Chronic Kidney Disease Medical Nutrition Therapy: Guidelines for Effective Management

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Abstract

Medical nutrition therapy (MNT) is a crucial but often overlooked component of treatment for Chronic Kidney Disease (CKD). A low protein diet has been demonstrated to delay progression of CKD, while bone mineral metabolism management improves outcomes when initiated at earlier stages of CKD management. Clients benefit from nutrition intervention to reduce sodium intake for blood pressure control and some may require education to manage serum potassium levels. The CKD dietitian, like the dialysis dietitian, has multiple roles including educator, coach, and cheerleader. Effective management of CKD with MNT may have long-term benefits, including reduction in healthcare costs and improvement in client/patient quality of life (1).

Medicare and Insurance Coverage

Medicare covers three hours of MNT with a registered dietitian in the first year of CKD, and two hours each year after the first year. Patients must be referred by a physician, with a glomerular filtration rate (GFR) between 13-50 mL/min/1.73 m^2 indicating CKD Stages 3-4 (2). Registered dietitians must have a National Provider Identifier (NPI) number to provide nutrition therapy to Medicare patients. Other types of insurance may allow for more frequent visits if required or requested by the patient. Patients may self-pay for nutrition therapy if they are not Medicare-eligible and do not have another type of insurance coverage.

Assessment

MNT goals for CKD are based on a thorough nutrition assessment, which should be completed initially and annually thereafter. Anthropometrics including height, weight, body mass index or BMI, and recent weight changes should be reviewed at each visit. If adequate time is available, skin-fold measurements may be useful to evaluate changes in body composition over time. Appetite may be poor due to uremia, requiring modifications in meal size and density or necessitating supplement use. Gastrointestinal symptoms that may interfere with appetite or ability to consume adequate energy and protein should be reviewed, including nausea/vomiting, diarrhea, constipation, and gas or bloating. Recommended energy intake for CKD patients is 30-35 kcal/kg for patients over 60 years of age, and 35 kcal/kg for those less than 60 (3). Energy intake should promote weight maintenance, and may require adjustment if weight gain or loss occurs. Three-day food records or twenty-four hour recalls are useful for assessing initial dietary patterns and subsequent adherence to diet recommendations.

Protein

Protein restriction has long been a controversial topic with CKD. Two smaller randomized controlled trials of diabetic patients with nephropathy concluded that protein restrictions of 0.6-0.8 g/kg/d had no beneficial effect on slowing the decline of GFR (4,5). An even smaller study of nine diabetic patients awaiting kidney/pancreas transplant compared a vegetarian low-protein (0.6 g/kg/d) diet supplemented with alpha-ketoanalogs reduced proteinuria, stabilized albumin levels, and slowed decline of GFR (6). However, a larger long-term follow-up of the Modification of Diet in Renal Disease (MDRD) study compared low-protein (0.58 g/kg/day) and keto acid/amino acid-supplemented very low-protein (0.28 g/kg/day) diets. The very low-protein diet had no effect on decline of GFR, and actually increased risk of death (7). However, an earlier meta-analysis of ten studies in both nondiabetic and diabetic patients with renal disease concluded that the low protein diet is beneficial in slowing progression of CKD (8). Consequently, the National Kidney Foundation's (NKF) Kidney Disease Outcomes Quality Initiative (K/DOQI) recommends a protein intake of 0.6-0.8 g/kg/d, with 50% from high biological value sources (9). Plant protein sources may slow decline of GFR and induce favorable effects on lipid profile and blood pressure, so inclusion of legumes, nuts, and soy protein is also recommended (10).

Phosphorus, Calcium, and Bone Mineral Metabolism Management Goals

Accumulating evidence suggests that bone mineral metabolism management in earlier CKD stages helps to reduce incidence and severity of renal osteodystrophy in stage 5 CKD. Recommended phosphorus intake is 800-1000 mg/day, or 10-12 mg/g of protein consumed (11). Before serum phosphorus levels

start to rise, parathyroid hormone (PTH) often increases above the recommended levels of 35-70 pmol/L for stage 3 or 70-110 pmol/L for Stage 4. Dietary phosphate restriction is generally sufficient to maintain PTH levels in the normal range during stage 3 CKD, but phosphate binders may be required in stage 4. The serum phosphorus target level is ≤ 4.6 mg/dL for stages 3-4, rising to ≤ 5.5 mg/dL in stage 5 (11).

New research suggests that the source of phosphorus, vegetable versus animal, may also be important. Moe and colleagues found that intake of phosphorus was correlated with fractional urinary excretion of phosphorus in patients on a vegetarian diet, but not for those on a diet including meat (12). This suggests that more phosphorus is absorbed from meat phosphate sources and also may not be excreted as efficiently as that from vegetable sources. As such, the focus of the low phosphorus diet should be on reducing intake of meat, dairy, and eggs rather than whole grains, legumes, and nuts. Vegetable phosphorus sources may require restriction in late stage 4 or stage 5 CKD, or phosphate binders may be introduced instead to allow a more liberal diet (11). Additionally, patients should be encouraged to reduce or eliminate sources of inorganic phosphate, such as soda, processed foods, and phosphate-injected meats.

Dietary calcium should be restricted to 2,000 mg/day total from diet and supplements (11). The target range for serum calcium is 8.4-9.5 mg/dL, with the goal for calcium-phosphorus product being < 55. As calcium most often appears in the same foods that contain phosphorus, further dietary restrictions are not usually required. Some patients may exhibit hypocalcemia, which should be treated with calcium carbonate and active Vitamin D if PTH is elevated or if the patient develops clinical symptoms (11).

Serum 25-hydroxy vitamin D should be evaluated on the initial assessment and annually. If vitamin D levels fall below 30 ng/mL, therapy with vitamin D_2 in the form of ergocalciferol or cholecalciferol, should be initiated. The recommended dose is dependent on the level of deficiency; an algorithm for dosing can be found in the K/DOQI clinical practice guidelines for bone metabolism and disease in CKD (11).

Potassium

For many CKD patients, potassium restriction remains unnecessary until stage 5 of the disease. However, patients who are accustomed to consuming greater quantities of fruits and vegetables may need to decrease their intake. The goal range for serum potassium is 3.5-5.0 mEq/L (3). Medications commonly taken in CKD may either raise or lower potassium levels. Angiotension Converting Enzyme (ACE) Inhibitor and Angiotensin II receptor blocker (ARB) drug classes are frequently used to control blood pressure and may cause serum potassium to become elevated. Potassium-sparing diuretics including spironolactone and torsemide may cause serum potassium to become elevated. Potassium wasting diuretics such as furosemide, hydrochlorothiazide, metolazone, and triamterene may lower serum potassium by causing an increase in excretion. In some cases, patients may require additional potassium supplementation.

Sodium, Fluid, and Blood Pressure

While fluid is not restricted in CKD stages 1-4, sodium intake should not exceed 2.3 grams daily (9). Reduction in sodium consumption may help to decrease blood pressure to ≤ 120/80 as recommended by the K/DOQI guidelines and slow CKD progression. These changes can be achieved through reduction of the intake of canned, processed, and restaurant food items. Assisting patients in learning to cook at home, thus controlling the sodium in their food, may also be beneficial. A reasonable fluid intake should be achieved in order to avoid the need for increasing doses of diuretics. Kopple and Massry recommend 2000 ± 500 mL daily for those with impaired kidney function not yet in stage 5 CKD (13).

Vitamins and Minerals

There is no consensus available for vitamin and mineral supplementation in CKD stages 1-4. The dietary recommended intakes may be met with diet alone, or can be supplemented with a B-complex plus vitamin C product or renal vitamin (3). Regular multivitamins containing fat-soluble vitamins are generally not recommended in CKD in order to avoid accumulation (13). Although not common, if iron or zinc deficiencies are suspected, laboratory work should be evaluated prior to starting supplementation.

Alkaline Diet

Recently, there has been interest in the effect of metabolic acidosis on the progression of CKD. While studies demonstrated reduction in progression to stage 5 CKD with use of sodium bicarbonate tablets plus vitamin C, there are few studies with the high alkaline diet published (14). It may be inferred by some that a diet high in fruits, vegetables, nuts, and legumes and low in animal protein, which promotes serum alkalinity, could be beneficial in delaying advancement to stage 5 CKD. However, Leal and colleagues concluded that metabolic acidosis was related to the stage of CKD, not alkalinity of diet in their 2009 study (15). A high alkaline diet should be undertaken with caution as its emphasis on plant foods may promote hyperkalemia.

Diabetic Goals

When counseling patients with Diabetic Kidney Disease, care should be taken to create and implement a dietary plan that the patient agrees upon and is able to follow. Insulin and oral hypoglycemic medications may need to be adjusted on an ongoing basis as CKD progresses. As GFR declines, less insulin is typically needed to maintain blood glucose in the desired range due to decreased degradation by the kidney (3). K/DOQI recommends a target glycosylated hemoglobin (HbA1C) to be maintained at < 7.0% (16). A high fiber diet including whole grains, legumes, and nuts should be encouraged, with care to monitor potassium and phosphorus levels and adjust accordingly. Omega-3 fatty acids from food sources such as cold-water fish may also be beneficial for prevention of diabetes-related cardiovascular disease. For those who do not eat fish, an omega-3 supplement may be used. Various studies have shown non-significant improvements in GFR, blood pressure, HbA1C, and total and low density lipoprotein cholesterol with use of 2.0 grams of eicosapentanoic acid (EPA) and 2.6 grams docosahexanoic acid (DHA) daily. It is incumbent on the dietitian to evaluate omega-3 fatty acid supplements for EPA and DHA content as well as safety prior to recommending a particular brand to a patient.

Malnutrition

Prevention of malnutrition is the most important goal in MNT for CKD (17). Uremic symptoms, comorbid conditions, taste acuity changes and gastrointestinal side effects related to medications, and alterations in gastric motility may induce malnutrition in this population. Unplanned weight loss may be countered with liberalization and increase in the caloric density of the diet or use of nutritional supplements. A decline in serum albumin necessitates an assessment of protein intake and possible inflammatory factors if not accompanied by weight loss. In situations of acute illness, protein restriction may need to be suspended to provide adequate nitrogen for recovery. The dietitian and physician should work together to develop a nutrition plan to promote anabolism while minimizing impact on GFR as much as possible.

Resources for the CKD Dietitian

Patient Education Materials and Tools

National Kidney Disease Education Program (NKDEP)

http://www.nkdep.nih.gov/professionals/ckd-nutrition.htm

American Association of Kidney Patients

http://www.aakp.org/aakp-library/dsp_kidneyCats.cfm?cat=7

Clinical Guidelines

National Kidney Foundation Kidney Disease Outcome Quality Initiative (NKF K/DOQI)

http://www.kidney.org/professionals/kdoqi/guidelines_commentaries.cfm#guidelines

Medicare Medical Nutrition Therapy Benefit Overview for Providers

https://www.cms.gov/MedicalNutritionTherapy/

Conclusion

Although dietary modifications in CKD may be challenging to implement, MNT may help to slow the decline in GFR. Thus prolonging the time to initiation of dialysis, or preventing it altogether. CKD patients may be highly motivated to avoid the challenges of initiating dialysis by improving their nutrition. This will also help increase their odds of becoming a viable renal transplant candidate. CKD dietitians have a unique opportunity to create nutrition plans that are individually tailored to help preserve patients' quality of life and improve outcomes!

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Looking for Renal-Focused Sessions at ADA's Food & Nutrition Conference & Expo?

The Skinny on Bariatric Surgery: Illuminating the Evidence from Early Stage CKD through Transplant will be offered on Monday, Sept. 26, 3:30 – 5 p.m. (Ballroom 20A, San Diego Convention Center) and is planned by the Renal Dietitians DPG. (DPG Spotlight Session)

Description of Session:
In recent years, patients with kidney disease have increasingly sought bariatric surgery to improve transplant candidacy or health outcomes. This session will review current bariatric surgery procedures, those associated with renal complications, and those preferred for patients with chronic kidney disease (CKD). Additionally, this session will review the current, cutting-edge literature regarding bariatric surgery and renal implications as well as MNT.

Objective 1 - Discuss current bariatric operations in the management of medically complicated obesity, which procedures can be associated with renal complications and which procedures are preferred in patients with CKD.
Objective 2 - Explore the most current evidence-based literature to determine if correction, reduction or elimination of morbid obesity in CKD would result in better outcomes.
Objective 3 - Integrate available evidence into CKD MNT concerning the use of bariatric surgery as a potential complementary medical/surgical therapy.

CPE Level: 3; **CPE Hours:** 1.5
Learning Need Codes: 5370, 5340, 4040

Improving Care: MNT in Primary Care Settings for CKD is offered Monday, Sept. 26, 1:30 – 3 p.m. (Ballroom 6C&F, San Diego Convention Center)

Description of Session
Chronic kidney disease (CKD) is poorly managed in the primary care setting, in part because clinicians, including RDs, feel inadequately educated. Generalist RDs can play a significant role in early diagnosis, treatment and education in primary care settings. Appropriate care can assist patients at risk, including those with diabetes and hypertension, to slow CKD progression and treat complications. An RD will describe her practice experience and the new CKD certificate training program and clinical tools.

Objective 1 - Describe the burden of CKD in the U.S.
Objective 2 - Identify how RDs in primary care settings can provide appropriate care to CKD patients.
Objective 3 - Utilize the new CKD certificate training program and clinical tools to provide care to pre-dialysis CKD patients.

CPE Level: 2; **CPE Hours:** 1.5
Learning Need Codes: 5340, 3020, 3005