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## **Reduced and declining physical function in prevalent dialysis patients – identifying the vulnerable**

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For many patients with advanced chronic kidney disease (CKD) requiring renal replacement therapy (RRT), particularly frail patients or with significant comorbid disease burden, haemodialysis remains the default treatment option. Kidney transplantation and peritoneal dialysis provide alternative modalities of RRT, respectively offering differing benefits and potential hazards; whilst some patients may consider they would prefer conservative management of advanced kidney disease.

Conventionally, once established on haemodialysis, therapy revolves around established, auditable treatment targets such as dialysis adequacy, haemoglobin, serum phosphate and haemodialysis access which are usually associated with better outcomes. For example, considering adequacy of haemodialysis, achievement of a urea-reduction ratio of >67% has been associated with a reduced risk of death by 26% [1]. This concept of guideline directed therapy to improve specific outcomes is not new. Nephrologists have applied this mantra for decades and generally, this approach has improved patient outcomes, when one considers the expansion of

haemodialysis programmes over the past three decades, to take on more elderly, frail and comorbid patients.

However important, extending life may not necessarily be the outcome all patients wish, some of whom may opt for *quality over quantity* of life. It is only in the last few years that focus has turned towards patient reported outcomes in renal medicine, focussing on symptoms, mood and physical independence. Efforts are being made by renal registries to routinely collect these data [2]. In a condition associated with 'accelerated aging' [3], nephrologists must understand the natural history of patient reported outcomes in order to improve patient care. Physical fitness is lower in advanced CKD compared to healthy age-matched individuals. Underpinning the natural history of physical function in haemodialysis patients - who face at least 12 hours per week of enforced sedentariness - is essential to support intervention to improve both quality and quantity of life.

In their paper [4] Van Loon *et al* study the trajectory of physical function in a haemodialysis population from 2004-2009, with particular focus on effect of age on physical function. They analysed data collected originally collected as part of the CONTRAST study, a randomised control trial assessing the effect of haemodialysis versus haemodiafiltration on cardiovascular health and all-cause mortality in a multicentre study involving North American and European participants. Using a validated tool (KDQOL-SF) they assessed self-reported physical ability at baseline and annually during follow-up. Participants' physical function status was divided into tertiles of low, intermediate and poor physical function to describe baseline characteristics. For analysis, participants were divided into groups based on age; <65, 65-74 and ≥75 years. At 2 years the composite of a pre-determined decline in performance score or remaining in the 'poor' category were defined as a poor-

outcome. A logistic regression model was applied to determine factors associated with this poor outcome and baseline demographics.

Baseline data were available on almost 700 participants, with a mean age of 64 years. At baseline, there was a clear difference in reported physical function by each age group with 'good' function being present in only 41.7, 28.7 and 21.8% of those aged <65, 65-74 and ≥75 years respectively. Although striking, these findings are in keeping with known effects of CKD, a wasting disease associated with sarcopenia[5]. More worryingly, they describe baseline physical function group as predictive of survival with mortality rates of 14,19 and 48% at 2 years for good, intermediate and low baseline. In addition to their high mortality rate, a further 24% of those with poor baseline physical function had a poor composite outcome (9% stagnated in the poor category and a further 15% declined). In those aged ≥65years who began in the good or intermediate groups the most frequent outcome was decline in physical function score.

Previous work has shown that initiating dialysis is linked with substantial and sustained decline in function status [6] and that lower functional status is associated with higher mortality [7]. Both findings provide clinicians with useful information when discussing initiation of dialysis with patients. However, there are difference in study methodology between those and this current report. For instance, the former study examined only nursing home residents with a mean age of 73 years and the latter, it must be remembered that initiation of dialysis not only increases exposure to medical intervention and nosocomial infection but has an increased risk of cardiovascular events[8], which a less physically active person may not tolerate, leading to higher mortality rates at initiation. Whilst viewed as a limitation by the authors, the finding of progressive physical decline – faster than that expected in the

general population – in the surviving prevalent population is significant and applicable to current dialysis care. A further limitation offered by the authors is the use of patients in a clinical trial to observe the trajectory of physical decline and use of self-reported questionnaires. The self-inclusion into such a study, is likely to omit those most frail. This only supports the likelihood that their results underestimate the degree of low physical function in the prevalent dialysis population and calls for development of urgent interventions. In their logistic regression model, they identify increasing age and lower serum albumin as predictors of poor outcome. They accurately, albeit unfortunately, acknowledge that neither are reversible factors.

However, there remains hope. The results of a recent multicentre randomised control trial of a simple exercise program managed by dialysis staff[9] demonstrated an improvement in physical function in addition to improvement in quality of life scores. Implementing a simple exercise ‘prescription’ to this captive audience is a commendable idea. At present, it is yet to be seen if a mortality benefit can be gained.

Van Loon *et al* have shown a rapid decline in physical function as the natural trajectory of prevalent dialysis patients, with higher mortality rates in those with low physical function at baseline, identifying those aged  $\geq 65$  years as the at-risk group. As renal registries begin collecting quality of life data, it seems logical to develop evidence based interventions to improve physical function, with the goal of improving quality and, perhaps in time, quantity of life.

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