Timing of Dialysis Initiation—Do Health Care Setting or Provider Incentives Matter?

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In 2012, the point prevalence of treated ESRD in the United States exceeded 636,000 patients, and approximately 115,000 new patients initiated treatment for ESRD that year (1). Dialysis is a life-saving but expensive procedure that is covered by Medicare for all eligible patients regardless of their age. Dialysis is not a procedure without complications and risks to the patient, and therefore, its indication should be established on the basis of the best possible evidence and ideally, done with little variation across providers and systems.

One question, however, that has vexed the nephrology community is what constitutes the optimal timing of dialysis initiation for any given patient approaching kidney failure. Unless a clear emergent indication for dialysis arises (e.g., hyperkalemia, acidosis, fluid overload, serositis, or encephalopathy), it seems that timing of dialysis initiation is quite variable and that numerous factors play a role in that decision. On one hand, initiating too soon will corset the majority of patients into a payer. On the other hand, waiting too long can lead to prolonged exposure to the uremic milieu, and if the patient is not followed closely, it carries the risk of acute morbidity and mortality. Often, it is the acute appearance of subjective uremic symptoms or complications that dictates dialysis initiation; however, the onset of uremic signs and symptoms varies significantly among individual patients, and what is frequently ascribed to uremia may be related to diabetic gastroparesis or associated anemia instead. In the search for an objective metric that may guide initiation, kidney function has been used, which is preferably assessed by urine collection and calculation of the creatinine clearance (or the mean of the creatinine and urea clearance) but more recently, has been assessed using estimation equations for GFR. However, when examining determinants of eGFR at dialysis initiation, it became apparent (1) that eGFR was highly variable at initiation of dialysis for United States patients and (2) that available information on demographics and co-morbidities reported for patients by their nephrologists at the onset of ESRD explained only 11% of the variation in eGFR at initiation across health service areas (2), clearly indicating that other factors or a great deal of random chance determined when any given patient initiated treatment for ESRD.

It has been observed over the past decade or two that patients have started dialysis increasingly early (i.e., with relatively more preserved residual kidney function) (1). The percentage of patients who started dialysis at an eGFR ≥10 ml/min per 1.73 m² has increased from 12.5% in 1996 to 40.5% in 2012 (1). The reasons for this trend are poorly understood but may at least partly be because of the evolving opinion that earlier initiation may be better for the patient. Evidence supporting this shift has been limited, and earlier studies using mostly observational designs had a high potential for bias. The best trial on this question, the Initiation Dialysis Early and Late Study, randomized patients with CKD stage 5 to an earlier start (defined as planned initiation of dialysis when Cockcroft–Gault equation–estimated creatinine clearance was 10–14 ml/min) or a later start (defined by estimated creatinine clearance of 5–7 ml/min) (3). The study concluded that planned earlier initiation yielded no improvement in patient survival or other clinical outcomes, including quality of life, cardiovascular and infectious events, or complications of dialysis (3).

Absent any compelling evidence supporting a given initiation threshold and in light of the largely unexplained (by observed factors) variation in dialysis initiation practice in general, what could explain these trends toward earlier initiation? It has long been speculated that some of this development could be a result of provider-side incentives. Indeed, a large body of literature supports that physicians (and other health care providers) do respond to financial and other economic and noneconomic incentives, and these forces may be particularly powerful in clinical situations where evidence is unavailable or insufficient to strongly suggest using a specific clinical strategy (4–6). In the setting of dialysis initiation, this would mean that physicians may benefit by initiating dialysis earlier directly through higher physician fees or co-ownership of dialysis facilities or more indirectly, through medical directorships of dialysis facilities or greater convenience or operational efficiency by being able to see more patients while rounding in the same dialysis unit. Conversely, this would mean that physicians who would not benefit in either way (at least not directly in financial ways;
e.g., salaried physicians) would not be inclined to initiate dialysis as early, because they would not generate additional marginal income.

A study published in this issue of CJASN by Yu et al. (7) examined this very question by testing the null hypotheses (1) that veterans who initiated dialysis inside the Veterans Affairs (VA) system (cared for by salaried VA physicians who have no marginal financial gain to expect) experienced similar timing of initiation of dialysis (at a similar eGFR) as veterans initiated outside the VA (paid for by the VA or not), where non-VA physicians would reap additional patients (and fees) and (2) that the secular trends toward earlier initiation reported previously would also not differ among these groups. (Yu et al. [7] also included nonveterans as an external group, perhaps to provide context.) Indeed, Yu et al. (7) rejected their first null hypothesis on the basis of data that indicated that veterans who initiated dialysis within the VA had a lower likelihood of initiating dialysis early: the adjusted probability of having an eGFR > 10 ml/min per 1.73 m² was 31%, whereas the respective adjusted probabilities (taking into account the considerable differences in observed patient characteristics across groups) were 36% among veterans initiated outside the VA for whom dialysis care was paid for by the VA and 40% for those whose dialysis was paid by insurance other than the VA (adjusted mean eGFR values for these groups were 8.7, 9.4, and 10.0 ml/min per 1.73 m², respectively). Hence, these results support the possibility of provider-induced demand, in that veterans approaching ESRD experienced differential timing of dialysis initiation depending on their providers’ financial incentives, with salaried physicians in the VA system initiating patients relatively later than nephrologists outside the VA who received incrementally higher monthly payments for each additional patient.

Before jumping to premature conclusions, one needs to consider possible alternative explanations for these findings. The most important and obvious one is residual confounding. The data presented already showed considerable differences in demographics and observed clinical characteristics among these groups of veterans. Much of the available information originated from the Medical Evidence Report, where numerous validation studies have established the poor sensitivity and positive predicted values of data reported to the Centers for Medicare and Medicaid Services for most items. In addition, it is possible that the quality of the data reported in the Medical Evidence Report differs among groups of veterans defined by the setting of their dialysis initiation. Indeed, it has been shown that the validity of the information in this form differs across demographic characteristics (8). Therefore, it is possible that some or most of the differences can be attributed to unobserved differences in characteristics that may influence the timing of dialysis initiation. It is also possible that patients within the VA have more detailed and continuous care that permits conservative treatment for ESRD until relatively lower residual kidney function has been reached. The available data supporting this research certainly cannot establish the clinical appropriateness of the reported timing of initiation for any of these groups of veterans.

Regarding the second hypothesis tested that previously observed trends toward earlier initiation of patients approaching ESRD may differ across location of dialysis initiation and dialysis coverage by the VA, it is interesting that these trends seemed parallel (albeit at a different level) in veterans initiating at the VA compared with the other groups, including nonveterans. However, this body of research is severely hampered by the creatinine measurements made over time. Creatinine assays have been standardized only in recent years; before that, available creatinine assays had rather large interassay variability, and overall, they produced higher creatinine measurements than a modern standardized assay would have produced (9, 10). This systematic bias is unaccounted for (and unaccountable) and may explain some, much, or all of the secular trends observed in eGFR at dialysis initiation.

In summary, the study by Yu et al. (7) illustrates that both veterans with ESRD who initiated dialysis inside versus outside the VA system did so with increasingly preserved kidney function over time. Thus, the system and the physicians practicing in it were exposed to similar changes in practice. However, at each point in time, veterans initiating dialysis outside the VA system consistently did so with more preserved kidney function than those who started dialysis inside the VA. These practice contrasts of intra- versus extra-VA initiation of dialysis cannot be explained from information reported in the ESRD registry and warrant detailed subsequent investigation using the highly granular information that the electronic health record of the VA system offers.

Disclosures

None.

References


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