

Evaluating dialysis decision-making in hepatorenal syndrome

Abstract

Background: Hepatorenal syndrome (HRS) has traditionally been associated with high in-hospital mortality in the absence of liver transplantation. However, the underlying data are uncertain. The question of whether to recommend initiation of hemodialysis for patients with HRS who are not considered candidates for liver transplant is therefore both clinically and emotionally difficult.

Methods: We conducted a vignette-based survey of physicians from internal medicine subspecialties (nephrology, critical care, and palliative care) involved in dialysis decision-making for critically ill patients with HRS. Our clinical vignette described a critically ill patient with HRS requiring multiple vasopressors, who was not felt to be a candidate for liver transplantation. The survey assessed physician recommendations regarding dialysis initiation, expected survival, and perceived likelihood of life extension, recovery, and harm with dialysis, as well as decision-related emotional distress. Associations with reported distress were evaluated using multivariable linear regression.

Results: 53 physicians (19 nephrology, 21 critical care, 3 palliative care, 4 trainees) responded. The majority of physicians (71%) did not recommend hemodialysis, even though the average rating for dialysis extending life was 54.6 out of 100. Physicians reported high distress related to this decision as measured using a validated scale. Higher provider religiosity was associated with lower reported distress ($\beta = -0.82$; 95% CI -1.55 , -0.10 ; $p = 0.03$).

Conclusion: Decision-making about dialysis initiation in the critically ill patient with hepatorenal syndrome is associated with distress in all physician disciplines among our study participants, with only religiosity identified as a protective factor. Further research is required to understand how to best assist physicians and explore the reasons for this finding.

Keywords: hepatorenal syndrome, hemodialysis, dialysis initiation, liver transplantation, critical illness, physician decision-making, emotional distress, religiosity, palliative care

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Introduction

Hepatorenal syndrome (HRS) is a dreaded complication of decompensated cirrhosis and has an extremely high in-hospital mortality with or without treatment. Orthotopic liver transplantation (OLT) remains the definitive treatment for end-stage liver disease and effectively resolves HRS in most cases.^{1,2} Historically, dialysis has been felt to have limited utility in patients with HRS who are ineligible for OLT.¹ However, the claim that HRS-1 patients have a higher mortality rate than those with other causes of Acute Kidney Injury (AKI) in the setting of cirrhosis has been more recently questioned.^{3,4}

The literature offers conflicting recommendations on this issue, with the European Association for the Study of the Liver (EASL) supporting dialysis for patients with HRS who fail other treatments regardless of transplant eligibility, and on the other hand, the Acute Dialysis Quality Initiative (ADQI) advising against dialysis for non-OLT candidates unless the HRS has an acute and reversible cause.^{1,2}

In a descriptive study of 107 patients with decompensated chronic liver disease and AKI, twenty-seven were identified as having HRS as the cause of AKI. The study concluded that not receiving hemodialysis when indicated was significantly associated with a 2.7-fold increase in relative risk of death compared to patients who did receive hemodialysis (95% CI: 1.5–4.8; $p = 0.0001$).⁽⁴⁾ Another study by Allegretti et al. showed that the 6-month mortality for non-OLT patients was 85%, with the prognosis being driven by the

overall disease severity and not just the type of AKI. Factors like higher Model for End-Stage Liver Disease (MELD) scores, older age, and critical illness were better predictors of mortality than the AKI cause.⁵ Additional co-morbidities such as hepatic encephalopathy, malignancy, and thrombocytopenia have also been identified as important factors in determining the prognosis and impacting dialysis decision-making in patients with HRS.⁴

Conducting a thorough assessment of the overall clinical and social condition of the patient, understanding the potential risks and benefits associated with dialysis, and engaging in extensive discussions with the patients and their families about goals of care are all necessary for patient-centered decision-making. For some patients, the additional time provided by dialysis can hold profound significance, allowing them to address personal matters and come to terms with the gravity of their situation. Conversely, other patients may prioritize quality of life over prolongation and prefer to focus on comfort care or hospice, declining dialysis to avoid the physical and emotional burden of treatment.³

To date, current recommendations on whether to initiate hemodialysis in patients with AKI presumed due to HRS-1 present clinical and potentially emotional challenges for physicians.³ While data regarding offering dialysis to HRS patients who are not candidates for liver transplant vary, it is crucial to ensure that an individualized, patient-centered, and evidence-based decision is made for each patient based on their needs. Fostering an environment

for good decision-making involves understanding the causes of the underlying variability in this multi-dimensional process, which is influenced not only by patient-specific factors, but also by provider perspectives, including personal beliefs, religiosity, cultural values, and clinical experience.^{6,7}

In this study, we examined attitudes and perceptions of physicians who practice in different internal medicine specialties regarding whether and how they offer hemodialysis for HRS patients who are not suitable for liver transplantation. By understanding the reasons underlying perspectives in this important area of physician decision-making, we can not only improve patient care and counselling but also use this information to design guidelines for patient care in AKI related to HRS that can offer support to clinicians in this complex care.

Methods

We conducted a cross-sectional vignette-based survey study during the period of January 2024 – April 2024. We included physicians involved in dialysis decision-making in critically ill patients with hepatorenal syndrome, specifically including physicians and advanced care practitioners in the specialties of nephrology, critical care, palliative care, GI/hepatology, general internal medicine, and family medicine. We also included medical trainees, specifically residents and fellows, as they often are involved in family discussions about withholding or withdrawing medical interventions.

Data for this study were collected through an online structured questionnaire called Qualtrics and was designed to examine physician attitudes and perceptions about the decision-making processes, emotional responses, and professional experiences initiating dialysis in patients with advanced liver disease. The questionnaire was distributed online through an anonymized Qualtrics link via departmental listservs. The questionnaire was divided into four sections.

The first section introduced the purpose of the study and included a consent form. The second section presented a clinical vignette (added in supplementary material) describing a hypothetical patient scenario involving a 65-year-old man with acute renal failure due to hepatorenal syndrome and multiple comorbidities. The vignette aimed to standardize the context for all respondents, allowing evaluation of potential variability in clinical decision-making under similar conditions. This was followed by questions assessing the patient's expected survival, the likelihood of dialysis extending life, and recovery outcomes with or without dialysis (using a scale of 0 to 100).

Respondents were also asked about potential harms from dialysis or related procedures, their recommendations for initiating hemodialysis, and the factors that could influence their decision-making in this context. Information on the frequency of making renal replacement therapy (RRT) decisions in clinical practice, comfort levels managing goals-of-care discussions, and preparedness based on training was also collected.

In the third section, emotional responses were measured using the Positive and Negative Affect Schedule or PANAS.⁽⁹⁾ PANAS is a 20-item self-report measure to assess positive affect (PA) and negative affect (NA), reflecting an individual's emotional state in response to a given situation.⁸ In this study, PANAS was applied to evaluate physicians' emotional responses to the clinical vignette. Only the negative affect items relevant to the vignette were included. Responses were rated on a 5-point Likert scale ranging from 1 ("not

at all") to 5 ("extremely") and summed to generate a composite score representing clinical distress in dialysis decision-making. The scores are added to get a composite score reflecting the 'Clinical Distress in Dialysis decision-making'. Negative emotions such as distress, fear, hostility, shamefulness, guilt, and worthlessness were included and measured under the clinical scenario.

The fourth section regarding sociodemographic and professional background information included the medical discipline, clinical role, years of experience, primary practice setting, age, gender, race, and self-reported religiosity on a scale from 0 (not religious) to 7 (very religious), with specifics left open to interpretation by the respondent.

We created a linear regression model to assess the association of survey items with the reported distress in response to the vignette. The outcome in this model was the modified PANAS score reported by physicians in response to the vignette, modelled as a continuous variable. The covariates in the model included the physician's prediction about prognosis, the physician's belief about the ability of hemodialysis to extend life, physician's belief about the possibility of clinical recovery with hemodialysis, physician reported comfort with the decision, physician reported familiarity with renal replacement therapy, and relevant physician demographic variables.

All statistical analyses were conducted in STATA 17.0 (StataCorp LLC, College Station, TX, USA).

Results

The survey was distributed to a total of 357 individual emails via departmental listservs. A total of 53 physicians participated in the study, for a response rate of 15%. Our respondents included 19 nephrologists (35.8%), 21 critical care physicians (39.6%), 5 general internal medicine physicians (9.4%), 3 palliative care physicians (5.7%), 1 hepatology physician (1.8%), 1 family medicine physician (1.8%), with 3 not providing an answer (5.7%). Table 1 summarizes respondent demographics.

The sample comprised 31 attending physicians (58.5%), 14 fellows (26.4%), 4 resident physicians (7.5%), and 4 not providing an answer (7.5%). 27 physicians (50.9%) reported primarily clinical practice, 17 physicians (32.1%) reported equal involvement in both clinical and research activities, 4 physicians reported primary research or administrative work (7.5%), with the remaining 5 not providing an answer (9.4%).

Most respondents (n = 34, 69.4%) were between 25 and 44 years old. The self-reported gender distribution was nearly equal, with 23 men (43.4%), 24 women (45.3%), 1 "other gender" (1.9%), and 5 not providing an answer (9.4%). Self-reported racial/ethnic demographics included 35 non-Hispanic White (66.0%), 12 Asian individuals (22.6%), 1 Hispanic (1.9%), 1 Black (1.9%), 1 other (1.9%), and 6 not providing an answer (9.4%). Religiosity, measured on a scale from 0 (not religious at all) to 7 (very religious), had a mean score of 2.9 (SD = 2.0), a median of 3 (IQR: 1–4) and a mode of 3.

In response to the clinical vignette, 38 physicians (71.7%) reported that they would not recommend initiating hemodialysis for the patient. Variability in comfort level with dialysis decision-making was noted across specialties (Figure 1), with nephrologists reporting the lowest comfort (mean = 2.6 on a 4-point Likert scale) and critical care physicians reporting the highest (mean = 2.9/4). Clinician distress reported in response to the vignette was comparable to the levels of distress clinicians recalled in the survey with similar clinical scenarios during actual practice ($\beta = 0.346$; 95% CI -0.002, 0.695; $p = 0.05$).

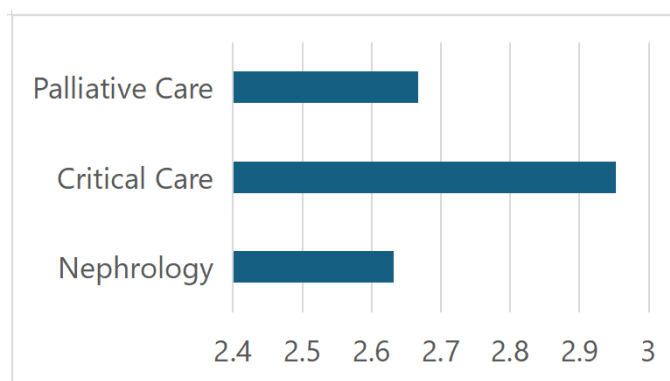


Figure 1 Physician comfort with dialysis decision-making by specialty.

Average ratings of respondent comfort with decision to offer or not offer dialysis in vignette by respondent reported medical specialty. Comfort rated on a 4-point Likert scale, from 1 being very uncomfortable to 4 being very comfortable.

Within the vignette, most physicians expressed a low likelihood of meaningful recovery regardless of dialysis initiation. Thirty-seven physicians (69.8%) estimated a prognosis of days to weeks for the patient described in the vignette. The perceived likelihood of harm from dialysis or procedural requirements was reported as low by most of the physicians (68.6%), who rated potential harm between 0–50 on a scale of 0–100 (0 = will definitely not cause harm, 100 = will definitely cause harm). When asked how likely it was that dialysis could extend life, the average response was 55 on a scale from 0 to 100 (0 meaning dialysis will offer no extension at all and 100 meaning dialysis will definitely extend life).

Among the respondents, 24 (45.2%) reported making decisions about initiating renal replacement therapy (RRT) less than once a month. Respondents were asked, “how well did the training for your discipline prepare you to make care related decisions about initiating or not initiating dialysis in patients with advanced liver disease?” 26 physicians (49%) reported feeling somewhat well-prepared, while 11 (20%) felt very well-prepared, 10 (18.9%) felt slightly prepared, and 2 felt not at all prepared (3.8%).

In our regression model, higher physician religiosity was associated with lower reported distress ($\beta = -0.82$ per 1-point increase, 95% CI $-1.55, -0.10$; $p = 0.03$) (Figure 2). No other variables were significantly associated with distress. No other covariates had a statistically significant association with our outcome of interest. Full model results are available in the supplement (Supplemental Table 1 & Table 2).

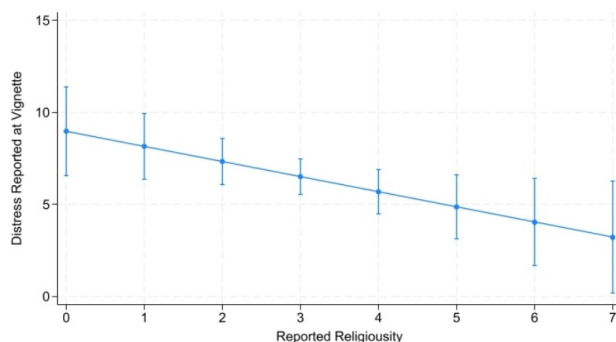


Figure 2 Association between physician religiosity and reported distress at vignette.

Model output for predicted level of respondent distress for a given level of respondent self-reported religiosity. In fully adjusted model, each 1 point change in religiosity resulted in a -0.82 change in distress with distress measured as a composite PANS score (95% CI $-1.55, -0.10$), and p -value of 0.03.

Table 1 Respondent demographics

Respondent demographics	N = n(%)
Respondent specialty	
Nephrology	19 (35.8)
Pulmonary & critical care	21 (39.6)
Palliative care	3 (5.7)
Hepatology or GI	1 (1.8)
General internal medicine	5 (9.4)
Family medicine	1 (1.8)
Not identified/missing	3 (5.7)
Respondent training level	
Attending physician	31 (58.5)
Fellow	14 (26.4)
Resident	4 (7.5)
Other/Training level missing	4 (7.5)
Years in position (Among attending physicians)	
0-2 Years	6 (19.4)
3-5 Years	1 (3.2)
6-10 Years	6 (19.4)
10-12 Years	4 (12.9)
12-20 Years	8 (25.8)
>20 Years	6 (19.4)
Primary role	
Clinical	27 (50.9)
Research or administrative	4 (7.5)
50-50 Mix of Both	17 (32.1)
Not identified/missing	5 (9.4)
Age range	
25 to 34	16 (30.2)
35 to 44	18 (34.0)
45 to 54	9 (17.0)
55 to 64	5 (9.4)
65 to 74	1 (1.9)
Age missing/not given	4 (7.5)
Self-identified gender	
Cisgender male	23 (43.4)
Cisgender female	24 (45.3)
Other	1 (1.9)
Not given/missing	5 (9.4)
Self-reported race	
Non-hispanic white	35 (66.0)
Hispanic	1 (1.9)
Black	1 (1.9)
Asian	12 (22.6)
Other	1 (1.9)
Not identified/missing	3 (5.7)

Table 2 Physician Responses to Vignette-Based Dialysis Decision-Making and Clinical Practice Experience

Physician Responses to Vignette-Based Dialysis	N (%) or Average (Standard deviation)
Expected prognosis without intervention	
Hours to days	11 (20.7)
Days to weeks	37 (69.8)
Weeks to months	5 (9.4)
How likely is dialysis to extend life (Scale 0 to 100)	
Average (Standard deviation)	54.6 (29.6)
How likely is dialysis to result in recovery to “meaningful Life outside the hospital” (Scale 0 to 100)	
Average (Standard Deviation)	24.9 (19.3)
How Likely Is Dialysis to Cause Harm (Scale 0 to 100)	
Average (Standard deviation)	44.1 (25.7)
Would you recommend hemodialysis	
Yes	15 (28.3)
No	38 (71.7)
Comfort with decision	
Very uncomfortable	7 (13.2)
Somewhat uncomfortable	10 (18.9)
Somewhat comfortable	26 (49.1)
Very comfortable	10 (18.9)
Distress from last time you had to make this decision in clinical Practice	
Average (Standard deviation)	4.2 (5.1)
Frequency of renal replacement therapy decisions	
Never	1 (1.8)
Less than once a month	24 (45.2)
At least once a week	15 (28.3)
Multiple times per week	9 (17.0)
No answer	4 (7.5)
Preparedness for goals of care discussions for dialysis in patients with cirrhosis	
Not prepared at all	2 (3.8)
Slightly prepared	10 (18.9)
Somewhat well prepared	26 (49.1)
Very well prepared	11 (20.7)
Not answered/missing	4 (7.5)

Discussion

This study highlights the difficult decisions physicians face when considering hemodialysis for patients with hepatorenal syndrome (HRS) who are not candidates for liver transplantation. While most physicians chose not to recommend dialysis, nearly a third still believed it could extend life, suggesting that decision-making involves more than just prognostic estimates. Comfort levels with these decisions varied by specialty, with nephrologists expressing more discomfort compared to critical care physicians. Emotional burden in decision-making was encountered when physicians faced disagreement from family members. Additionally, we observed that religiosity was negatively associated with distress, suggesting a potential protective effect. Together, these findings reflect the emotional, ethical, and specialty-specific complexities involved in dialysis decision-making for this population.

The discordance between prognostication and recommendation suggests that while physicians recognize dialysis can prolong life, they do not recommend it. Underlying differences to explain include that physicians may be prioritizing other aspects of patient well-being, such as symptom burden, quality of life, and the avoidance of potentially inappropriate interventions.⁹ Physicians may also be

underestimating patient-reported quality of life, assuming it to be worse than what a patient finds acceptable.¹⁰ Furthermore, because doctors are highly aware of healthy lifestyles, they may also be projecting their quality-of-life standards onto patients. However, physicians' risk-benefit assessments may reflect the underlying clinical reality, as outcomes in patients with HRS requiring dialysis are often poor, with mortality driven more by overall disease severity than by dialysis itself.^{11,12} Thus the finding that physicians in this study were just slightly over the threshold of “50” when asked how likely it was that dialysis could extend life, likely reflected this perspective.

One of the key findings was the difference in comfort levels among specialists. It is interesting that Nephrologists were the least comfortable with these decisions, while critical care physicians were the most comfortable. This could be because of the types of patients these doctors usually treat. Nephrologists often see a wide range of patients with kidney disease, including those who may benefit from long-term dialysis but may be ill from other conditions, which might make them hesitant to withhold such treatment. The idea that the final decision relies heavily on the nephrologist, both in a consultative role with colleagues, but from the patient and their family, may place additional burden on physicians in this specialty.

On the other hand, critical care doctors frequently manage very sick patients with poor chances of recovery, so they may be more accustomed to hemodialysis not being as effective for HRS-1 patients, and/or not as likely to feel emotional impact from such decisions—making ‘life and death’ decisions daily in their critical care practice. Literature has shown that requirement of continuous renal replacement therapy (CRRT), mechanical ventilation, and catecholamine support, are strongly associated with greater death rates in patients with cirrhosis and HRS-1 undergoing hemodialysis.¹³ The difference in the preferences of doctors in different specialties might not be because of their personal reasons, but because of their daily comfort and exposure, encountering very sick patients at different stages in disease processes.

A particularly interesting finding was the negative correlation between self-reported religiosity and reported distress. Religion contributes positively to reducing distress and anxiety in a physician, subsequently allowing them to be more confident and empathetic in their decisions. When dealing with terminally ill patients, all physicians deal with emotional exhaustion and our findings align with previous studies, demonstrating that religiosity may serve as a protective factor against physician burnout, perhaps by serving as a personal coping mechanism when faced with such morally and emotionally complex decisions.⁷ While religion and spirituality is a deeply personal aspect of an individual’s life, and the mean of our provider population’s self-assessment less religious, religiosity impact on the overall mental health of a physician has been supported in research.¹⁴

This study has several limitations. Firstly, the sample size was small, and the study was conducted at a single institution, which may affect the generalizability of the findings. Additionally, given our low response rate, physicians who elected to participate may differ systematically from those who did not in terms of comfort with end-of-life decision-making, personal religiosity, clinical experience with HRS, and interest in ethics or palliative care. We did not receive a significant number of responses from hepatology specialists, who are typically involved in determining transplant eligibility. Their perspectives may differ and should be included in future studies. Additionally, the measure of religiosity was limited to a self-reported item and did not explore what religiosity or spirituality meant to each physician, nor how these beliefs specifically influenced their decision-making. Decision-making is also a highly subjective process and may vary based on personal experiences, training, and cultural factors, making it difficult to generalize across institutions. However, this being a single-center study, one of the main purposes was to help guide future research.

Despite these limitations, this study has important implications. The difference between believing dialysis may extend life but not recommending it suggests the need to better understand the factors influencing decision-making—and what a physician believes as quality in living longer. Future efforts are needed to better address physician distress using specialty-specific interventions, such as targeted guidelines for different speciality doctors to help navigate complex decisions, including offering dialysis to sick patients that may appear to have little hope for any successful outcome.

Additionally, involving patients’ families more actively may reduce emotional burden of physicians and families by sharing responsibility and aligning care with patient wishes. Studies suggest that structured family meetings and advance care planning reduces decisional regret and provides emotional support for both physicians and families.¹⁵ Lastly, we recommend healthcare institutions to consider promoting spiritual care programs for physicians to help

manage stress and support decision-making. One study found that 70% of individuals described knowing very little about what dialysis would really entail when they started, signifying that patients might feel unprepared and ill-informed about dialysis.¹⁶ While this study was conducted about offering dialysis in general and not critical care setting, these conversations are likely even more difficult in our patient population—with immense opportunity to optimize a patient and family-centered approach.

Overall, this study highlights how challenging it is to make decisions about dialysis for HRS patients who aren’t eligible for a liver transplant. It also shows how distressing these decisions can be for physicians, especially when there are disagreements between colleagues and/or patient/family members. With the rate of RRT use for AKI patients with cirrhosis nearly doubling,¹⁷ more research is needed to better define when dialysis might be appropriate and to support patients, families AND doctors in managing the emotional strain of these decisions.

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Conflicts of interest

The authors declare no conflicts of interest.

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