

Ripple Effects: CKD and Physical Function

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Physical function enables independence and underlies quality of life. Pediatricians celebrate a child's first steps; geriatricians worry when an older adult walks more slowly. Chronic kidney disease (CKD) drives muscle loss,¹

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and a previous study has shown that limited physical function predicts mortality in CKD.² Despite nearly one-fifth of people with CKD using an assistive device for ambulation,² the trajectory of how physical function changes with CKD progression, including the transition to dialysis, is not well understood. In this issue of *Kidney Medicine*, Hart et al³ address this gap in our understanding about physical function over the course of kidney disease, including the transition to dialysis, in community-dwelling adults with CKD.

The investigators evaluated the trajectory of physical function over time using data from the brain in kidney disease longitudinal cohort. Over 5.25 years, 562 persons with CKD were assessed annually in-person with the short physical performance battery (SPPB) and gait speed. The SPPB evaluates balance, gait speed, and ability to get out of a chair, and gait speed assesses walking pace. Both assessments are highly predictive of future mortality and disability.⁴⁻⁶ If a person started dialysis, they received an additional in-person visit within 1-3 months after initiation. Afterwards, they were then assessed twice yearly. Using both measures, the investigators found that physical function declined over time, with the greatest losses seen among those with most advanced stages of CKD. For persons who had a baseline estimated glomerular filtration rate of <15 mL/min/1.73 m², they lost 0.47 points per year on the SPPB, and 0.035 m/s per year for gait speed. Because the minimal clinically important difference for the SPPB is 0.5 points and 0.05 m/s for gait speed,⁷ these results mean that every 2 years, these individuals experienced a clinically notable decline in their physical function. Among those who started receiving dialysis, gait speed continued to decline after dialysis initiation. These findings suggest that there is an overall downward decline in physical function in persons with CKD and hints that dialysis initiation likely does not improve physical function.

This article has several key strengths. First, the study is longitudinal and followed over 500 persons with CKD for over 5 years. Participants were assessed in-person, either annually or biannually, and thus the study reflects an enormous commitment of time and resources. Second, the study used SPPB and gait speed. These are validated assessments that use minimal equipment, facilitating

reproducibility. Third, when a participant started dialysis, more frequent assessments were added, enabling a better understanding about this pivotal period. We do note that the study had limited diversity, with most participants identifying as White and having some college education. In addition, no data are presented on the physical function of participants who pursued supportive care for kidney failure as opposed to dialysis initiation. Such data would provide a more complete picture of the trajectory of physical function as the disease worsens.

The study by Hart et al³ is important for 2 reasons. First, physical function is important to persons with CKD and their families. Through the standardized outcomes in nephrology initiative, persons with CKD and their families identified "life participation," or the ability to pursue desired activities and interactions with others, as a key outcome for CKD research.⁸ Because physical function underlies the feasibility of different activities, this research is clearly addressing a priority of persons with CKD. Second, the study provides evidence that for community-dwelling individuals in the United States, physical function does not improve with dialysis initiation. These findings complement the work of the Indiana University Longitudinal Study of Incident Dialysis study, which found that over half of their 183 participants experienced losses in gait speed after dialysis initiation.⁹ Similarly, the Canadian Frailty Observation and Interventions Trial demonstrated that transition to dialysis was associated with losses in the ability to get out of a chair.¹⁰ In the Netherlands, Goto et al¹¹ found that physical function, as measured by independent activities of daily living, decreased within the first 6 months of initiating dialysis.¹¹

Clinically, the findings of Hart et al³ have several implications. Given that life participation is a priority for persons with CKD, these findings suggest that, when dialysis initiation is being discussed, the impact on physical function should be an integral part of the conversation. This includes a discussion that improvements in physical function are highly unlikely, even with the routine removal of excess fluid and toxins, and that some may even experience a decline in physical function. Moreover, these changes should also be discussed with the families of persons with CKD. As a person's physical function declines, their reliance on others for support for essential and routine tasks increases. For a person with CKD, these changes likely mean reduced quality of life, and for their families, increased responsibilities. Informing patients with CKD and their families of these anticipated changes, especially for those who live alone, is needed. Ideally, family members are aware and prepared for these changes. Clinicians should also consider if other options for support

are appropriate, such as in-home support services (often funded by Medicaid), relocation to a more supportive living environment such as assisted living, or hiring a private aide or caregiver if financially feasible. Clinicians should also use Medicare-supported benefits for durable medical equipment, such as canes or walkers, raised toilet seats, and tub grab bars.

As a person with CKD loses physical function and becomes less independent, their resulting needs inevitably increase the responsibilities of family members providing assistance. However, O'Hare et al³ have documented that family members are infrequently approached and often feel overlooked and invisible to clinicians.¹² Given that loved ones often help persons with CKD navigate the health care system, manage competing priorities, and assist in making medical decisions, including them is crucial for shared decision-making and person-centered care. The greater responsibilities of family members increase caregiver burden, defined as the adverse effects on an individual's mental, physical, and financial health because of caregiving responsibilities.¹³ Ramifications include greater rates of depression, heart disease, and future mortality.¹⁴⁻¹⁶ To truly execute comprehensive care for a person with CKD, clinicians should solicit input of family members and assess for caregiver burden. Although in general there are inadequate resources to address caregiver burden in the United States,¹⁷ acknowledgment by clinicians about the vital contributions of families is the first step to addressing this essential but often ignored component of medical care for persons with CKD.

Finally, clinicians should also pay attention to the mental health of persons with CKD as the disease progresses. Anxiety, or feelings of uncertainty, dread, and fearfulness in anticipation of the future, is common in persons with CKD.¹⁸ Better information of what to expect, including what will likely occur with physical function, may ameliorate feelings of uncertainty for persons with CKD, especially if they transition to dialysis. Although prediction of when kidney failure will occur is still somewhat imprecise, equipping persons with CKD and their families with knowledge and potential tools to address the upcoming challenges in physical function may reduce anxiety and promote adaptation to these changes.¹⁹

Despite the name, CKD is a disease that impacts multiple aspects of a person's health and well-being. This study by Hart et al³ demonstrates how CKD changes the physical function as kidney health declines. To fully prepare persons with CKD and their families for the next steps, clinicians should share the trajectory of projected changes in physical function. Such information will help persons with CKD and their families to anticipate future needs, whether it be more hands-on physical assistance, reaching out to a support group, or investigating local services in the community for those with limited physical function. Although a person's trajectory with CKD is unlikely to ever be simple or easy, sharing the potential details of this path may ease the journey for persons with CKD and their families.

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