# Effects of self-management on chronic kidney disease: A meta-analysis

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A B S T R A C T

*Background:* Self-management programs may facilitate the improvement of outcomes in medical, role, and emotional management and health-related quality of life in patients with chronic kidney disease. Studies on the effect of three self-management tasks have reported conflicting findings. In addition, systematic reviews are unavailable.

*Objective:* This study evaluated the effects of self-management programs on medical, role, and emotional management and health-related quality of life in chronic kidney disease.

*Design:* Meta-analysis of randomized controlled studies.

*Data sources:* The meta-analysis involved an online search of the English literature from PubMed, Cochrane, Web of Science, and CINAHL and the Chinese literature from the Airiti Library that were published from the inception of the websites until January 1, 2017.

*Review methods:* The meta-analysis was conducted to evaluate the effects of self-management on chronic kidney disease outcomes. Electronic databases were searched by using keywords: chronic kidney disease, end-stage renal disease, renal failure, dialysis, self-management, self-efficacy, empowerment, cognitive behavioral, and educational. The methodological quality of randomized controlled trials was assessed using the Cochrane Handbook. Data were analyzed using Comprehensive Meta-Analysis software 2.0.

*Results:* Eighteen randomized controlled trials met our inclusion criteria. The results revealed that the self-management program significantly enhanced the effects of self-management on outcomes of medical, role, and emotional management and health-related quality of life in patients with chronic kidney disease. The following Hedges' g (effect size) values were obtained: (1) interdialytic weight gain, $-0.36$ (95% confidence interval, $-0.60$ to $-0.12$, $p < 0.01$); (2) self-efficacy, 0.57 (95% confidence interval, 0.18–0.96, $p < 0.01$); (3) anxiety, $-0.95$ (95% confidence interval, $-1.65$ to $-0.25$, $p = 0.01$); (4) depression, $-0.63$ (95% confidence interval, $-0.85$ to $-0.41$, $p < 0.01$) (5) health-related quality of life for the mental component of the SF-36, 0.71 (95% confidence interval, 0.45–0.97, $p < 0.01$); (6) the physical component of the SF-36, 0.61 (95% confidence interval, 0.35–0.86, $p < 0.01$); and (7) the Kidney Disease Quality of Life, 0.41 (95% confidence interval, 0.17–0.65, $p < 0.01$).

*Discussion:* This study revealed a small effect of self-management on interdialytic weight gain; medium effects on self-efficacy, depression, and health-related quality of life; and a large effect on anxiety. However, high-quality randomized controlled trial designs are required to confirm these results, although the existing evidence can guide clinical practitioners and health policy makers.

### What is already known about the topic?

- Patients with CKD may experience a wide range of physical and psychological symptoms as well as changes in lifestyles.
- Self-management programs may facilitate the improvement of outcomes of medical, role, and emotional management in patients with chronic kidney disease.
- Studies on the effect of three self-management tasks have reported conflicting findings.

### What this paper adds

- Self-management has a small effect on reducing inter-dialytic weight gain; medium effects on improving self-efficacy, health-related quality of life, and depression; and a large effect on decreasing anxiety.

# 1. Introduction

Chronic kidney disease (CKD) causes a health and health care expenditure burden in many countries (Saran et al., 2015). Patients with CKD may experience a wide range of physical and psychological symptoms as well as changes in lifestyles, and consequently undergo self-management challenges, which are necessary to improve their conditions (Murtagh et al., 2007; Yong et al., 2009). According to the US National Kidney Foundation, CKD progression is categorized into five stages according to the glomerular filtration rate (Inker et al., 2014). The quality of life deteriorates with increasing CKD severity (Perlman et al., 2005).When the renal function declines to stage 5 (end-stage renal disease), some patients must rely on long-term renal replacement therapy, for instance, hemodialysis or peritoneal dialysis (Wen et al., 2008).

Self-management is suggested to be a key to effective care of chronic diseases that is a process in which people perform daily health care-related functions for managing chronic diseases (Lorig and Holman, 2003, Welch et al., 2015). Self-management increases patients' confidence and skills as well as knowledge of their conditions, which can assist them with managing their health problems (Wagner, 1998). Corbin and Strauss (1988) proposed three self-management tasks, namely: medical management, role management, and emotional management. Medical management refers to taking medications and attending follow-up appointments (Corbin and Strauss, 1988). It may also be focused to disease-specific medical management which refers to tasks associated with a specific diagnosis; for example, fluid management is implemented to limit interdialytic weight gain in CKD because high interdialytic weight gain is considered an indicator of non-compliance (Clark et al., 2014) and may be associated with increased cardiovascular mortality and morbidity (Daugirdas et al., 2007). According to Corbin and Strauss (1988), role management includes changing and creating meaningful behaviors or roles. Self-efficacy is a core element of role management and is associated with patients' ability to engage in healthy behaviors and adhere to treatment regimens (Novak et al., 2013). Emotional management involves processing emotions that arise from having a chronic illness (Corbin and Strauss, 1988). The prevalence of anxiety and depression is high in patients undergoing hemodialysis (Feroze et al., 2012), and this may impair the self-management of their illness and lead to deteriorating conditions (Li et al., 2014). Emotional management can thus help reduce the impact of stress, anxiety, and depression in patients with CKD.

Self-management programs may improve the quality of life in patients with CKD (Bonner et al., 2014). However, a review of studies on self-management programs among patients with stage 1–4 CKD reported inconclusive evidence regarding the effectiveness of such programs (Bonner et al., 2014). Another integrative review of self-management interventions for stages 1–4 CKD could not draw conclusions on the efficacy of CKD self-management interventions (Welch et al., 2015). Reviews on the self-management of CKD have included only papers published between 2003 and 2013. Several randomized controlled trials (RCTs) assessing the efficacy of self-management programs for CKD have been published since then (Blakeman et al., 2014; Hare et al., 2014; He et al., 2014; Valsaraj et al., 2016; Wang, 2014; Wileman et al., 2016, 2014). An updated systematic review of the effect of self-management on CKD was therefore needed. The purpose of this study was to perform an up-to-date systematic review of the literature and use the available evidence to quantitatively determine the effects of self-management programs on the outcomes of different tasks, namely medical management (i.e., interdialytic weight gain), role management (i.e., self-efficacy), and emotional management (i.e., anxiety and depression), as well as health-related quality of life (HRQOL) in patients with CKD.

# 2. Methods

## 2.1. Criteria for study inclusion

### 2.1.1. Participants
In this meta-analysis, only studies on patients aged 18 years or older who had received a diagnosis of Stage 1–5 CKD were included.

### 2.1.2. Interventions
Intervention studies that employed self-efficacy training, empowerment, cognitive behavioral therapy, or education programs focusing on self-management, delivered face to face or through telephone were included.

### 2.1.3. Comparison
Studies that included at least one control group were included in the meta-analysis.

### 2.1.4. Outcome measures
Studies that evaluated the outcomes of self-management, namely medical (i.e., interdialytic weight gain), role (i.e., self-efficacy), and emotional management (i.e., depression and anxiety) as well as HRQOL in patients with CKD were included.

### 2.1.5. Study design
Studies that employed an RCT design were included.

## 2.2. Search strategy

This meta-analysis was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. We searched RCTs up to January 1, 2017. Four English electronic databases (PubMed, Cochrane, Web of Science, and CINAHL) were searched by combining (chronic kidney disease OR end-stage renal disease OR renal failure OR dialysis) AND (self-management OR self-efficacy OR empowerment OR cognitive behavioral OR educational) as keywords and the English language filter was applied in searching databases. One Chinese electronic database (the Airiti Library) was searched by combining ([ALL3]:"chronic kidney disease" OR [ALL3]:"end-stage renal disease" OR [ALL3]:"renal failure" OR [ALL3]: dialysis) AND ([ALL3]:"self-management" OR [ALL3]:"self-efficacy" OR [ALL3]: empowerment OR [ALL3]:"cognitive behavioral" OR [ALL3]: educational) as keywords. We contacted the authors of the primary reports to request any unpublished data. We used the available data for our analyses if authors did not reply. Furthermore, references from retrieved papers were reviewed for any additional studies.

## 2.3. Study selection

The titles and abstracts of potentially eligible articles identified by search criteria were independently screened by two reviewers (M.Y.L and L.F.H). Full texts of these articles were independently evaluated on the basis of inclusion criteria by two reviewers (M.Y.L and L.F.H). Disagreements were resolved by consensus. A third reviewer (P.S.T) was consulted for adjudication if consensus was not reached.

## 2.4. Methodological quality assessment

The methodological quality of the included RCTs was independently evaluated by two reviewers regarding Cochrane Handbook for assessing the risk of bias (Higgins and Green, 2011), and each component was categorized as having a high, low, or unclear risk of bias: random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, and selective reporting. The details of the risks of bias are summarized in Table 1.