

The effects of single and multi-component exercise, nutrition and educational interventions upon clinical and health-related quality of life outcomes in persons approaching and commencing dialysis – a systematic literature review

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Background: End stage kidney disease (ESKD) and dialysis are associated with complications leading to functional decline, reduced health-related quality of life (HRQoL), increased hospitalisation and poor survival, particularly within the first year of dialysis. Exercise, education, and nutritional interventions in pre-dialysis and dialysis patients may be important to prevent nutritional decline and maintain physical function and HRQoL in persons with ESKD, although there is little published evidence to support this. We performed a systematic literature review to identify relevant studies examining the association between exercise, nutrition and education interventions and clinical or HRQoL outcomes in persons approaching and commencing dialysis.

Methods: A systematic literature search of the electronic databases MEDLINE, CINAHL, EMBASE, PubMed, and Cochrane Central Register of Controlled Trials (CENTRAL) until July 2019 was conducted. Trials and observational studies meeting pre-defined eligibility criteria using a PICO question were included. Study selection was performed in two stages: title and abstract review, and full text review. Data extraction was conducted using a form tailored to the review question. Critical appraisal and risk of bias were assessed using CONSORT and Newcastle Ottawa Scale/Agency for Healthcare and Research Quality standards checklists according to study design.

Results: Seventy-five articles were retrieved for full-text review, with 15 eligible for inclusion. Two prospective cohort studies examining the effect of exercise interventions upon physical function demonstrated significant improvements in exercise capacity (44.0%; $p < 0.001$), functional ability (21-35%; $p < 0.001$) and exercise tolerance (mean rate of perceived exertion 12 vs 10; $p < 0.001$). One study involving retrospective analysis of an exercise intervention found reduced mortality or cardiovascular morbidity (HR: 0.60; 95%CI: 0.36-0.98; $p = 0.041$) in participants with increased exercise tolerance following the intervention. One feasibility study found that combined exercise and nutritional intervention led to significant increases in exercise capacity (17%, $p = 0.006$) and strength (8%, $p = 0.007$), and maintained nutritional status (Subjective Global Assessment - SGA). Two randomised controlled trials (RCTs) reported that nutritional status (determined by SGA) was maintained in 78% and 83% of participants, and improved in 17% and 22% of participants ($p < 0.01$) following nutritional intervention. Nine studies (one RCT, 4 prospective and 4 retrospective) were identified examining the effect of educational interventions upon mortality, hospitalisation, and HRQoL. Educational interventions were associated with lower mortality (HR: 0.59; 95%CI: 0.45-0.79; $p < 0.001$) and lower hospitalisation rates (7.2 vs 10.5 days; $p < 0.001$) than control group participants in the first year of dialysis. One study reported trends towards improved HRQoL following educational intervention. The heterogeneous nature of studies, including variations in study design, interventions, and outcomes, precluded meta-analysis. Methodological limitations identified in all studies included selection bias, measurement and confounding bias, use of varying outcomes, and inadequacy of study reporting.

Conclusion: To our knowledge this is the first systematic literature review on this topic. Findings, although limited, suggest that exercise, nutritional or educational interventions may lead to improved relevant clinical and HRQoL outcomes, and improved mortality and hospitalisation rates. As most interventions were single-component interventions, the effect of combined interventions is not currently known and therefore warrants further investigation in future studies.