table 1). Regarding patient performance status, 23% were fully active (score 0), while 23% were either capable of only limited self-care or completely disabled (score 3–4). The median CCI was 5 (IQR 4–6). Diabetes was the most common comorbidity (45%), followed by congestive heart failure (38%). Most patients had an AV fistula or an AV graft (55%). The median time on renal replacement therapy was 38 (IQR 16–81) months and mean dialysis time per week was 741 ± 156 min.

3.2 | Education and professional experience of nurses and physicians

Of the 112 hemodialysis nurses, 110 (98%) were either registered nurses or were registered nurses with specialist nurse and/or master education (Table 2). Among the physicians, 94% were specialists in nephrology, of which the majority were senior consultants in nephrology (Table 2).

TABLE 2 Education and professional experience of nurses (n = 112) and physicians (n = 15).

Variable		
Level of profession; nurse		
Assistant nurse	2%	n = 2
Registered nurse	75%	n = 84
Specialist nurse or/and master 60 credits	23%	n = 26
Worked as a nurse		
0–2 years	6%	n = 7
>2–5 years	10%	n = 11
>5–10 years	21%	n = 24
>10 years	63%	n = 70
Worked as nurse in nephrology		
0–2 years	19%	n = 21
>2–5 years	27%	n = 30
>5–10 years	13%	n = 14
>10 years	42%	n = 47
Level of profession; physician		
Licensed physician	7%	n = 1
Specialist trained	27%	n = 4
Nephrologist senior consultant	67%	n = 10
Worked as a physician		
>2–5 years	7%	n = 1
>5–10 years	7%	n = 1
>10 years	87%	n = 13
Worked as a physician in nephrology		
0–2 years	13%	n = 2
>2–5 years	0%	n = 0
>5–10 years	27%	n = 4
>10 years	60%	n = 9

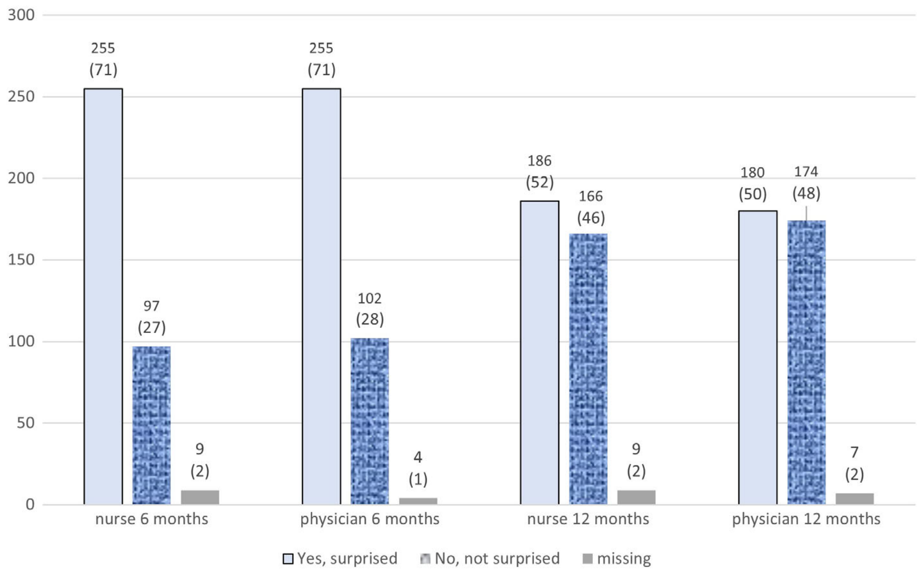

FIGURE 1 Frequencies and percent (%) for nurses' and physicians' responses to the surprise question regarding 6 and 12 months respectively (n = 361). [Color figure can be viewed at wileyonlinelibrary.com]

TABLE 3 Interrater agreement between nurses' and physicians' responses to the surprise question for specific patients regarding 6 and 12 months, respectively, using Cohens' kappa (κ).

	Nurses, yes, surprised, n	Nurses, no, not surprised, n	Total, n	κ, p (95% CI)
Six months				
Physicians				
Yes, surprised	206	43	249	$\kappa = 0.366$
No, not surprised	46	53	99	$p < 0.001$ (0.288–0.474)
Total	252	96	348	
Twelve months				
Physicians				
Yes, surprised	125	50	175	$\kappa = 0.379$
No, not surprised	57	113	170	$p < 0.001$ (0.281–0.477)
Total	182	163	345	

3.3 | Nurses' and physicians' responses to the SQ

Out of the 361 eligible patients, 112 nurses responded to the SQ for 352 patients regarding the time frame of 6 and 12 months, while 15 physicians responded to the SQ for 357 patients regarding the time frame of 6 months and for 354 patients regarding 12 months. Each nurse responded to the SQ for a median number of 3 patients (IQR 2–4) and each physician responded to the SQ for a median number of 26 patients (IQR 14–32). The proportion of nurses and physicians responding "no, not surprised" to the question: "Would I be surprised if this patient died within six months" was similar for nurses (27%) and physicians (28%) (Figure 1). The corresponding frequencies for "no, not surprised" regarding 12 months were also similar: 46% for nurses and 48% for physicians. However, there were differences regarding to which specific patient the nurses and physicians responded "no, not surprised", both regarding 6 months ($\kappa = 0.366$, $p < 0.001$, 95% CI = 0.288–0.474) and regarding 12 months ($\kappa = 0.379$, $p < 0.001$, 95% CI = 0.281–0.477) (Table 3).

3.4 | Associations between patient clinical characteristics and nurses' and physicians' responses to the SQ

For nurses in the unadjusted multivariable regression analyses regarding 6 and 12 months, patient age ≥ 75 years, performance status score 1–2 and score

TABLE 4 Association between patient characteristics and answering "no, not surprised" to the surprise question regarding 6 and 12 months, respectively, for nurses and physicians using *Unadjusted and Adjusted* logistic regression analysis with *conditional backward selection* to calculate odds ratios (OR) and 95% confidence intervals (CI).

Profession	Six months, unadjusted		Six months, full model adjusted		Backward selection		Backward selection	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Nurses					Seven steps		Eight steps	
Age ≥ 55–<75[a] (years)	1.51	(0.80–2.86)	0.83	(0.34–2.02)				
Age ≥ 75[a] (years)	2.99	(1.68–5.34)	1.61	(0.75–3.50)				
Performance status[b] (score 1–2)	3.94	(1.69–9.18)	2.52	(1.00–6.35)	2.62	(1.06–6.45)	2.65	(1.08–6.51)
Performance status[b] (score 3–4)	10.60	(4.37–25.70)	4.10	(1.43–11.72)	4.40	(1.60–12.10)	4.65	(1.70–12.73)
Charlson comorbidity index >5[c]	1.34	(0.83–2.15)	1.16	(0.61–2.22)				
Kt/V	0.65	(0.36–1.15)	0.60	(0.29–1.25)				
Dialysis access[d]	1.39	(0.84–2.30)	0.96	(0.49–0.77)				
Albumin (g/L)	0.83	(0.78–0.89)	0.85	(0.78–0.94)	0.84	(0.77–0.91)	0.84	(0.78–0.92)
Phosphorus (mmol/L)	0.73	(0.45–1.18)	0.90	(0.47–1.74)				
Hemoglobin (g/L)	0.98	(0.96–1.00)	0.99	(0.97–1.02)				
Parathyroid hormone (pmol/L)	1.00	(0.99–1.00)	1.00	(0.99–1.02)				
					Nagelkerke 0.209			
Physicians					Three steps		Four steps	
Age ≥ 55–<75[a] (years)	1.04	(0.54–2.01)	0.63	(0.24–1.66)				
Age ≥ 75[a] (years)	3.33	(1.90–5.83)	2.50	(1.12–5.58)	2.40	(1.11–5.18)	2.27	(1.06–4.85)
Performance status[b] (score 1–2)	3.92	(1.68–9.14)	3.81	(1.38–10.48)	3.86	(1.41–10.60)	3.51	(1.31–9.45)
Performance status[b] (score 3–4)	12.25	(5.05–29.71)	7.52	(2.42–23.32)	7.68	(2.49–23.70)	6.90	(2.29–20.80)
Charlson comorbidity index >5[c]	1.65	(1.03–2.63)	2.12	(1.08–4.14)	2.11	(1.08–4.12)	2.05	(1.06–3.99)
Kt/V	0.44	(0.24–0.78)	0.36	(0.16–0.81)	0.34	(0.16–0.75)	0.35	(0.16–0.77)
Dialysis access[d]	1.60	(0.98–2.62)	1.07	(0.52–2.17)				
Albumin (g/L)	0.87	(0.82–0.92)	0.86	(0.78–0.95)	0.86	(0.78–0.95)	0.85	(0.77–0.93)
Phosphorus (mmol/L)	0.92	(0.58–1.46)	1.13	(0.58–2.21)				
Hemoglobin (g/L)	0.98	(9.60–1.00)	0.98	(0.96–1.01)				
Parathyroid hormone (pmol/L)	1.01	(1.00–1.02)	1.02	(1.01–1.03)	1.02	(1.01–1.03)	1.02	(1.01–1.03)
					Nagelkerke 0.344			
Profession	**Twelve months, unadjusted**		**Twelve months, full model adjusted**		**Backward selection**		**Backward selection**	
	OR	**(95% CI)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**	**OR**	**(95% CI)**
Nurses					Six steps		Seven steps	
Age ≥ 55–<75[a] (years)	1.47	(0.85–2.52)	1.24	(0.60–2.58)				
Age ≥ 75[a] (years)	3.77	(2.23–6.36)	2.85	(1.44–5.66)	2.78	(1.44–5.40)	2.77	(1.44–5.36)
Performance status[b] (score 1–2)	3.32	(1.82–6.08)	2.50	(1.12–5.06	2.39	(1.20–4.77)	2.40	(1.21–4.76)
Performance status[b] (score 3–4	9.42	(4.63–19.15)	4.17	(1.70–10.20)	4.17	(1.74–10.00)	4.46	(1.87–10.63)
Charlson comorbidity index >5[c]	1.48	(0.96–2.28)	1.30	(0.73–2.31)				
Kt/V	0.65	(0.39–1.09)	0.59	(0.31–1.13)				
Dialysis access[d]	1.23	(0.79–1.93)	0.88	(0.48–1.61)				
Albumin (g/L)	0.86	(0.81–0.91)	0.90	(0.83–0.97)	0.89	(0.83–0.97)	0.90	(0.84–0.98)
Phosphorus (mmol/L)	0.89	(0.59–1.35)	1.11	(0.63–1.98)				

TABLE 4 (Continued)

Profession	Twelve months, unadjusted		Twelve months, full model adjusted		Backward selection		Backward selection	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Hemoglobin (g/L)	0.98	(0.97–1.00)	0.99	(0.97–1.01)				
Parathyroid hormone (pmol/L)	1.00	(0.99–1.00)	1.00	(0.99–1.01)				
					Nagelkerke 0.229			
Physicians					Three steps		Four steps	
Age ≥ 55–<75[a] (years)	1.86	(1.09–3.19)	1.05	(0.49–2.25)				
Age ≥ 75[a] (years)	3.77	(2.24–6.34)	2.67	(1.30–5.50)	2.74	(1.35–5.57)	2.59	(1.29–5.22)
Performance status[b] (score 1–2)	2.81	(1.56–5.07)	2.18	(1.07–4.46)	2.17	(1.06–4.42)	2.16	(1.06–4.39)
Performance status[b] (score 3–4)	12.04	(5.78–25.07)	4.91	(1.91–12.64)	4.84	(1.89–12.42)	4.72	(1.85–12.02)
Charlson comorbidity index >5[c]	2.35	(1.52–3.64)	2.48	(1.36–4.53)	2.49	(1.36–4.54)	2.45	(1.35–4.46)
Kt/V	0.59	(0.35–0.99)	0.48	(0.24–0.98)	0.50	(0.25–0.98)		
Dialysis access[d]	1.43	(0.91–2.24)	0.96	(0.51–1.83)				
Albumin (g/L)	0.87	(0.82–0.92)	0.88	(0.81–0.96)	0.88	(0.81–0.96)	0.89	(0.82–0.97)
Phosphorus (mmol/L)	0.79	(0.52–1.20)	0.89	(0.49–1.63)				
Hemoglobin (g/L)	0.98	(0.96–1.00)	0.97	(0.95–0.99)	0.97	(0.95–0.99)	0.97	(0.95–0.99)
Parathyroid hormone (pmol/L)	1.00	(0.99–1.01)	1.01	(1.00–1.02)				
						Nagelkerke 0.324		

[a]Reference age < 55 years.
[b]Reference Performance Status (score 0).
[c]Reference Charlson comorbidity index ≤5.
[d]Reference AV-fistula/graft.

3–4, lower albumin, and lower hemoglobin were associated with higher odds for answering "no, not surprised" to the SQ (Table 4). In the fully adjusted analysis regarding 6 months, performance status score 1–2 and score 3–4, and lower albumin were associated with higher odds for answering "no, not surprised" to the SQ. In the fully adjusted analyses regarding 12 months, patient age ≥ 75 years, performance status score 1–2 and score 3–4, and lower albumin were associated with higher odds for answering "no, not surprised" to the SQ (Table 4).

For physicians in the unadjusted analyses regarding 6 and 12 months, patient age ≥ 75 years, performance status score 1–2 and score 3–4, lower albumin, lower hemoglobin, CCI score >5, and lower Kt/V were associated with higher odds for answering "no, not surprised". In addition, regarding 12 months patient age 55 - <75 was also associated with higher odds for answering "no, not surprised". In the fully adjusted analysis regarding 6 months, performance status, patient age ≥ 75 years, CCI score >5, lower albumin, lower Kt/V, and higher parathyroid hormone were associated with higher odds for answering "no, not surprised" to the SQ. In the fully adjusted analysis regarding 12 months, patient age ≥ 75 years, performance status score 1–2 and 3–4, CCI score >5, lower albumin, and lower hemoglobin were associated with higher odds for answering "no, not surprised" to the SQ (Table 4).

4 | DISCUSSION

The major finding in the present study is the discrepancy between nurses' and physicians' appraisal of patients on hemodialysis who are approaching the end of life as reflected by their responses to the SQ. Even if the proportion of nurses and physicians responding "no, not surprised" was similar, there was a substantial difference concerning which specific patient the nurses and physicians would be "no, not surprised" if he/she died within 6 or 12 months. Furthermore, the patient clinical characteristics associated with nurses' and physicians' SQ responses deviated. In both groups lower performance status and lower albumin were associated with higher odds for answering "no, not surprised" to the SQ regarding 6 months. In addition, physicians' responses were associated with older age, high comorbidity, lower Kt/V, and higher parathyroid hormone. Regarding 12 months

SQ responses, both nurses' and physicians' answers were associated with lower performance status, lower albumin, and older age. In addition, physicians' responses were associated with high comorbidity burden and lower hemoglobin.

Previous studies in other contexts have shown that the responses to the SQ vary considerably.[43] Differences in responses to the SQ between hemodialysis nurses and nephrologists have also been examined in one previous study,[32] which focused on accuracy in predicting mortality, without exploring the interrater agreement or the differences in the association to patient clinical characteristics. To our knowledge, the present study is the first study to explore the different perspectives underlying nurses' and physicians' responses to the SQ in a hemodialysis context, and how these answers are associated with patient clinical characteristics.

The differences in appraisal between nurses and physicians may both be related to the organization of care, but also to the differences in clinical training and in their interpretation and handling on of symptoms. Even if the SQ should be based on healthcare professionals' overall clinical perception formed from knowledge of medical history, clinical course, and laboratory values it should also be based on intuition and on clinical experience.[27,30]

Nurses responses to SQ were associated with variables that may be visible in encounters with the patient and in close patient care, such as lower performance status, low albumin as a surrogate marker for malnutrition, and older age.[44] This may relate to the fact that nurses meet their patients often and see the patient arriving to the hemodialysis facility. Nurses also have insight into the home situation and into the intradialytic symptoms the patient presents during treatment. The determinants associated with physician responses to the SQ also included variables related to clinical characteristics, such as lower Kt/V, indicating difficulties in achieving adequate dialysis clearance, high parathyroid hormone, being part of the chronic kidney disease mineral bone disorder syndrome,[45] and renal anemia, potentially related to inflammation and resistance to erythropoiesis stimulating agents (ESA).[46] Lower Kt/V, presence of secondary hyperparathyroidism, and hyporesponsiveness to ESA have previously been shown to be associated with an increased risk of mortality.[44,47] Kt/V, hemoglobin, albumin, and parathyroid hormone within recommended limits in international guidelines are known to be associated with decreased risk of mortality and the largest survival advantage is for albumin.[48]

These differences in responses to the SQ and in associated patient clinical characteristics indicate a need for interprofessional communication and collaboration to ensure quality of care for these patients. This is especially important, as differences in perspectives about initiating of serious illness have been described as challenging in communication between nurses and physicians.[36] An increased understanding of this may promote interprofessional dialog and collaboration to identify vulnerable patients in need of serious illness conversations. It may also promote the initiation and follow up of such conversations by both nurses and physicians meeting these patients in different clinical situations, which is a prerequisite to achieve care in accordance with patients' preferences and needs toward the end of life.

4.1 | Strengths and limitations

One strength in this multicenter study is that it is a nationally representative group of patients treated with hemodialysis, including healthcare professionals from three regions. In Sweden, all dialysis treatments are covered by national insurance and therefore the treatment is available to all, irrespective of income. Another strength of this study was that each patient was evaluated by one nurse and one physician involved in the care of the patient and familiar with the history, the patient's clinical trajectory, and the treatment. In other studies evaluating the SQ, one or few physicians and/or nurses have evaluated many, and sometimes all patients at one dialysis unit[28,43] which may introduce a risk of rater bias.[18,31] Limitations include that the nurses responded both to the SQ and to the performance status, and that the physicians in most cases responded both to the CCI and the SQ for their patients. This may introduce a bias toward that they could have been overly affected by these certain aspects in their responses to the SQ. This was however handled through instructing both groups to respond to the SQ before their respective clinical evaluation of the patient.

5 | CONCLUSION

Nurses and physicians have different perspectives in their appraisal of patients treated with hemodialysis when answering the SQ, which may be important since both groups of professionals may initiate serious illness conversations in frail hemodialysis patients approaching the end of life. This knowledge may reinforce the need for open communication and discussion between nurses and physicians which may support an earlier and more timely initiation of serious illness conversations in order to achieve a more individualized hemodialysis treatment and care, consistent with patient preferences and needs toward the end of life.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

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