Nutrition Interventions in Chronic Kidney Disease

Cheryl A.M. Anderson, PhD, MPH, MS[a,*], Hoang Anh Nguyen, MD, MPH[b], Dena E. Rifkin, MD, MS[c]

KEYWORDS

• Chronic kidney disease • Nutrition • Interventions

KEY POINTS

- Dietary modification is recommended in the management of chronic kidney disease (CKD).
- Individuals with CKD often have significant comorbid conditions, such as high blood pressure, diabetes, cardiovascular disease, and obesity, for which dietary modification is also recommended.
- Dietary considerations in CKD can be numerous and complicated for both the provider and patients; adherence to recommendations is difficult for patients to achieve.
- Guiding principles of nutritional management include (1) assessment and monitoring of nutritional status throughout all stages of CKD; (2) creation of an individualized yet comprehensive nutrition plan that meets clinical guidelines and will have favorable effects on CKD and associated comorbidities; and (3) recommendation of meal plans that are feasible, sustainable, and suited for the patients' food preferences and needs.
- Given the high prevalence of CKD and the tremendous burden for patients, diet/nutrition is a modifiable factor that could help impact a major clinical and public health issue.

INTRODUCTION

There are numerous reasons to consider nutrition-related interventions in patients with chronic kidney disease (CKD). CKD results in altered metabolism of many nutrients and their end products. Individuals with CKD may also have multiple comorbidities, including a disproportionate burden of hypertension, type 2 diabetes mellitus, and cardiovascular disease (CVD), all of which are amenable to treatment via changes in nutrition. Indeed, many patients with CKD experience fatal cardiovascular events before needing renal replacement therapy. Further, as CKD progresses, medication regimens

[a] Department of Family Medicine and Public Health, UC San Diego School of Medicine, 9500 Gilman Drive, MC 0725, La Jolla, CA 92093-0725, USA; [b] Department of Nephrology and Hypertension, UCSD Medical Center, 200 West Arbor Drive, San Diego, CA 92102, USA; [c] Department of Nephrology and Hypertension, VA San Diego Healthcare System, 3350 La Jolla Drive, San Diego, CA 92161, USA
* Corresponding author.
E-mail address: c1anderson@ucsd.edu

Med Clin N Am ■ (2016) ■–■
http://dx.doi.org/10.1016/j.mcna.2016.06.008 **medical.theclinics.com**

become increasingly complex; nutrition planning plays an important role in slowing down kidney function decline. Therefore, the objectives of nutrition interventions in CKD include addressing the root causes of CKD (diabetes and hypertension); achieving and maintaining optimal nutritional status and nitrogen balance; preventing buildup of toxic metabolic products, thus, minimizing the risk of uremia; and avoiding complications, such as hyperphosphatemia, anemia, hyperkalemia, hypervolemia, and metabolic acidosis. Through these mechanisms, nutrition interventions, for individuals with CKD, should reduce the risk for secondary hyperparathyroidism, malnutrition, muscle wasting, heart failure, hypertension, fatigue, shortness of breath, nausea, and poor quality of life.

The body of research for nutrition interventions in CKD is growing but still quite limited, as even today the current recommendations are primarily based on expert opinion or extrapolated from research on individuals without CKD. The initial clinical practice guidelines for nutrition in CKD were created by the National Kidney Foundation's Kidney Disease Outcome Quality Initiative (K/DOQI) in an effort to provide consensus practice standards based on evidence, opinion, or a combination of both and were developed by expert, multidisciplinary work groups.[1] Guidelines also exist for earlier stages of disease[2] and for those with hypertension.[3] In general, K/DOQI recommends that routine care for patients include dietary advice from a registered dietitian who is experienced in counseling patients with CKD, which is particularly important, as there will likely be a need to address and prioritize management for multiple diagnoses, such as diabetes or hypertension, in addition to CKD. Another source of nutrition guidance is Kidney Disease: Improving Global Outcomes (K/DIGO), which was established in 2003 as a global organization to develop evidence-based guidelines in kidney disease. Recommendations are embedded in clinical practice guidelines for anemia,[4] blood pressure,[5] mineral and bone disorder,[6] and lipids in CKD.[7] Readers are referred to these guidelines for further background information (**Table 1**).

Given the limited availability of data from clinical trials (**Table 2**), nutrition interventions in CKD are largely driven by the clinical judgments of physicians and renal dietitians. Importantly, to the extent possible, patients should play a key role in informing nutritional plans and interventions. The complexities of a renal diet need to be integrated into patients' cultural preferences, financial constraints, and family centered eating patterns. A comprehensive plan for nutrition is one that focuses on

- Establishing overall healthful dietary patterns
- Promoting fluid, electrolyte, and mineral balance
- Preventing dyslipidemia, elevated blood glucose levels, micronutrient deficiencies, and protein-energy malnutrition
- Maintaining appropriate weight and body composition
- And assessing use of supplements, such as phosphorus binders, iron, and bicarbonate

ESTABLISHING HEALTHFUL DIETARY PATTERNS TO PREVENT CARDIOVASCULAR DISEASE IN CHRONIC KIDNEY DISEASE

The most common causes for CKD are hypertension and type 2 diabetes mellitus. Obesity is also a contributing factor. These risk factors for CKD are nutrition related, and healthful dietary patterns have the potential to prevent or mitigate them and, therefore, reduce the risk of CKD. Common elements of healthful dietary patterns include a variety of vegetables; fruits; grains, of which 50% are whole; fat-free or low-fat dairy, which includes milk, yogurt, cheese, and fortified soy; oils; and sources