Most medical providers argue that they practice patient-centered care; incorporating evidence-based best practices in the context of patient preferences, capacity, and healthcare goals. However, to accomplish true patient-centered care, we must transition from disease-oriented care to patient-oriented care. The foundation of this is shared decision making in which evidence-based best practices are adapted within the patient’s context, which is referred to as contextualized care.1,2 The end result is individualized care that enables patients to achieve the best outcomes based on what is important to them, rather than what is important to the healthcare provider or system.3 When this approach is successful, it improves overall patient outcomes and possibly decreases unnecessary testing, procedures, and therapy.3,4

We also know that our patients want and expect accurate, transparent information about their disease trajectory, including symptoms and symptom management, survival, cost of care, and quality of life for each therapy choice. Unfortunately, nephrologists and other providers have not consistently met this expectation.5–8 Certainly this gap in information exchange may be due to the nephrology team’s lack of awareness, communication skills, or time to spend with the patient; however, it may also be due to the lack of available trusted data that can be interpreted relative to certain subsets of CKD patients. This is particularly true for the older adult with advanced CKD or AKI.

A clinical commentary by Rosansky and Clark9 highlights the recent decline in the number of patients starting renal replacement therapy in the United States. The data presented indicate that the decrease in early dialysis starts (with an estimated GFR ≥10 ml/min per 1.73 m²) accounts for a large part of this change. Interestingly, there has been a slowdown in early dialysis starts even for individuals aged >75 years, whose increasing incidence of dialysis has outpaced other age groups. Changes in practice patterns leading to the decrease in early starts were influenced by well designed, patient-oriented research informing conversations with patients around the timing of and need for renal replacement therapy.9–19 The knowledge gained from these studies and others about the pros and cons of therapy options, including maximum conservative management, should be incorporated into patient-centered, age-relevant decision aids, a tool that is successful in helping patients understand the effect of various options on their healthcare goals and personal priorities.20,21 Unfortunately, many elderly patients do not decide whether to pursue renal replacement therapy while they are in calm, controlled preemptive settings. Rather, patients often must make this decision at the time of an acute illness or decompensation of a complex chronic illness, when time pressures and lack of prognostic data hinder the decision making process.22,23 In these acute situations, especially for very elderly individuals (aged ≥85 years) with limited baseline overall survival, there are many questions regarding survival predictions, subsequent quality of life, burden of the therapy, intensity of medical services needed, degree of recovery expected, and so forth, for which we have little data. This knowledge gap in critical health status transitions has often left providers, patients, and surrogate healthcare decision makers with difficult decisions without evidence-based data on which to make a truly informed patient-centered decision. The consequence is a nonstandard approach to therapy, as shown by the wide variation in the percentage of older patients in dialysis programs throughout the United States and worldwide.15,24–28

In this issue of *JASN*, Wong et al.29 use 2010 US Renal Data System data30 to retrospectively determine the association of intensity of care at the time of dialysis initiation with survival and the need for subsequent intensive medical services. Primary outcome measures were time to death after initiating dialysis and time spent in the hospital during the follow-up period with the future use of intensive procedures as a secondary outcome measure. The authors found significantly higher

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mortality (adjusted hazard ratio, 1.44; 95% confidence interval, 1.42 to 1.47) and a higher number of overall hospital days, including subsequent hospitalizations ($P<0.001$), for patients who required more intensive care at dialysis initiation. Of the 416,657 Medicare beneficiaries aged ≥67 years, more than half (64.5%) initiated dialysis in the hospital, with the percentage of hospital starts increasing with increased age (aged 67–74 years, 62.7%; aged ≥85 years, 68.2%; $P<0.001$). Wong et al. also noted a significant increase in in-patient dialysis starts versus outpatient starts over time. These data are consistent with the trends of increased intensive care in the last few months of life for elderly patients.31,32 One of every five Americans dies in an intensive care unit (ICU) and although hospice care is delivered to an increasing number of older patients, an increasing proportion of patients receive ICU care in the last month of life, possibly before dismissal to hospice care.33

Wong et al. identified three life-supporting procedures to reflect healthcare intensity around the time of dialysis initiation: feeding tube placement, cardiopulmonary resuscitation, and mechanical ventilation. All of these procedures were associated with limited survival. Patients who had feeding tube placement had the lowest median survival at 0.4 years (inter-quartile range [IQR], 0.2–1.4) compared with 0.8 years for patients with cardiopulmonary resuscitation (IQR, 0.2–2.3) and 0.9 years for patients with mechanical ventilation (IQR, 0.3–2.7). In addition, the ongoing need for subsequent higher levels of care measured by the percentage of remaining time spent in the hospital and the subsequent need for intensive procedures increased with intensity of care required at dialysis initiation. Specifically, one in three patients in the study cohort had >14 total hospital days and one in six received life-supporting procedures. These data support findings from previous studies involving older dialysis patients that report a negative effect on quality of life and ability to maintain independence once dialysis is started.5,34,35 In fact, some patients regret starting dialysis due to the unanticipated burden of disease and/or treatment.5

Although there are inherent limitations with the Medicare claims data, as outlined by the authors, this study adds important insights into the circumstances and outcomes of elderly hemodialysis-treated patients. This new evidence will help inform discussions around patient-centered outcomes (e.g., survival and subsequent acute and intensive medical care needs, including hospitalizations) for elderly individuals facing the choice of whether to start renal replacement therapy in acute and nonacute settings.

Where do we go from here? As the older CKD and geriatric populations with increased risks for AKI continue to grow, we are obligated to better understand what is needed to optimize their care. When and how do we more effectively educate older patients with advanced or progressive CKD or those at risk for AKI about their risks for needing renal replacement therapy and treatment options? As pointed out by Wong et al.,29 these conversations must include sharing information important to this population, such as the patient’s prognosis and the need for future healthcare interventions. The study by Wong et al. is the first to provide insight into the association of site, intensity of care, and length of hospitalization at the initiation of dialysis to the subsequent burden of disease. With these data, translated in the context of patient preferences, we can better design individualized care that will allow patients to meet goals and smooth transitions during health status changes, leading to fewer ICU admissions and ICU deaths, better symptom management, improved quality of life, and decreased cost of end-of-life care.36,37 In addition, nephrologists and nephrology teams must improve their knowledge of end-of-life care, including symptom management and advanced care planning.21,37,38 Engaging palliative care experts in the care of our elderly patients, as well as those with complex advanced comorbidities, to improve the symptoms and overall burden of disease has been shown to improve end-of-life quality.29 There is also value in partnering with geriatric experts in the care of elderly patients with AKI or advanced CKD to avoid misinterpreting symptoms and physical changes as evidence of uremia versus part of complex geriatric syndromes or consequences of treatment.40–42 Advanced care planning before episodes of acute decompensation is associated with decreased resource utilization at the end of life as well as improved patient and family caregiver outcomes.8,34,42–44 Having advanced care plans documented and available across care settings is important for seamless care plan implementation, but having them available does not consistently affect care.8 If the nephrology team is familiar with the patient’s preferences and advanced care planning, partnering with the inpatient practice to ensure that the nephrology team is involved in the initial conversation with the patient or family when options for renal replacement are discussed may result in adherence to the patient’s declared preferences. In summary, a patient-centered interdisciplinary approach is advantageous when patients are receiving life-sustaining therapies such as dialysis, choosing therapy options, and deciding whether to be maintained on renal replacement therapy at the end of life.21,39,45 To improve patient-centered care and outcomes for this complex elderly population,45,46 we need more well designed, sufficiently powered studies, as well as systemic review and synthesis of existing literature focusing on outcomes important to this population.47,48 With these approaches, we will continue to gain and better manage the knowledge needed for critical shared decision making throughout the disease trajectory of our elderly CKD and AKI patients.

**DISCLOSURES**

A.W.W. serves as chair of the American Society of Nephrology Quality and Patient Safety Task Force and as a member of the American Society of Nephrology Accountable Care Organizations Task Force and Public Policy Board.
REFERENCES


assessments in potential transplant recipients. The aim of these investigations is to identify, and remediate, significant coronary artery disease before transplantation. However, the role of cardiovascular assessment in asymptomatic patients awaiting transplantation remains controversial. Patients on maintenance dialysis often have limited exercise capacity, limiting the development of symptoms, and readily available noninvasive tests, such as stress echocardiography and isotope scanning, lack sensitivity and specificity in this population. Routine angiography, even by computed tomography scanning, has risks and, even in the best centers, the intervention rate is low. One underlying reason is that coronary artery disease is only a part of the cardiovascular disease profile of patients with ESRD, in which uremic cardiomyopathy (the principal form of which is ventricular hypertrophy, with myocardial fibrosis) is an important determinant of sudden cardiac death and heart failure.

On the other hand, it is clear from screening programs that exercise capacity in potential transplant recipients is a strong predictor of post-transplant outcomes. It is a reasonable statement that patients who are able to perform even modest, asymptomatic exercise (e.g., a few minutes of a treadmill test) can be included on the waiting list without the need for additional cardiovascular investigations.

Against this background, the study by Ting et al. published in this issue of *JASN* adds to our understanding of the predictive value of cardiovascular fitness in patients awaiting transplantation. In a single-center study, the authors evaluated functional cardiopulmonary exercise testing in 240 patients awaiting renal transplantation. They were followed up to 5 years, during which time 24 patients died and 124 received transplants. The investigators measured the anaerobic threshold (AT) (i.e., the VO$_2$ [measured alveolar oxygen uptake]) at which lactate is produced during exercise, which is approximately 50–60% of peak VO$_2$ in the general population. They categorized patients into those with an AT of <40% predicted peak VO$_2$ and those at or above this level. The low AT was associated with increased left ventricular mass (131.8±39.6 g/m$^2$ versus 118.9±36.3 g/m$^2$; *P*=0.02) and poorer systolic function (left ventricular ejection fraction 59.8%±11.1% versus 62.7%±9.5%; *P*=0.04) on echocardiography. Moreover, low AT was associated with excess mortality. The mean AT was 29.9%±6.3% in 24 patients who died during follow-up compared with 39.7%±9.6% in the 216 survivors (*P*<0.001). The corresponding peak VO$_2$ was 50.1% of predicted in nonsurvivors and 65.2% in survivors. In a multivariate survival analysis, AT (40%) and whether the patient was transplanted were the only two independent risk factors for all-cause mortality, although age was not included and diabetes was close to significance (see below). Conventional risk factors such as hypertension and dyslipidemia were not statistically significant and even cigarette smoking only showed a trend toward adverse outcome.

In patients with a low AT (<40%), transplantation was associated with a substantial survival benefit compared with