Dialysis in Late Life: Benefit or Burden

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As a result of the changing dialysis demographics, nephrologists are increasingly faced with problems traditionally considered to be geriatric issues. The specialty of nephrology has often been seen as using intensive, expensive, and complex technologies for patient care. Dialysis programs have evolved into highly efficient, fast-paced units that accommodate a rapid turnover of patients. They are in direct contrast to geriatric programs, which use geriatric principles to offer simple, multidimensional, holistic care to frail older patients. Finding the balance between nephrology and geriatric skill sets is a particular challenge for up-and-coming nephrologists who have an interest in geriatric nephrology. This mini-review addresses some of the challenges, increases awareness of specific issues, and highlights new opportunities in this field.

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Dialysis is undoubtedly one of the medical success stories of the recent past. It has been and continues to be an accessible and life-prolonging treatment for those with ESRD. In the past five decades, increased numbers of older patients have initiated dialysis worldwide in terms of both absolute numbers and rates per million population. The fastest growing portion of the US Renal Data System prevalent population are those aged ≥75 yr, and dialysis initiation rates are reported at 1744 per million population for those ≥aged 75 yr (1). Although the improvements in survival are welcomed, they need to be interpreted in the face of recent research demonstrating that improved survival may be complicated by increased morbidity. Elderly patients who are on dialysis seem to have a higher burden of age-related problems, or "geriatric syndromes," such as frailty, falls, and cognitive impairment. There is also emerging evidence that dialysis initiation may be associated with accelerated rates of functional and/or cognitive decline. Thus, appropriate medical training is required for individuals who care for complex older dialysis patients.

Geriatric Giants in Dialysis

Multiple studies have demonstrated high rates of frailty, falls, functional impairment, and cognitive impairment. The term "frailty" is used to describe patients with sarcopenia, weakness, weight loss, and functional decline (2–4). Collectively, these changes contribute to frailty, considered one of the geriatric giants—a syndrome precipitated by and often attributed to changes in cellular or molecular pathways that lead to multiple alterations in homeostatic responsiveness (2). Frail individuals are at high risk for increased morbidity, hospitalization, nursing home placement, and mortality (5–10). Although the term is easily understood when used in common speak, in scientific or clinical research practice, it has been difficult to pinpoint the exact features of frailty; therefore, a variety of scales have been developed and validated (8–12). The most widely accepted clinical definition is that used by Fried *et al.* (2), in which frailty is defined as the presence of three of five criteria: Unintentional weight loss, self-reported exhaustion, slow gait speed, weakness (measured using a hand-grip), and low physical activity.

Frailty

In a population-based community study of individuals who were older than 65 yr, those with impaired renal function (defined using arbitrary creatinine cutoffs of 1.3 and 1.5 mg/dl for men and women, respectively) were shown to be at higher risk for frailty than those with normal renal function (15 *versus* 6%, respectively) (13). The data showed an inverse relationship between the prevalence rates for frailty and the level of renal function, and dialysis patients have been shown to experience one of the highest prevalence rates for frailty in any single population. In the Dialysis Morbidity and Mortality Study (DMMS) Wave II study, a total of 67.7% of patients of all ages met collective criteria for frailty (14). While the prevalence was maximal in the oldest age category (78.8% of those who were older than 80 yr were considered frail), a significant number of younger individuals fulfilled criteria for frailty (66.4% of those aged 50 to 60 yr). As one would expect, frailty was strongly associated with high mortality rates and increased hospitalization even after adjustment for demographics, comorbidities, and serum albumin at the time of dialysis initiation. A large proportion of those aged ≥65 yr reported a loss of vitality, and most reported difficulty with simple activities such as lifting groceries, climbing stairs, and walking.

Accidental Falls

Not unsurprising, patients who require dialysis have been reported to have a higher burden of other geriatric syndromes. They experience more accidental falls than would be expected

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in age-matched populations (15–17) and have an overall lower level of independent functioning (18–20) and increased burden of cognitive impairment (21–23). Fall incidence rates have been estimated between 1.2 to 1.6 falls per person-year for dialysis patients whoa re older than 65 yr (16,23). As seen in the non-dialysis population, individuals with a history of falls were found to be at increased risk for subsequent falls (23,24). Although not clearly identifiable as "fallers," individuals at most risk for falling tended to have multiple comorbid conditions, take multiple medications, have low predialysis systolic BP, and experience difficulties when walking (23). Multiple explanations for the association between increased fall risk and impaired renal function, such as the high number of concomitant comorbid conditions and dialysis-related precipitants (postdialysis fluid shifts and hypotension), have been proposed (25). It is interesting that falls were associated with a two-fold risk for mortality even after adjustment for common predictive markers (26).

Functional Decline and Disability

Loss of independent functioning and high levels of dependence have been recognized in older individuals who are on dialysis (18,27). Recent studies have shown that functional difficulties may actually start at fairly early stages of renal impairment, long before the need for dialysis. In a cohort of individuals who were aged 70 to 79 yr, those with mild decrements in renal dysfunction were 15% more likely to have a new onset of functional disability than individuals with normal renal function (hazard ratio 1.15 [95% confidence interval (CI) 0.90 to 1.46] for those with cystatin C $\geq$1.13 mg/L compared with those with cystatin C $<$0.86 mg/L) (19). Similarly, high dependence has been reported in elderly prevalent dialysis patients: More than 50% of patients required help with at least one aspect of personal care (20). Among those who reported being independent in personal care, a significant number required help with instrumental activities of daily living, such as cooking and shopping for groceries. In the same study, patients also reported significant difficulties with managing their personal transportation—an important issue for patients who attend outpatient hemodialysis sessions. It is unclear when and how the functional deterioration occurs and whether it is gradual or sudden. Recent data suggest that older patients experience accelerated decline around the time of dialysis initiation (28,29). Small single-center studies have shown that further functional decline occurs during hospitalization, with deterioration seen across multiple measures (muscle strength, cognition, and functional dependence) (30). Other age-related changes, such as sensory impairment and vision loss, are also common, with one study reporting that 39% of prevalent older hemodialysis patients had severe vision loss (31). These may have further impact on independent living.

Cognitive Function

Brain function has been seen to be affected by the presence of chronic kidney disease, such that as kidney disease progresses, cognitive function declines (21,22,32,33). Maintaining higher hemoglobin levels using erythropoietin can help improve cognitive function (34) as can, possibly, the use of nocturnal hemodialysis (35). It is likely that the severity of cognitive impairment increases over time; however, the supporting data tend to be weak, because most studies are cross-sectional in design and depend on corrections for age, gender, and level of education to standardize results across populations. One study, presented only in abstract form, followed a dialysis cohort during a 1-yr period (n = 230) and showed that 30% had progressive worsening of cognitive impairment whereas 18% showed improvement over time (36). Much of the cognitive impairment is likely explained by subclinical vascular damage (silent infarcts and white matter disease are easily seen on magnetic resonance imaging scans [37–40]), but hemodynamic and fluid shifts during dialysis may also contribute to some of the fluctuations (40,41).

Balancing Benefit and Burden

The benefit of dialysis is undoubtedly prolonged survival in those with ESRD. In some countries, dialysis survival in elderly patients may be improving. For example, in Canada, patients who started dialysis when they were aged 75 to 80 yr had a 14% increase in life expectancy in the era 1995 through 1999 compared with those who started dialysis between 1990 and 1994 (average life expectancy 3.19 yr [95% CI 3.03 to 3.35 yr] and 2.73 yr [95% CI 2.63 to 2.83], respectively) (42); however, from the data shown previously, dialysis may also be burdensome. The renal community may be in part at fault for promoting dialysis as a curative, life-saving therapy. Patients and families are rarely aware that, particularly in those aged $\geq$65 yr, the prognosis with dialysis treatment is similar to that of colorectal cancer and only marginally better than that of lung cancer (43,44). In dealing with older people who are approaching dialysis, the nephrologist must be sensitive not only to the medical issues but also to issues about quality of life and the individual's values.

It is imperative that clinicians actively discuss and consider nonaggressive renal care in addition to peritoneal dialysis (PD), hemodialysis, and transplantation (45,46). Although it is distasteful to think of withholding dialysis purely on the basis of age, physicians must be responsible for offering care that promotes the best quality of life and not necessarily the longest duration. This is particularly relevant when one considers the burden of functional and cognitive illnesses described previously. Discussions by physicians about dialysis or transplantation often include information about the treatment itself but rarely consider how patients feel on dialysis, the differences between the dialysis treatments, or which of their usual activities they may be able to continue.

The ultimate goal should be to distinguish who would be a good dialysis candidate and who would do poorly; however, attempts to define a subpopulation of elderly patients who would not do well on dialysis have been largely unsuccessful. Age, functional status, mobility, and comorbidity burden are predictive of survival but do not explain sufficient variability to allow the development of a criterion score that can be used to select patients for dialysis (47). Individualized assessment seems to be optimal, although the criteria on which decisions are based are implicit and therefore hard to teach. Furthermore, an approach to palliative care, although an integral part of

oncology programs, is offered only sporadically across renal programs. Two nephrology programs, both in the United Kingdom, have established palliative care pathways for older patients. In one, patients who were offered a palliative path were more likely to have diabetes, to be older, and to have more baseline comorbid conditions (47). Details about family support, cognitive function, and functional or frailty scores were not given. Dialysis care offered only marginal benefits (median survival 8.3 *versus* 6.3 mo for those who opted for dialysis care compared with those who accepted palliative care recommendations, respectively) (48). The second unit reported outcomes for 129 patients who were aged ≥75 yr (49). All were advised that the burden of starting dialysis was likely to outweigh any benefits; however, 52 of 129 patients opted to undergo dialysis therapy. Survival was measured from the time when patients first had an estimated GFR of <15 ml/min per /1.73 m^2, leading to potential for various biases (50). A 16% difference in 1-yr survival was seen (49). Functional outcomes, such as the ability to remain at home, were not reported.

Modality Choices

The use of PD in elderly patients may be controversial. Although the worldwide use of PD has declined, 11.6% of patients aged ≥75 yr in Canada and 15% of patients aged ≥65 yr in the United Kingdom are started onto PD as their initial dialysis modality (51,52). Reports suggesting that elderly women with diabetes experience higher mortality when treated with PD as their initial dialysis modality are of concern; however, recommendations to avoid PD in this group of patients cannot be made easily (53,54). Advocates for PD still champion personal independence as the sole largest benefit of the treatment (55,56). Extrapolation of the data showing an increased mortality risk would likely shorten life only by a few weeks to months in contrast to a potentially improved quality of life. Differences between the two dialysis modalities, in terms of functional and cognitive burden, independence, and satisfaction with life, are lacking but may influence physician practice. Initiatives to promote care within residential and nursing home settings and to promote independent living with PD may become increasingly important in modality decision-making (57–59).

Nonaggressive Renal Care and End-of-Life Care

The term "nonaggressive renal care" has been deliberately chosen in preference to conservative care. It is critical that not starting or withdrawal from dialysis not be viewed as "withdrawal of care" or passive care. Rather, nonaggressive renal care is an intensive approach that prioritizes comfort. Active care is given for all physical symptoms and emotional and spiritual needs akin to the palliative cancer literature. Specific training for doctors regarding management of pain, depression, and renal-specific symptoms (*e.g.*, myoclonic jerks, fluid accumulation, itching) is needed. Interventions such as surgical creation of vascular access should be considered only after evaluation of the benefits in light of concomitant morbidity and life expectancy (60).

Providing care at the end of life is an important aspect of comprehensive geriatric nephrology care (46,61–64). Nephrologists are encouraged, as a simple initial step, to ask themselves whether they would be surprised if a patient died in the next year. If they answer no, then discussions around a less aggressive approach to care may be appropriate. One study showed that a negative response was associated with a 3.5-fold increase in the odds of death within the subsequent 12 mo (65). In practice, however, many patients and families seem to have goals that are inconsistent with their likely prognosis, and a structured approach to management and discussions is appropriate. Strategies to facilitate difficult conversations include early discussions around prognosis, acknowledging the difficulties associated with end-of life decision-making, and the pairing of symptoms with solutions offered by palliative care services (64,66). Aggressive management of non–renal-specific symptoms such as pain and depression are essential, and involvement of the palliative care service is recommended (46,61). Whenever possible, discontinuation of medications that do not offer immediate symptom benefit (*e.g.*, statins, antihypertensive or antithrombotic medications) may improve patients' taste and ability to eat and thus quality of life. Additional help for families and caregivers is often needed as they support their loved ones through the final stages of life. Younger nephrologists tend to express less self-assessed preparedness for discussions around end-of-life issues than those with longer experience (67). In addition, in a survey of nephrology fellows, although 99% identified that it was important to provide end-of-life care, they believed that they received the least education and felt least prepared to provide this type of care (68). As a result, renal training programs are encouraged to incorporate into their training programs formal training for end-of-life care and communication skills.

The Changing World of Nephrology

The scope and practice of nephrology continue to evolve. In response to the needs of the aging dialysis population, the American Society of Nephrology held, for the second consecutive year, a 2-d course on geriatric nephrology during Renal Week 2009. During this course, topics such as the validity of estimating equations in older populations, the assessment for and management of geriatric syndromes, and issues around dialysis decision-making and end-of-life care were discussed. Furthermore, in collaboration with a core group of interested academics, the American Society of Nephrology has published an online Geriatric Nephrology Curriculum that is made available to all who are interested (69). Together with ongoing research, fueled by an increased number of funding opportunities for resident in the United States, it is hoped that these initiatives will change practice and promote better elder renal care.

Disclosures

None.

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