

# Chronic kidney disease and the primary health care framework

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## Abstract

Chronic kidney disease (CKD) is a worldwide public health issue where kidney function progressively deteriorates over many years and ultimately results in complete kidney failure, known as end stage kidney disease [ESKD] (Johnson and Usherwood, 2005). Renal replacement therapy must be instituted once ESKD has been diagnosed to preserve life. The numbers of people being diagnosed with CKD are increasing with the dialysis-dependent population rising by an average of 6% per year over the past 10 years. This article reviews the status of CKD in Australia and examines how the primary health care (PHC) framework can be incorporated into the contextual nursing care of people with CKD. Exemplars explain how five interconnecting principles of the PHC framework; accessibility; appropriate technology; increased emphasis on health promotion; intersectorial collaboration and public participation can be applied to the nursing management of people with CKD. Finally, specific areas where nephrology nursing research can be focused are suggested.

## Introduction

The measurement of serum creatinine has been historically used in the identification of CKD (Morbidity and Mortality of Renal Dialysis 1994). However, the measurement of a raised serum creatinine is a late marker of renal injury as more than 90% of renal function will have been lost before the serum creatinine rises above the normal range (Levin, 2000; Caring for Australians with Renal Impairment [CARI], 2007c). A more accurate measurement of renal function is achieved using the Cockcroft-Gault formula (Cockcroft and Gault, 1976) for the determination of glomerular filtration rate [GFR] (Knight, 2002). More recently a prediction of the estimated GFR (eGFR) has gained

acceptance where the modification of diet in renal disease (MDRD) formula is used in a system of automated reporting by pathology laboratories on all adult serum creatinine samples (Johnson and Usherwood, 2005; National Chronic Kidney Disease Strategy [NCKDS], 2006). Using this formula, the levels of kidney impairment along the CKD continuum can be defined (Reddan et al 2003; NCKDS, 2006).

Normal kidney function is defined as an eGFR greater than 90ml/min. An eGFR of between 60 to 89ml/min indicates mild kidney impairment, or very early CKD. This is the level where information should be provided about CKD risk factors and strategies that delay further deterioration of kidney

## Key Words

chronic kidney disease, primary health care, nursing

function (NCKDS, 2006). An eGFR of between 30 to 59ml/min corresponds to moderate kidney impairment. An eGFR between 15 to 29 ml/min, also known in the literature as advanced chronic kidney disease, is when the serum creatinine begins to rise and symptoms begin to become noticeable. This level of eGFR indicates that severe kidney damage has occurred (NCKDS, 2006). An eGFR of less than 15ml/min is known as end stage kidney disease (ESKD).

Through national dialysis registries, the incidence of ESKD has been identified as increasing between 3-8% per year in Australia/New Zealand, the United States, Canada and Japan (Cass et al 2002; Knight, 2002). The Australian Institute of Health and Welfare (2005) has confirmed that the number of people being treated for ESKD has "more than tripled over the last 20 years" (p11). Russ, Shim and Kaufman (2005) reveal the ethical dilemma confronted by nephrologists in that it is considered "morally unjustified not to offer dialysis to any patient with ESKD" (p 301).

As a result of this position, the over 65 years of age group are the most rapidly expanding segment of the ESKD population in the USA, Europe and Australia (Russ et al 2005).

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### Risk factors for CKD

The major risk factors that are known to contribute to the development of CKD from an Australian perspective are: diabetes mellitus; arterial hypertension or cardiovascular disease; smoking; age over 50 years; family history of kidney disease; Aboriginal or Torres Strait Islander heritage; recurrent urinary tract infections; chronic exposure to non-steroidal anti-inflammatory drugs (NSAIDs); aminoglycoside antibiotics such as Gentamicin and contrast agents such as Iodine (Knight, 2002; Rossert and Wauters, 2002; Druke and Foley, 2006; NCKDS, 2006; CARI, 2007a). Diabetes and/or hypertension have caused up to 40% of patients requiring maintenance dialysis therapy (Levin, 2000; NCKDS, 2006) while Ravenscroft (2005) has reported that diabetic nephropathy is currently the leading cause of kidney failure worldwide.

Interestingly, the metabolic syndrome (Reaven, 1988) which is characterised by abdominal obesity, hypertriglyceridaemia, low high density lipoprotein cholesterol levels, hypertension and fasting hyperglycaemia has been associated with the development of type II diabetes, cardiovascular disease, fatty liver disease, polycystic ovary syndrome and sleep apnoea (Locatelli, Pozzoni and Del Vecchio 2006). Recently, Locatelli et al (2006) have been able to demonstrate a link between the metabolic syndrome and CKD where obesity is now recognised as a modifiable risk factor. Palaniappan, Carnethon and Fortmann (2003), in their analyses from the third national health and nutrition examination survey (NHANES III) found that there was an increased risk of microalbuminuria in people with the metabolic syndrome. Microalbuminuria or overt proteinuria is a prognostic feature of CKD (CARI, 2005a) with the greater the amount of proteinuria, the greater the likelihood of progression to ESKD. Rossert and Wauters (2002) have recommended that a dip stick urinalysis should be an important aspect of kidney

health screening and this simple test is well within the scope of practice for nurses in the clinical setting.

The ageing population has important implications for nephrology nurses, as increasing age is an important risk factor for developing CKD. Ageing is accompanied by a natural reduction in kidney function of approximately 8% with each adult decade of life. These changes reduce the capacity of older people to respond to physiological and pathological stressors resulting in a rapid deterioration of kidney function when other co-morbid conditions such as diabetes arise or during acute illness episodes (NCKDS, 2006).

### Primary health care framework

The primary health care (PHC) approach was endorsed as an appropriate methodology for health care 30 years ago through the *Declaration of Primary Health Care* at Alma Ata (World Health Organisation [WHO], 1978) and reinforced at the first international conference on health promotion held in Ottawa, Canada in 1986 (Smith and Cusak, 2000). *The Ottawa Charter* (WHO, 1986) was the outcome of an international agreement that aimed to raise the health status of individuals, families and communities to lead healthy and productive lives by providing affordable and sustainable health care within the community (Royal College of Nursing, Australia, 1999; Hildon, 2000; Kendall, 2008).

A common misconception of PHC is that the person needs to be disease free to qualify for primary health care (Russell and Sander, 1998) and indeed, prevention of renal disease is the ultimate goal of PHC (NCKDS, 2006). However nursing interventions within the framework of PHC have been established, that assist with the management of those people who have already developed CKD, to maintain as healthy a lifestyle as possible. Nephrology nurses play an integral role in PHC as nephrology nurses allow people

to maximise their health potential by promoting health within the context of renal disease, managing complex chronic conditions as well as providing palliative care for those with CKD who choose not to accept renal replacement therapies (Russell and Sander, 1998; Kendall, 2008).

### Accessibility

The principle of accessibility (McMurray, 2007; Kendall, 2008) is focussed on equity, where people with CKD can access information and services so that decisions can be made and actions taken which will slow kidney disease progression (CARI, 2007b). Referral to a nephrologist for specialist interventions is mandatory once a diagnosis of very early or mild CKD has been confirmed (Roderick et al 2002). Additional interventions are initiated as kidney function deteriorates and the target criteria have been reached.

The first of six interventions is to control the blood pressure using angiotensin converting enzyme inhibitors (ACEI) or angiotensin II receptor blockers (ARBs) (Rossert and Wauters, 2002; NCKDS, 2006). The Australian and New Zealand organisation Caring for Australians with Renal Impairment, [CARI] (2006) reported the analyses of the COOPERATE trial where a combination treatment of both ACEI and ARBs had a renoprotective effect by reducing proteinuria and therefore delaying the progression of non-diabetic kidney disease compared with only using one medication.

The second intervention is a moderate protein restriction, with nutritional supervision, unless the serum albumin falls below 22mmol/L (Rossert and Wauters, 2002). Interestingly, therapeutic weight loss for obese patients can result in reduced albuminuria (CARI, 2007d). The third intervention is to commence iron supplementation, either oral or intravenously to keep the serum ferritin concentration above 100 µg/l and transferrin saturation (TSAT) greater than 20%. Subcutaneous erythropoietin

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should be initiated to maintain the haemoglobin concentration between 11–12.5g/dl according to Rossert and Wauters (2002). However, Drucek and Foley (2006) recommend haemoglobin levels to be kept between 12–13g/dl.

Dietary counselling is required with a non-aluminium phosphate binder to keep the serum phosphate concentration below 1.6mmol/L (CARI, 2005b). An oral active vitamin D metabolite is required if the parathyroid hormone concentration becomes greater than 2.5 times normal (Rossert and Wauters, 2002). Dietary counselling is advised with an increase in physical exercise to prevent or manage dyslipidaemia (CARI, 2007d). Statin therapy should be instituted if low density lipoproteins (LDLs) become greater than 2.6mmol/L, high density lipoproteins (HDLs) fall below 1mmol/L or triglycerides rise above 2.1mmol/L (Rossert and Wauters, 2002). Finally, screening for hepatitis and human immunodeficiency virus (HIV) status, initiation of vaccinations against hepatitis B including other important primary health care vaccinations such as pneumococcal and influenza vaccinations and health promotion advice such as quit smoking are advocated (Rossert and Waters, 2002). Nephrology nursing research should focus on whether people with CKD have access to all of the above recommendations and are either receiving, or have received, these therapeutic interventions during the course of their illness continuum (NCKDS, 2006).

Another example of accessibility is the provision of information on dialysis treatment options. Nephrology nurses are in the ideal position to provide this information as Ravenscroft (2005) has suggested that nurses are challenged to find innovative and appropriate strategies for making information on renal replacement therapies available to patients with CKD. CARI (2005a) have recommended that patients, their families or carers should receive sufficient information and education regarding the nature of ESKD and the options for their treatment, as

early as possible, to allow them to make an informed decision about the management of their disease. The timing of discussions about renal replacement therapies including transplantation is crucial in the patients' perceptions of choice (Landreneau and Ward-Smith, 2006).

However, Gordon and Sehgal (2000) found that patients with CKD are often left with little or no guidance and/or information to make an optimal and timely choice about renal replacement therapy options and the consequences of this decision. Klang, Björvell and Clyne, (1999) have reported that people with CKD require special attention, as they have to undergo several treatment regimens during the progress of their disease and they need to learn to cope with multiple symptoms as well as the physical and psychosocial disabilities of the disease. Their study found that the pre-dialysis stage has been identified as a time of emotional upheaval and adjustment affecting many aspects of the patient's life.

Landreneau and Ward-Smith (2006) found that if and when patients, and their families, consider the choice of renal replacement therapy, including pre-emptive transplantation, they need to be supported by nephrology nurses to become more capable of making a choice of therapy which most accurately reflects their wishes and needs while possibly having limited physical and cognitive abilities. Vig et al (2006) discussed how surrogates, such as family members, make medical decisions for others, which might not be based on the patient's best interests but on feelings of guilt and filial responsibility.

Nursing research needs to undertaken to provide descriptive models about perceptions of choice among people with CKD related to the option of renal replacement therapies and that this research should be focused from the perspective of the affected individuals as well as their families (Landreneau and Ward-Smith, 2006; Ravenscroft, 2005).

### Appropriate technology

The principle of appropriate technology focuses on the use of technology in the most appropriate way to meet the needs of the community (McMurray, 2007). One example of this principle is the engagement nephrology nurses have in the debate on whether to provide dialysis therapy to all members of the CKD community (Rabetoy and Payton, 2006). In Russ et al's (2005) research, three quarters of the patient population at their study dialysis unit were over 70 years of age. Their study has highlighted the ethical dilemma of treating elderly people with dialysis. "While on dialysis, death gradually, insidiously fills up the experience of life, including more and more time, until life is finally forced to succumb to death" (p 299). Dialysis therapy prolongs life and nephrology nurses are cognisant that the appropriate technology is only justifiable if there is an appropriate quality of life. Russ et al (2005) also posed the view that the participants in their study had a sense of dialysis imposed, involuntarily, and inevitably with many participants expressing the slimmest understanding of how and why they came to be on dialysis or what exact conditions had led to their kidney failure. Klang et al (1999) reported that elderly people with CKD present more challenges for nephrology nurses, as the elderly need sufficient time to acquire and internalise knowledge.

The incremental process in the preparation for renal replacement therapy does not adequately prepare patients for the eventuality of dialysis treatment (Russ et al 2005). These incremental steps included the periodic blood and urine tests that track kidney disease progression, the creation of an arterio-venous fistula as a precautionary measure should dialysis be needed in the future and even an exploratory visit to the dialysis unit. Each step appears, from the patient's perspective, as a minor course of action without any significant consequences but from the viewpoint of nephrology nurses,

the patient was being adequately prepared in the eventual need for dialysis therapy.

In an attempt to address this dichotomy, nursing research should focus on patient empowerment and how the person with CKD perceives their journey from diagnosis to the initiation of dialysis therapy. Particularly, how the process can be improved for those people with ESKD who feel that they are able to make their own decisions *when* and *if* they commence their own “timely” dialysis therapy (NCKDS, 2006) rather than being the object of scientifically based guidelines, protocols and algorithms (Van Driel et al 2005).

### Increased emphasis on health promotion

The principle of increased emphasis on health promotion is the process of enabling people to increase control and improve their health (McMurray, 2007). Nephrology nurses are attempting to meet this primary health care principle where education is provided in the reduction of cardiovascular risk factors as a consequence of CKD (McCarley and Burrows-Hudson, 2006). Cardiovascular disease is responsible for 40% to 50% of deaths in people, with ESKD, in Australia (Hobson, Kalra and Kalra, 2005; Johnson, Craven and Isbel, 2007). The education provided by nephrology nurses includes the consumption of a low saturated fat diet, regular moderate exercise and cessation of smoking so that a voluntary change in high-risk behaviour is achieved. Cancer screening for reproductive cancers is another area of PHC that needs attention in the CKD population as the life expectancy for people with CKD increases (Fishbane and Goldman, 2002). Nephrology nursing research can focus on health promotion activities currently being undertaken in renal units around Australia and areas where health promotion activities can be initiated for the benefit of the current CKD population.

### Intersectoral collaboration

The principle of intersectoral collaboration involves a network of organisations working together to achieve a common aim for stakeholders (McMurray, 2007). In the context of CKD, various organisational units cooperate to provide care to people with CKD. The philosophy of the multidisciplinary team consists of a multitude of health professionals contributing to the well being of people with CKD. Shared or integrated care is a health care process that encourages a decision-making partnership between stakeholders such as health professionals and the patient and/or family members (Fishbane and Goldman, 2002; van Driel et al 2005).

Health professionals within a typical CKD multidisciplinary team are CKD nurses, nephrology nurse practitioners, anaemia co-ordinators, nephrologists, vascular surgeons, endocrinologists, general practitioners, dieticians, social workers and pharmacists (Mendelsohn 2005; NCKDS, 2006). Further qualitative and/or randomised controlled prospective quantitative research needs to be undertaken to evaluate the role of each of these team members, particularly the emerging CKD nurses' role, to identify the specific impact on CKD patient outcomes (Goldstein et al 2004; CARI, 2005a; Curtis et al 2005). However, van Driel et al (2005) have suggested that it is not the individual health professional's performance but the quality of the entire team that determines the outcome in the multidisciplinary team process.

Owen et al (2006) have researched the impact of multidisciplinary teams within the context of CKD from a consumer point of view. Their pre-dialysis clinical pathway was redesigned to assist in the smooth transition of patients with advanced CKD or ESKD onto their dialysis programs. Each department in the multidisciplinary team examined their role and identified critical points of patient contact where the service

did not meet consumer needs. Areas identified were notification to the dialysis service, referrals for vascular access and pre-dialysis education. Another example is from Rudd (2006) where the multidisciplinary team was called “Fistula Force”. This multidisciplinary team, which consisted of nephrology nurses, nephrologists and vascular surgeons, improved the vascular access pathway.

The contribution of general practitioners (GPs) and practice nurses to the management of people with CKD provides another example for intersectoral collaboration. Practice nurses can provide weight management and kidney health checks (Carrigan, 2008) while GPs can monitor the eGFR on regular visits and ensure early referrals to nephrologists (CARI, 2007a).

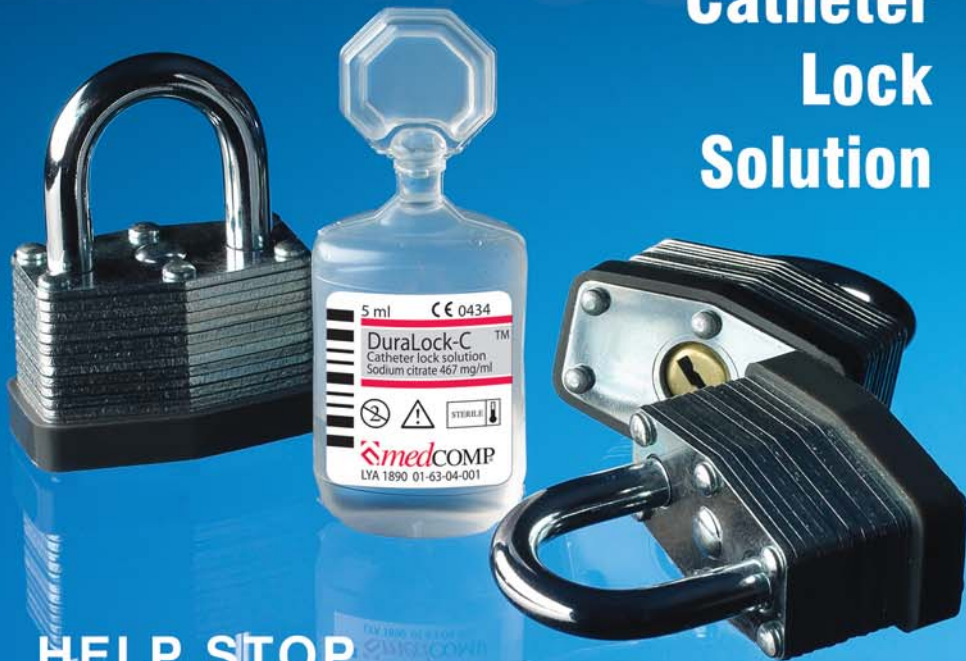
Other stakeholders are non-government organisations (NGOs) that have an interest in the care of people with CKD. One NGO is Kidney Health Australia (KHA). This ‘non-profit’ organisation provides information to people with kidney impairment via their website (KHA, 2007), as well as fundraising events help to promote the profile of CKD within the community. Their mission is to promote kidney and urinary tract health through research, consumer participation and education (KHA, 2007). One initiative that KHA is participating in is the *National Chronic Kidney Disease Strategy* (NCKDS, 2006). The NCKDS initiative originated out of the national public partnership guidelines for improving national public health strategies development and coordination framework (National Health Partnerships, 2003) for chronic diseases and provides a wide range of recommendations in the prevention and management of CKD.

Pharmaceutical and biotechnology companies are other stakeholders within the intersectoral collaboration principle of PHC. Pharmaceutical companies supply medications such

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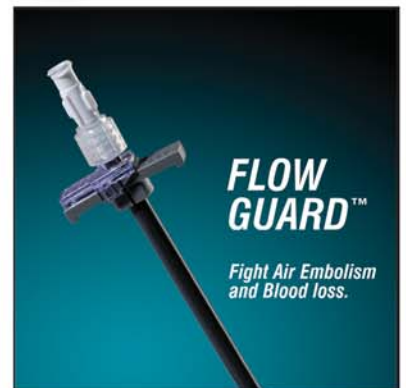
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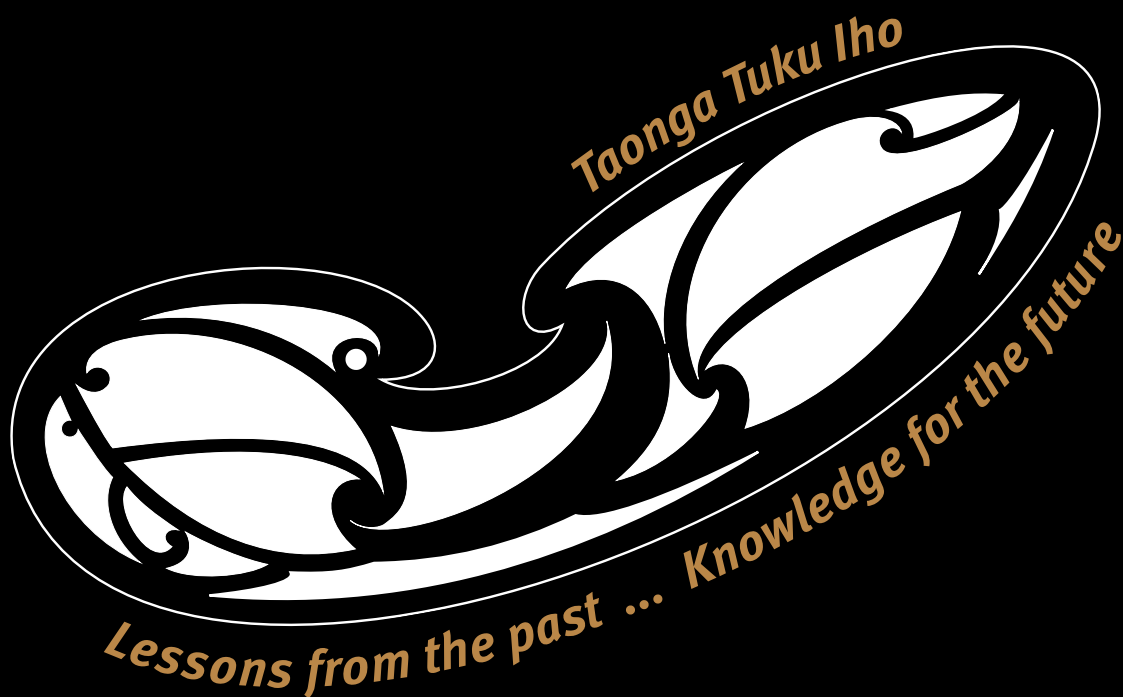
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as antihypertensive and lipid lowering medications, iron and Vitamin D supplementations as well as the newer quit smoking patches that are integral to the current therapeutic management of people with CKD. Biotechnology companies supply erythropoietin and biopharmaceutical companies supply vaccines. Other stakeholders are private pathology and imaging companies that provide the myriad of pathology and diagnostic imaging services involved in the diagnosis and management of people with CKD. In addition to supplying services, pharmaceutical and biotechnology companies provide research scholarships and education to CKD health professionals. van Driel et al (2005) have posed the ethical view that sponsorship of research from pharmaceutical companies is biased in favour of a pharmaceutical outcomes rather than from a primary health care or change in lifestyle viewpoint. This issue can be the basis for further nephrology nursing research using an ethical decision making framework.

### Public participation

Public participation (McMurray, 2007) is where health professionals are recognised as a partner rather than the leader in the health care decision-making process. For the purposes of this article, public participation has focussed on the patient and their family during the decision making process in CKD. Chronic diseases such as CKD require an intensive long term commitment from the patient; their families and health professionals and van Driel et al (2005) have recommended that clear communication from all stakeholders is vital for quality care.

Locus of control (LOC) is a concept that examines how people feel about their responsibility to events that occur around them. People with a high internal LOC take responsibility and make their own informed decisions about their healthcare. Alternatively, people with a high external

locus of control attribute their health status to external factors beyond their control such as chance, Gods will, bad luck or the doctors care (van Driel et al 2005). Having an external LOC in allowing a higher being to guide the decision making process may not always have a negative outcome. Tanyi et al (2006) investigated the role of spirituality using a qualitative methodology. Their study recommended that the inclusion of the patients' spiritual beliefs and practices into their nursing care facilitated an improved adjustment to the CKD process while, Walton (2002) found that the patients' faith, connectedness with God, meaningful relationships with others and prayer were significant spiritual support systems in the daily struggle with their kidney disease. Research of these issues by nephrology nurses in relation to the empowerment or disempowerment of people with CKD is both warranted and necessary.

### Conclusion

In conclusion, this article has demonstrated how the PHC framework can be incorporated into the current contextual nursing care of people with CKD. Examples where nephrology nursing research can have a significant impact within the five principles of the PHC framework have been identified, particularly in determining if people with CKD have access to the current therapeutic interventions in which to preserve their remaining kidney function and the impact of the emerging CKD nephrology nursing role within the multidisciplinary team. Another area where nephrology nursing research can be influential is in the pre-dialysis education arena, specifically education of the elderly CKD population. Finally, the contribution nephrology nurses can make to the health promotion of people with CKD in particular, the prevention of cardiovascular disease and cancer.

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