Signs and Symptoms Associated With Earlier Dialysis Initiation in Nursing Home Residents

Manjula Kurella Tamura, MD, MPH,[1,2] Ann M. O'Hare, MD,[3] Charles E. McCulloch, PhD,[4] and Kirsten L. Johansen, MD[4,5]

Background: Factors driving the trend of earlier dialysis initiation for persons with end-stage renal disease are unknown. We wanted to determine the association of the number and type of signs and symptoms with timing of initiation of dialysis in US nursing home residents.

Study Design: Observational study.

Setting & Participants: We used data from the US Renal Data System linked with the Minimum Data Set, a national registry of nursing home residents. The cohort consisted of 2,402 nursing home residents who initiated dialysis between 1998 and 2000 and had at least 2 recorded clinical assessments in the year before dialysis initiation.

Predictors: We evaluated 7 clinical signs and symptoms: dependence in activities of daily living, cognitive function, edema, dyspnea, nutritional problems, vomiting, and body size.

Outcomes: Earlier dialysis initiation was defined as estimated glomerular filtration rate ≥15 mL/min/1.73 m^2 at the start of dialysis.

Results: Median estimated glomerular filtration rate at the start of dialysis was 9.8 (25th-75th percentile, 7.4-13.4) mL/min/1.73 m^2. After adjustment for age, sex, race, and comorbid conditions, each additional sign or symptom was associated with a higher odds for earlier dialysis initiation (OR, 1.16 per symptom; 95% CI, 1.06-1.28), as was each adversely changing sign or symptom (OR, 1.26 per symptom; 95% CI, 1.16-1.38). The population-attributable risk for earlier dialysis initiation associated with having one or more signs and symptoms of volume overload, cognitive decline, increasing activities of daily living dependence, and weight loss was 31%; volume overload had the largest aggregate population-attributable risk.

Limitations: We lacked information about metabolic indications for dialysis initiation.

Conclusions: Volume overload, cognitive decline, increasing activities of daily living dependence, and weight loss were associated with earlier dialysis initiation; however, these factors explained less than one-third of cases of earlier dialysis initiation in nursing home residents.

Am J Kidney Dis 56:1117-1126.

INDEX WORDS: Dialysis initiation; end-stage renal disease; elderly.

During the last decade, persons with end-stage renal disease (ESRD) have started dialysis with progressively higher estimated glomerular filtration rates (eGFRs),[1,2] generally assumed to represent an intervention earlier in the course of kidney disease. In general, patients who are older and those with more comorbid conditions are more likely to start dialysis with a higher eGFR.[3,4] One proposed explanation for this observation is that these patients may develop symptoms earlier in the course of kidney disease compared with younger healthier patients. A related rationale is that creatinine-based GFR-estimating equations are less accurate in elderly patients, leading to concerns that they may underestimate the severity of kidney failure in this population. Nonuremic symptoms also may mimic symptoms of uremia in frail elderly patients. Alternatively, earlier initiation of dialysis may be driven by a pre-emptive management

From the [1]Division of Nephrology, Department of Medicine, Stanford University School of Medicine; [2]Geriatric Research and Education Clinical Center, Veterans Affairs Palo Alto Health Care System, Palo Alto, CA; [3]Division of Nephrology, Department of Medicine, University of Washington and Veterans Affairs Puget Sound Health Care System, Seattle, WA; [4]Department of Epidemiology and Biostatistics, and [5]Department of Medicine, Division of Nephrology, University of California San Francisco, San Francisco, CA.

Received April 23, 2010. Accepted in revised form August 9, 2010. Originally published online as doi:10.1053/j.ajkd.2010.08.017 on October 25, 2010.

Address correspondence to Manjula Kurella Tamura, MD, MPH, Division of Nephrology, Stanford University, 780 Welch Rd, Ste 106, Palo Alto, CA 94304. E-mail: mktamura@stanford.edu.

0272-6386/10/5606-0014$0.00/0
doi:10.1053/j.ajkd.2010.08.017

approach based predominantly on decrease in eGFR below a specific threshold rather than on the development of uremic symptoms or other complications of ESRD.

In a recent clinical trial, planned initiation of dialysis when the Cockcroft-Gault creatinine clearance decreased to 10-14 mL/min did not prolong survival or improve other clinically meaningful outcomes compared with a strategy of dialysis initiation when symptoms develop or when eGFR decreases to <7 mL/min.[5] Preemptive earlier initiation of dialysis may impose a substantial burden on patients, caregivers, and the health care system. Some have suggested that earlier initiation of dialysis has contributed to the recent dramatic increase in ESRD incidence in the elderly.[2,6,7]

Studies of timing of dialysis initiation have largely used ESRD registries that fail to capture the events leading up to dialysis initiation[3,8-12]; thus, the extent to which clinical signs or symptoms influence the timing of dialysis initiation is unknown. It also is unclear which signs or symptoms are associated most strongly with timing of dialysis initiation in the elderly. The National Kidney Foundation's Kidney Disease Quality Outcomes Initiative (KDOQI) clinical practice guidelines suggest that in addition to several metabolic complications, certain clinical signs and symptoms may justify the initiation of dialysis when eGFR is >15 mL/min/1.73 m^2, including neurologic dysfunction, refractory volume overload, weight loss, nausea and vomiting, or an otherwise unexplained decrease in functioning.[13]

We studied the association of 7 commonly assessed signs and symptoms with timing of dialysis initiation: dependence in activities of daily living (ADLs), cognitive function, edema, dyspnea, nutritional problems, vomiting, and body size. We hypothesized that the presence of these signs and symptoms and their trajectory would be associated independently with earlier initiation of dialysis, and that collectively, these signs and symptoms would account for a large fraction of earlier initiation of dialysis in elderly nursing home residents.

METHODS

Participants

We used data from the US Renal Data System (USRDS) that had been linked with data from the Minimum Data Set (MDS), using name, date of birth, Social Security number, health insurance claim number, and beneficiary identity code. In this manner, we identified all persons who were residents of a nursing home at the start of dialysis and who started dialysis between June 1, 1998, and December 31, 2000, as previously described.[14] The MDS is a national registry of residents of nursing homes in the United States. We included all individuals who were residents of a nursing home on the first ESRD service date and with a length of stay of at least 90 consecutive days (not including departures ≤15 days) or less than 90 consecutive days and culminating in death. Because nursing home residence can be transitional, we included persons who had resided in a nursing home for 90 consecutive days and were discharged no more than 15 days before the first ESRD service date and then returned to a nursing home within 90 days. For the primary analyses, we limited the cohort to individuals with at least 2 recorded clinical assessments within the year before dialysis initiation, resulting in 2,509 individuals who were residents of a nursing home at the start of dialysis. Of these, we excluded 107 with missing values for eGFR at dialysis initiation, leaving 2,402 individuals in the analytic cohort.

Exposure Variables

MDS assessments are completed by nursing staff at admission and every 3 months, as well as at the time of acute change in status and readmission from the hospital. From these assessments, we selected 7 clinical signs and symptoms identified by practice guidelines as potential indications for earlier dialysis initiation: dependence in ADLs, cognitive function, edema, dyspnea, nutritional problems, vomiting, and underweight. Dependence in each of 7 ADLs (eating, dressing, toileting, personal hygiene, locomotion, transferring, and bed mobility) was rated 0-4 as follows: 0 indicates independent; 1, needs supervision; 2, needs limited assistance; 3, needs extensive assistance; and 4, dependent. Total MDS-ADL score ranges from 0-28; higher scores indicate more extensive functional impairment. MDS-ADL score >20 can be interpreted as the need for extensive assistance in each of 7 ADLs. Cognitive function was evaluated using the MDS Cognitive Performance Scale (CPS). The scale is derived from MDS items that assess consciousness, decision-making skills, short-term memory, ability to make oneself understood, and functional dependence in eating. MDS-CPS scores range from 0-6; higher scores indicate poorer cognitive function. An MDS-CPS score >1 is approximately equal to a Mini-Mental State Examination score <20, indicating moderate to severe cognitive impairment. The MDS-ADL and MDS-CPS scales have been validated previously.[15-17] Edema, dyspnea, vomiting, and nutritional problems, defined as complaints about the taste of food or hunger or leaving >25% of meals uneaten, were evaluated as present or not present at each assessment. Body mass index at each assessment was categorized as ≤18.5, 18.5-≤25, 25-≤30, and >30 kg/m^2.

We determined the change in each of these signs and symptoms using the first and last assessment conducted within 1 year before dialysis initiation. Increasing ADL dependence was defined as an increase in MDS-ADL score of 1 point or more. Cognitive decline was defined as an increase in MDS-CPS score of 1 point or more. Percentage