Catheter lock solutions are instilled into central venous access systems to have certain effects in this location. These access systems can be either dialysis catheters, Hickman-type lines or port-a-cath systems. The latter are used mainly in parenteral nutrition and for the administration of medication in oncology patients. These access systems are approved as medical devices and are CE marked. The central venous access is inserted in the subclavian, jugular or femoral veins.

The use of Antimicrobial Lock Solutions have been recommended in the “Hygiene Guideline complementing the German Dialysis Standard” and in the Position statement of European Renal Best Practice (ERBP)”. Pure heparin solutions containing no antimicrobial agent do not meet this criterion. Antibiotics are associated with the development of resistancy which is a major drawback. Highly concentrated citrate solutions and taurolidine-citrate solutions are therefore conceivably useful in this application.

Highly concentrated citrate solutions (30% and 46.7%) cause major adverse effects such as cardiac arrests and embolisms that are a significant risk for the patient. TauroLock™ as an antimicrobial lock solution has proven useful in dialysis, oncology and parenteral nutrition for many years and has meanwhile become established in the prevention of catheter-related infections.

TauroLock™ is safe: TauroLock™ is biocompatible and non toxic. In contrast to highly concentrated citrate there is no protein precipitation if using TauroLock™.

** References: **

Pre-dialysis education for patients with chronic kidney disease

Matthew D Stephenson & Wendi Bradshaw

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Abstract

Learning outcomes

On completion of this continuing professional development activity, participants should be able to:

• Determine why pre-dialysis education is important for persons approaching end-stage kidney disease
• Identify at least three examples of successful education strategies, explaining why they may be considered beneficial
• Suggest patient-related factors that impact upon the effectiveness of education programs
• Reflecting upon education interventions at your facility, consider potential modifications or additional activities that may go towards improving patient outcomes
• Explain the objectives of the Joanna Briggs Institute renal care node

Keywords

Evidence-based summaries, best practice, pre-dialysis education, end-stage kidney disease, renal replacement therapy.

Introduction

The prevalence of chronic kidney disease (CKD) is on the rise worldwide and dialysis rates are increasing by about 6–8% annually (Ribitsch et al., 2013). CKD has five stages of disease, based on the glomerular filtration rate, with Stage 5 being end-stage kidney disease (ESKD). For patients with ESKD, treatment options include pre-emptive transplantation, peritoneal dialysis (PD), in-centre haemodialysis (HD), home HD or supportive non-dialytic management, also known as conservative care (Morton et al., 2011). Pre-dialysis education is important for CKD patients to ensure they are informed of all their treatment options and supported to make an informed choice (Morton et al., 2011).

This is the third continuing professional development (CPD) paper developed to report on an ongoing nephrology issue, offering here the evidence associated with pre-dialysis education for patients with CKD. It comprises an evidence summary from the Joanna Briggs Institute (JBI) renal care node, which provides evidence-based resources in renal care with a focus on renal nursing. The goal of the JBI renal care node is to promote evidence-based best practice and enhance the quality of renal care to improve patient outcomes.

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Methods

This evidence summary was conducted using a streamlined rapid review approach and is based on a structured search of selected evidence-based health care databases (Munn et al., 2015). The databases searched included the JBI Database of Systematic Reviews, the Cochrane Library, the Database of Abstracts of Reviews of Effects (DARE), Medline (PubMed), CINAHL, and Google Scholar. A range of keywords and subject headings appropriate for each database were used. Search terms included ‘pre-dialysis education’, ‘chronic kidney disease AND education’. Titles and abstracts of search results were screened to identify the “best available” evidence, according to the JBI levels of evidence (Figure 1). Full-text articles of identified studies were retrieved and further assessed for relevance to the evidence summary topic. Articles identified as relevant were assessed for methodological quality using an abridged set of critical appraisal tools (Munn et al., 2015). The characteristics and key points arising from the evidence are listed for each study, along with the JBI evidence level. Based on the evidence presented, best practice recommendations are reported separately with Grade A suggesting a “strong” recommendation and Grade B a “weak” recommendation.

Key points from the evidence

- A systematic review on educational interventions in kidney disease care included 22 randomised controlled trials (RCTs) (Mason et al., 2008). Interventions delivered during CKD stages 4 and 5 were reported to have short-term benefits on self-care dialysis knowledge, self-efficacy, and numbers of patients selecting self-care dialysis. Trials that assessed long-term outcomes reported significant improvements in long-term knowledge retention and the delayed onset of dialysis therapy. One RCT provided results of 20 year follow-up of a pre-dialysis educational intervention. This trial included 335 patients with CKD randomly assigned to receive pre-dialysis psycho-educational interventions (n=172) or usual care (n=163) and showed that median survival was 2.25 years longer for patients in the pre-dialysis education group compared to patients in the usual care group (relative risk [RR], 1.32; 95% confidence interval [CI], 1.0 to 1.74). (Level 1)
- A systematic review including two RCTs and two observational studies found that multidisciplinary pre-dialysis care is effective in delaying progression of CKD (Strand & Parker, 2012). The reviewers reported that an important component of pre-dialysis care is education to increase patients’ knowledge and understanding of the causes of ill health for people with CKD. (Level 1)
- An RCT evaluated the effect of multidisciplinary pre-dialysis education on total medical costs in the first six months following HD initiation (Yu et al., 2014). The trial included 425 incident HD patients who were randomised into multidisciplinary pre-dialysis education group or usual care group before reaching ESKD. Patients in the education group had lower total medical costs in the first six months after HD initiation (US$9147.6/patient in education group and US$11190.6/patient in usual care group, p=0.003). They also had fewer hospitalisations, shorter length of hospital stay and lower inpatient costs than the usual care group. The authors concluded that multidisciplinary pre-dialysis education was “independently associated with reduction in the inpatient and total medical expenditures.

![Levels of Evidence for Effectiveness](image-url)
of the first six months post-dialysis owing to decreased inpatient service utilisation secondary to cardiovascular causes and vascular access-related surgeries” (Yu et al., 2014, p. 1). (Level 1)

• A caring for Australian renal impairment (CARI) clinical guideline titled “Pre-dialysis education for patients with chronic kidney disease” (Thomas, 2007), which is due for review, suggested that all renal units develop their own educational programs, tailored to their patient cohorts, in a structured manner. Guideline recommendations, based on evidence from three RCTs, include:

a) Pre-ESKD education forms an important part of the management strategy to slow the progression of kidney disease and may have an independent beneficial effect. (Level 1)

b) All patients should have access to pre-ESKD training programs and staff. (Level 1)

• A quasi-experimental study, including 40 patients with ESKD, assessed the effectiveness of a multimedia interactive DVD as an education tool (Chiou & Chung, 2012). The experimental group received three nurse-guided sessions utilising a multimedia interactive DVD, while the control group received usual hospital health education. The study showed significant improvements in knowledge, pre-dialysis uncertainty and decision regret in the experimental group, compared to the control group, suggesting interactive multimedia is an effective education tool. (Level 2)

• A quasi-experimental quality improvement project involved the implementation of a pathway for matching education material with the literacy levels of dialysis patients (Owen et al., 2009). Baseline testing showed that the level of comprehension required for existing printed education materials exceeded the literacy level of the patient population. Following the pathway, brochures were modified to improve readability to ensure that they met the literacy levels of the patient group. (Level 2)

• A two-part, non-experimental study asked the question: “In patients with CKD, what is the effect of kidney disease education on clinical outcomes and knowledge of CKD self-management behaviours?” (Enworom & Tabi, 2015, p. 365). The researchers performed a retrospective evaluation of the (US) Medicare Kidney Disease Education (KDE) program and prospectively surveyed participants from the general population with CKD, to compare clinical outcomes. The KDE participants demonstrated slower decline in GFR compared to non-participants (M=18.3mL/min/1.73m², SD=8.3mL/min/1.73m² vs. M=15.0mL/min/1.73m², SD=6.1mL/min/1.73m²), and maintained stable anaemia status compared to non-participants. Researchers concluded that provision of education to Stage 4 CKD individuals was associated with improved outcomes. (Level 3)

• An observational study aimed to evaluate the influence of a structured pre-dialysis education programme (PDEP) on the mode of chosen renal replacement therapy (RRT) (Goovaerts et al., 2005). The goals of the PDEP were to offer information on all modalities, decrease anxiety and promote self-care modalities. The researchers performed a retrospective review of 242 patients starting their first RRT over a six-year period. They concluded that “a high percentage of patients exposed to a structured PDEP start with a self-care RRT modality … leaving in-centre haemodialysis for patients needing medical and nursing care, or for patients refusing to participate in their treatment.” (Goovaerts et al., 2005, p. 1842).

They additionally suggested that a higher proportion of patients choosing self-care modalities were early referrals (eGFR>20mL/min, or at Stage 4 CKD) a time-point in line with K/DOQI guideline recommendations for optimal information receipt. Interestingly, the researchers additionally note that “… in the whole cohort of patients, the cause of ESKD was associated with the RRT modality: the proportion of patients with chronic glomerulonephritis or chronic interstitial nephritis on self-care therapy was significantly higher than that of patients with nephrosclerosis, diabetic nephropathy or unknown cause of ESKD” (p. 1842); however, “… the younger the age group, the higher the probability of choosing a self-care modality (P<0.01 Mann-Whitney U-test)” (Goovaerts et al., 2005, p. 1845). (Level 3)

• A retrospective cohort of 269 patients who received a pre-dialysis education intervention “Healthy start (HS)” and a matched group of 269 patients who did not receive the intervention had comparative analysis conducted to determine differences in morbidity and mortality at 90 and 365 days of chronic dialysis treatment (Fabian et al., 2016). The findings indicated no differences to mortality in the first year of dialysis; however, “… crude (unadjusted) incident mortality rates … seen in this study [South Africa] were much lower than those reported in other countries with the exception of Japan” (p.118), which the authors partially attribute to a relatively young dialysis population age (Fabian et al., 2016). (Level 3)

• A prospective multi-centre cohort study assessed the information provided to patients with CKD in Australian renal units about options for treatment, including pre-emptive transplant, dialysis, and conservative management (Morton et al., 2011). The majority of Australian renal units (66 out of 73) participated in the study and 721 incident CKD Stage 5 patients from across these units were included. The majority of patients (84%) were presented with information about their options prior to commencing treatment. Seventy-five per cent of patients were presented with home dialysis information, 32% with information on pre-emptive transplantation, and 65% were informed about conservative care as an option. Information about treatment options was first provided in Stage 5 CKD for 65% of
patients, Stage 4 for 32%, Stage 3 for 2% and Stage 2 for 1%. The authors concluded that: “Most Australian patients were informed of their treatment options prior to starting treatment, albeit in late stage CKD” (Morton et al., 2011, p. 1266). (Level 3)

- A retrospective cohort study, including 227 patients with ESKD, evaluated the impact of a structured, multidisciplinary pre-dialysis education programme on the incidence rates of patients using PD and HD (Ribitsch et al., 2013). Patients (and family members) participated in an interactive, small-group, pre-dialysis education session presented by a multidisciplinary team, covering the principles of different treatment options. Patients in the standard care group received no structured pre-dialysis counselling. Over a four-year period, 70 patients (30.8%) took part in the education programme and 157 (69.2%) received no structured pre-dialysis education (standard care group). In the education group, 38 patients (54.3%) started with PD and 32 (45.7%) with HD. In the standard-care group, 44 patients (28.0%) started with PD and 113 (72.0%) with HD (p < 0.001). (Level 3)

- A retrospective cohort study that enrolled 1218 consecutive pre-dialysis CKD patients assessed the effect of multidisciplinary pre-dialysis education (Cho et al., 2012). Pre-dialysis education was associated with reduced unplanned urgent dialysis (8.7% in education group and 24.2% in usual care group, p < 0.001) and reduced hospital stays (2.16 days/year in education group and 5.05 days/year in usual care group, p = 0.024). No statistically significant survival advantage was associated with pre-dialysis education during the median 30 months of follow-up. Patients in the education group had lower incidence of cardiovascular events (adjusted hazard ratio, 0.24; 95% CI, 0.08 to 0.78) and demonstrated a tendency toward a lower infection rate (adjusted hazard ratio, 0.44; 95% CI, 0.17 to 1.11) than patients in the usual care group. (Level 3)

- A single-centre study of patients (n=283) referred over a two year period for pre-dialysis education, aimed to prognostically assess the impact of comorbidity and frailty on outcomes (Pugh et al., 2016). The Charlson Comorbidity Index (CCI) and Clinical Frailty Scale (CFS) were used, and results indicate that the scores from these at the time of referral were independent predictors of mortality. In particular, by follow-up, 76% of patients with a high (pre-dialysis education) CFS score had died, 63% of whom had not commenced dialysis. The majority of these persons had preserved eGFR (>10mL/min) at time of death indicating kidney disease was not the direct cause of death. The authors suggest that for these patients, unnecessary discussion of dialysis may have unwittingly increased their anxiety, without tangible benefit. They conclude that “incorporating a measure of frailty into the current pre-dialysis education programme could improve the shared decision-making process by providing patients and relatives

with relevant and timely prognostic data. There is a pressing need to develop tools that better inform patients entering dialysis programmes about their prognosis” (Pugh et al., 2016, p. 329). (Level 3)

- A descriptive cross-sectional study, including 30 patients, identified the perceived information needs among patients with stage 4 CKD (Lewis et al., 2010). The top four topics patients identified they would like included in an educational programme were knowledge of kidney disease, care of a vascular access, treatment options, and medications. (Level 4)

- A narrative review and synthesis of the broader literature for patients with ESKD considered best practice recommendations for the development of education programs for prospective transplant recipients (Skelton et al., 2015). The authors determined four strategies as best practice when devising such programs: (Level 5)
  1. Allow for individual tailoring,
  2. Consider patients with low health literacy,
  3. Be culturally competent/safe,
  4. Aid in showing patients how to navigate health care processes.

- In recognising that pre-dialysis education for persons with CKD is paramount in offering preparation for the choice of appropriate RRT, and that shared decision making is integral to this process, an expert opinion paper outlining the development of the My Kidneys My Choice Decision Aid discussed development and integration of the aid along with the shared decision making philosophy vital to its uptake (Fortnum et al., 2015). The tool was developed in 2012 as “… surveys of educational practices in ANZ [Australian and New Zealand] renal units found a wide variance in ESKD education practice…” (Fortnum et al., 2015, p. 82) and in response to recognition that patients have better outcomes when they have choice in their treatment modalities. The paper showcases the decision aid in its specific sections, from My kidneys; My lifestyle; My options; My choice; My questions, linking this in with education suggestions for both consumers and health care professionals. (Level 5) (see Additional patient resources).

- An expert opinion article developed by the European Renal Best Practice (ERBP) Advisory Board has provided clinical advice on the education of patients with ESKD on dialysis modality selection (Covic et al., 2010). Amongst other advice, they suggest that “… all patients and their families should receive well-balanced information about the different RRT modalities, by means of a structured education programme. This also applies to late referral patients and those starting dialysis in an emergency situation, which should receive the information once their condition has stabilized.” (Covic et al., 2010, p. 225). (Level 5)

- Acknowledging that, despite receiving prior standard nephrology care, many patients with CKD are unprepared
for ESKD, an expert opinion piece discussed resource centred interventions to overcome and reduce issues arising through the transition to end-stage (Green & Boulware, 2016). The authors stressed the importance of estimating prognosis by using validated risk prediction tools; of individualising pre-dialysis education programs to allow for patient readiness to change; of utilising kidney failure-specific decision-making aids for shared decision making with nephrology carers and family; and the importance of comprehensive care including psychosocial support. The Chronic Care Model was showcased as offering six essential elements of care improvement for patients with chronic illness, and several international peer support programs were listed for patient access (Green & Boulware, 2016). (Level 5)

Best practice recommendations

- Structured, multidisciplinary pre-dialysis education programs are recommended for all patients with CKD to provide information on all treatment options, thereby providing patients with knowledge and support to make informed treatment choices. (Grade A)

- Provision of multidisciplinary education to patients earlier in the disease progression (that is to say, at the beginning of Stage 4) may be recommended to allow adequate time to prepare for treatment. (Grade A)

- Late-referred patients and those starting dialysis in an emergency situation should also receive structured education regarding treatment options once their condition has stabilised. (Grade A)

- Any printed education materials should be in a format and written in a way that is accessible to the patient (for example, using clear, understandable writing). (Grade A)

Note: Grade A indicates a ‘strong’ recommendation where it is clear that desirable effects outweigh undesirable effects of the strategy; where there is evidence of adequate quality supporting its use; there is a benefit or no impact on resource use; and values, preferences and the patient experience have been taken into account.

Conclusions

Nephrology care for persons with kidney disease frequently encompasses the entire trajectory of illness, and it is essential that patients are well equipped to partner with professionals for their many and varied care needs. Disease-specific education that incorporates pharmaceutical, dietary and other medical information is usually given at the first presentation for renal care. At this time, such information may be overwhelming and complex.

This evidence summary has indicated the importance of pre-dialysis education in offering optimal preparation and support for patients to make the best decisions regarding their chosen renal replacement modality. Effective pre-dialysis education not only provides essential skills and knowledge for self-care when transitioning to renal replacement therapy, but importantly allows informed decisions to be made with confidence, in a shared care context.

Additional patient resources


To obtain general consumer-oriented information on kidney disease and treatment options: http://kidney.org.au/

References


Skelton, S. L., Waterman, A. D., Davis, L. A., Peipert, J. D., & Fish, A. F. (2015). Estimating prognosis by using validated risk prediction tools; of individualising pre-dialysis education programs to allow for patient readiness to change; of utilising kidney failure-specific decision-making aids for shared decision making with nephrology carers and family; and the importance of comprehensive care including psychosocial support. The Chronic Care Model was showcased as offering six essential elements of care improvement for patients with chronic illness, and several international peer support programs were listed for patient access (Green & Boulware, 2016). (Level 5)

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