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Rationale & Objective: Nutrition management can slow the progression of chronic kidney disease (CKD) and help manage complications of CKD, but few individuals with CKD receive medical nutrition therapy before initiating dialysis. This study aimed to identify knowledge, attitudes, experiences, and practices regarding medical nutrition therapy and barriers and facilitators to medical nutrition therapy access for individuals with CKD stages G1-G5 from the perspective of patients and providers.

Study Design: Cross-sectional study composed of anonymous surveys.

Setting & Population: Adults with CKD stages G1-G5 and medical providers and registered dietitian nutritionists who regularly see patients with CKD stages G1-G5 were recruited by email using National Kidney Foundation and Academy of Nutrition and Dietetics databases and through the National Kidney Foundation 2019 Spring Clinical Meetings mobile app.

Analytical Approach: Descriptive analyses and Fisher exact tests were conducted with Stata SE 16.

Results: Respondents included 348 patients, 66 registered dietitian nutritionists, and 30 medical

providers. In general, patients and providers had positive perceptions of medical nutrition therapy and its potential to slow CKD progression and manage complications, and most patients reported interest in a medical nutrition therapy referral. However, there were feasibility concerns related to cost to the patient, lack of insurance coverage, and lack of renal registered dietitian nutritionists. There was low awareness of Medicare no-cost share coverage for medical nutrition therapy across patients and providers. About half the practices did not bill for medical nutrition therapy and those that did reported issues with being paid and low reimbursement rates.

Limitations: Results may not be generalizable due to the small number of respondents and the potential for self-selection, nonresponse, and social desirability bias.

Conclusions: Many patients with CKD stages G1-G5 are interested in medical nutrition therapy and confident that it can help with disease management, but there are feasibility concerns related to cost to the patient, insurance coverage, and reimbursement. There are significant opportunities to design and test interventions to facilitate medical nutrition therapy access for patients with CKD stages G1-G5.

Visual Abstract included

Complete author and article information provided before references.

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Chronic kidney disease (CKD) affects ~15% of the US adult population, imposing significant burden on individuals and health systems.^{1,2} CKD is categorized into grades 1 to 5 (G1-G5) based on estimated glomerular filtration rate.³ Individuals with CKD stages G1-G4 have higher levels of kidney function, whereas CKD stage G5 indicates kidney failure and often requires kidney replacement therapy by dialysis (G5D) or a kidney transplant (G5T) for survival. Individuals with CKD stages G1-G4 represent the majority of people living with the disease, and they incur significant treatment costs that increase as CKD progresses.^{2,4} Because Medicare expenditures increase from an estimated \$19,737 to \$29,285 per beneficiary per year from mild to severe CKD,⁵ clinicians should use interventions such as medical nutrition therapy to slow or halt CKD progression and reduce health care costs.

Medical nutrition therapy provided by a registered dietitian nutritionist is recommended for all individuals with CKD.¹ Medical nutrition therapy includes a complete nutrition assessment, diagnosis of nutrition problems, individualized intervention, and careful monitoring and evaluation to promote lifestyle modifications that will slow

or prevent CKD progression.^{6,7} In addition, medical nutrition therapy can mitigate the impact of associated comorbid conditions, including type 2 diabetes, obesity, hypertension, and hyperlipidemia.⁸ Currently, Medicare covers medical nutrition therapy for patients with estimated glomerular filtration rates of 13 to 50 mL/min/1.73 m², consistent with CKD stages G3-G5, with no cost-sharing.⁶ However, the overwhelming majority of individuals with CKD never receive medical nutrition therapy before initiating dialysis.⁹

Many barriers may prevent individuals with CKD stages G1-G5 from accessing medical nutrition therapy. Providers who do not diagnose early-stage CKD are unlikely to refer their patients to a registered dietitian nutritionist for medical nutrition therapy, and individuals who are unaware of their disease will not seek medical nutrition therapy.¹⁰ Also, despite existing evidence-based practice guidelines,^{11,12} providers may be unaware or unconvinced of medical nutrition therapy as a tool to reduce CKD progression.^{13,14} Logistical challenges, such as availability of practitioners, transportation, and time, are other common barriers that reduce patient access to registered

PLAIN-LANGUAGE SUMMARY

Nutrition management can slow the progression of chronic kidney disease (CKD) but few individuals with CKD receive medical nutrition therapy with a registered dietitian nutritionist before initiating dialysis. This study used anonymous surveys to understand patients' and providers' perceptions of medical nutrition therapy and medical nutrition therapy access for individuals with CKD stages G1-G5. Generally, patients and providers had positive perceptions of medical nutrition therapy and its potential to slow CKD progression and help manage complications of CKD, and most patients reported interest in a medical nutrition therapy referral. However, there were feasibility concerns related to cost to the patient, insurance coverage, and reimbursement. There was low awareness of Medicare no-cost share coverage for medical nutrition therapy. There are significant opportunities to design and test interventions to facilitate medical nutrition therapy access for patients with CKD.

dietitian nutritionists with expertise in kidney disease, known as renal registered dietitian nutritionists.^{15,16} Although limited research exists regarding access to CKD nutrition care, studies on access to diabetes self-management training have noted that patients who are most vulnerable, including non-Whites, older individuals, those with comorbid conditions, and the newly diagnosed, were least likely to access care.¹⁷⁻¹⁹

This cross-sectional study aims to describe knowledge, attitudes, experiences, and practices regarding medical nutrition therapy for patients with CKD stages G1-G5 and to understand the barriers and facilitators to accessing medical nutrition therapy for patients with CKD stages G1-G5, from the perspectives of patients, registered dietitian nutritionists, and medical providers.

METHODS

This study consisted of cross-sectional anonymous online surveys administered to patients with CKD stages G1-G5 and registered dietitian nutritionists and medical providers who regularly see patients with CKD stages G1-G5. Surveys were determined to be an appropriate method to measure knowledge, attitudes, experiences, and practices regarding medical nutrition therapy and beliefs about barriers and facilitators.²⁰ The surveys were a first step toward designing appropriate interventions to increase access to and use of medical nutrition therapy for patients with CKD stages G1-G5.

This report was developed using a reporting guideline for survey studies.²⁰ The study protocol (#19-111) was approved by the University of New Mexico Human

Research Protections Office. All participants reviewed an informed consent document and agreed to participate.

Survey Development

Initially, the study team reviewed the literature to identify barriers and potential solutions to increase medical nutrition therapy access for patients with CKD stages G1-G5.⁶ All questions on the patient, registered dietitian nutritionist, and medical provider surveys were jointly developed and revised by the study team, which included a nephrologist (H.K.); registered dietitian nutritionists with renal nutrition (D.B. and A.S.), billing and coding (M.S.), and epidemiology (E.Y.J.) expertise; and a data analyst (K.K.). Surveys were designed to include parallel questions assessing the same topic areas from the perspectives of each audience. The surveys were reviewed by the Academy of Nutrition and Dietetics' (Academy's) Survey Review Subcommittee under the Council on Research, which assesses aspects of survey design. Final survey questions are included in [Item S1](#).

Survey Instruments

The patient survey included 21 questions. The initial questions on the patient survey assessed eligibility, with patients 18 years or older with CKD stages G1-G5 included. The patient survey then included sociodemographic questions, as well as questions regarding insurance coverage, previous experience with a registered dietitian nutritionist, and health history. Patients were asked to rate their agreement, on a 5-point scale of strongly disagree to strongly agree, with statements related to the importance of medical nutrition therapy and lifestyle changes in managing CKD; helpfulness of lifestyle change supports; their self-efficacy, confidence, and interest in changing their lifestyle; their interest in being referred to a registered dietitian nutritionist; and beliefs about potential barriers related to seeing a registered dietitian nutritionist. Finally, the survey included 3 true or false questions assessing patient awareness of Medicare coverage of medical nutrition therapy for CKD.

The registered dietitian nutritionist and medical provider surveys were similar and included 24 questions. The initial questions on both surveys assessed eligibility, with practicing providers in the United States or territories seeing on average at least 5 adult patients with CKD stages G1-G5 per month included. The surveys then assessed demographic and practice characteristics. Providers were asked to rate their agreement, on a 5-point scale of strongly disagree to strongly agree, with statements related to the importance of medical nutrition therapy and lifestyle changes in managing CKD, beliefs about patient self-efficacy in making lifestyle changes, helpfulness of patient lifestyle change supports, beliefs about potential barriers to medical nutrition therapy referral, level of professional connection to others providing care to patients with CKD, and beliefs about the adequacy of the

renal registered dietitian nutritionist workforce. Next, the registered dietitian nutritionist survey asked a series of questions about receiving referrals for patients with CKD, whereas the medical provider survey asked how often they refer patients with CKD for medical nutrition therapy and about routine use of the CKD Clinical Pathway resource.²¹ Awareness of Medicare coverage of medical nutrition therapy for CKD was assessed using 3 true or false questions. Finally, there were questions assessing experience with billing, coding, and reimbursement for medical nutrition therapy services.

Survey Administration

Recruitment alerts for the medical provider and registered dietitian nutritionist surveys were broadcast through the National Kidney Foundation's (NKF's) 2019 Spring Clinical Meetings mobile application between May 8 and 12, 2019. The application was freely available for download, and the recruitment alerts were viewed by 139 registered dietitian nutritionists and 58 medical providers. The meeting was attended by 1,210 physicians, 298 advanced practitioners, and 434 registered dietitian nutritionists.

Additionally, the study team used the NKF constituent database to identify adult patients with CKD and medical providers who care for patients with CKD and distributed the survey recruitment message by email. A total of 7,698 medical providers and 2,700 patients with CKD who were not receiving dialysis were invited to participate. The study team also distributed the recruitment message by email to 1,887 members of the Academy Renal Dietitians practice group and 421 Board Certified Specialists in Renal Nutrition. For this wave of distribution, the survey was open between June 6 and 28, 2019, and reminder emails were sent 1 week after the initial invitation.

Four hundred five individuals responded to the patient survey; 361 were eligible and 348 completed the survey (13% response rate). One hundred sixty-six individuals responded to the registered dietitian nutritionist survey, among whom 68 were eligible and 66 completed the survey. Forty individuals responded to the medical provider survey, among whom 31 were eligible and 30 completed the survey. It is difficult to calculate an accurate response rate for medical providers and registered dietitian nutritionists because the number of eligible individuals using the NKF Spring Clinical Meeting application and in the NKF databases is unknown because some providers care primarily for patients receiving dialysis. We also do not know how many of the emails were successfully delivered.

Data Management and Analysis

Survey data were collected and managed using REDCap (Research Electronic Data Capture) electronic data capture tools hosted at the University of New Mexico.²² REDCap is a secure web-based application to support data capture for research studies. Survey data were descriptively analyzed

Table 1. Self-reported Demographic Characteristics of Participating Adult Patients With Non-Dialysis-Dependent CKD

Characteristic	No.	%
Sex		
Female	249	71.6
Male	98	28.2
Nonbinary	1	0.3
Race		
White or Caucasian	287	82.5
Black or African American	25	7.2
Asian	8	2.3
American Indian or Alaska Native	7	2.0
Native Hawaiian or other Pacific Islander	2	0.6
Other (self-described)/multiple	13	3.7
Prefer not to answer	6	1.7
Ethnicity		
Hispanic or Latino/a	25	7.4
Age group		
18-24 y	—	—
25-34 y	8	2.3
35-44 y	21	6.0
45-54 y	53	15.2
55-64 y	93	26.7
65-74 y	113	32.5
75-84 y	53	15.2
≥85 y	6	1.7
Prefer not to answer	1	0.3
Marital status		
Married or domestic partnership	222	64.2
Divorced	57	16.5
Never married	33	9.5
Widowed	24	6.9
Separated	4	1.2
Prefer not to answer	6	1.7
Education level		
Some high school, no diploma	7	2.0
High school diploma or equivalent (GED)	46	13.3
Some college, no degree	73	21.0
Associate degree	38	11.0
Bachelor's degree	97	28.0
Advanced degree (eg, master's, doctorate)	71	20.5
Professional degree (eg, MD, JD)	11	3.2
Prefer not to answer	4	1.2
Employment status		
Retired	167	45.5
Full-time employee (≥30 h/wk)	89	24.3
Unemployed due to disability or health-related reason	41	11.2
Part-time employee (<30 h/wk)	33	9.0
Homemaker	17	4.6
Volunteer	8	2.2
Unemployed and currently looking for work	5	1.4
Student	3	0.8
Unemployed and not currently looking for work	2	0.5
Prefer not to answer	2	0.5
Insurance type		
	141	40.5

(Continued)

Table 1 (Cont'd). Self-reported Demographic Characteristics of Participating Adult Patients With Non-Dialysis-Dependent CKD

Characteristic	No.	%
A plan through my employer or a family member's employer		
Medicare	127	36.5
Medicare Advantage Plan (MA Plan)	58	16.7
Medicare Supplemental Insurance	54	15.5
Medicaid	26	7.5
A plan I purchased myself	21	6.0
Another type of coverage	20	5.7
Affordable Care Act Plan (Healthcare.gov)	10	2.9
I'm not covered by health insurance	3	0.9
Prefer not to answer	8	2.3
Insurance coverage		
I've been covered by health insurance the entire time	315	91.0
I've been covered by health insurance part of the time	20	5.8
I have not been covered by health insurance at all	3	0.9
I don't know	3	0.9
Prefer not to answer	5	1.4
CKD stage		
Stage 1	5	1.4
Stage 2 mild CKD	21	6.0
Stage 3A moderate CKD	81	23.3
Stage 3B moderate CKD	85	24.4
Stage 4 severe CKD	113	32.5
Stage 5, not on dialysis	32	9.2
Unsure	11	3.2
Years living with CKD		
<2 y	49	15.7
3-5 y	92	29.4
6-10 y	84	26.8
>11 y	88	28.1
Has a doctor ever told you that you have prediabetes or diabetes?		
No	206	61.7
I'm not sure	9	2.7
Yes: type of diabetes ^a	119	35.6
Prediabetes	37	31.1
Type 2 diabetes	78	65.5
Type 1 diabetes	7	5.9
Gestational diabetes	3	2.5
I'm not sure	2	1.7
Has a doctor ever told you that you have hypertension or high blood pressure?		
Yes	277	82.4
No	56	16.7
I'm not sure	3	0.9
Has a doctor or other health professional ever suggested that you see an RDN?		
Yes	152	45.2
No	164	48.8
I'm not sure	20	6.0
Have you ever seen an RDN?		
Yes	170	50.7
No	160	47.8

(Continued)

Table 1 (Cont'd). Self-reported Demographic Characteristics of Participating Adult Patients With Non-Dialysis-Dependent CKD

Characteristic	No.	%
I'm not sure	5	1.5
Self-reported overall health rating		
Very poor	3	0.9
Poor	27	8.1
Fair	127	37.9
Good	124	37.0
Very good	51	15.2
Excellent	3	0.9

Note: n = 348. The use of "non-dialysis-dependent CKD" and CKD stages reflects the terminology used in the surveys, which was appropriate at the time. Since then, new KDIGO Nomenclature for Kidney Function and Disease have been developed and are used elsewhere in this article.

Abbreviation: CKD, chronic kidney disease; GED, General Educational Development; KDIGO, Kidney Disease: Improving Global Outcomes; RDN, registered dietitian nutritionist.

^aRespondents could select more than 1 type of diabetes, if applicable.

using Stata SE 16 (StataCorp LLC). Likert scale responses were analyzed as categorical variables. Fisher exact tests were used to assess relationships between variables. $P < 0.05$ was considered statistically significant.

RESULTS

Respondent Characteristics

Patient characteristics are reported in Table 1. Most respondents reported that they were women, White, and 55 years or older with CKD stages G3-G4 (80%). Most participants had lived with CKD for more than 5 years, have hypertension (82%), and had health insurance coverage since they received their diagnosis. The most frequently reported insurance type was Medicare (69%). Overall, 48% of patient participants had never seen a registered dietitian nutritionist and nearly half reported that medical providers have never suggested they should see a registered dietitian nutritionist. About one-third of patient participants had type 2 diabetes or prediabetes and were significantly more likely to have seen a registered dietitian nutritionist than patient participants without a diabetes diagnosis ($P < 0.01$).

Registered dietitian nutritionist characteristics are reported in Table 2. Most registered dietitian nutritionists had been practicing for 11 or more years (70%) and have a master's degree (55%). Responding registered dietitian nutritionists worked in a wide variety of employment settings. Nearly 40% were Board Certified Specialists in Renal Nutrition.

Medical provider characteristics are reported in Table 3. All responding medical providers reported nephrology as their primary area of clinical practice. Eighteen were physicians and 12 were advanced practice providers. Most medical providers had 11 or more years of practice experience caring for patients with CKD (69%) in a variety of settings. Around two-thirds primarily serve patients with Medicare. Fifty-three percent noted that a registered

Table 2. Self-reported Demographic Characteristics of Participating United States–Based RDNs Who Regularly See Adult Patients With Non–Dialysis-Dependent Chronic Kidney Disease

Characteristic	No.	%
Years practicing as an RDN		
≤2 y	3	4.5
3-5 y	7	10.6
6-10 y	10	15.2
11-20 y	12	18.2
>20 y	34	51.5
Highest completed degree		
Baccalaureate	29	43.9
Master's	36	54.5
Doctorate	1	1.5
Employment setting ^a		
Freestanding dialysis center, chain	19	28.8
Own private practice	13	19.7
Hospital dialysis center	9	13.6
Hospital kidney transplant program	8	12.1
Nephrology practice offering medical nutrition therapy	8	12.1
Freestanding dialysis center, non-chain	7	10.6
Chronic kidney disease clinic (hospital setting)	7	10.6
Physician office	5	7.6
Home health/home infusion company	1	1.5
Community health center	1	1.5
Other	16	24.2
Professional credentials		
Board Certified Specialist in Renal Nutrition (CDR)	26	39.4
CDE: Certified Diabetes Educator (National Certification Board for Diabetes Educators)	7	10.6
Board Certified Specialist in Obesity and Weight Management (CDR)	2	3.0
Other	7	10.6

Note: n = 66. The use of "non–dialysis-dependent chronic kidney disease" reflects the terminology used in the surveys, which was appropriate at the time. Since then, new KDIGO Nomenclature for Kidney Function and Disease have been developed and are used elsewhere in this article.

Abbreviations: CKD, chronic kidney disease; KDIGO, Kidney Disease: Improving Global Outcomes; RDN, registered dietitian nutritionist.

^aRDNs could select more than 1 employment setting, if applicable.

dietitian nutritionist was included on their clinical team, with 50% having a registered dietitian nutritionist on site. Most medical providers reported that they often or always refer patients with CKD stages G3-G5 to a registered dietitian nutritionist for medical nutrition therapy (73%) but never or rarely refer patients with CKD stages G1-G2 (63%). Medical providers who had a registered dietitian nutritionist co-located at their practice reported often or always referring patients with CKD stages G3-G5 to a registered dietitian nutritionist more than medical providers without a registered dietitian nutritionist on site (87% vs 60%). About 80% of medical providers reported that their practices were currently conducting some type of quality improvement activities.

Table 3. Self-reported Demographic Characteristics of Participating United States–Based Medical Providers Who Regularly See Adult Patients With Non–Dialysis-Dependent CKD

Characteristic	No.	%
Years practicing as a medical provider		
≤2 y	2	6.7
3-5 y	1	3.3
6-10 y	4	13.3
11-20 y	10	33.3
≥20 y	13	43.3
Years taking care of patients with CKD		
≤2 y	2	6.9
3-5 y	1	3.4
6-10 y	6	20.7
11-20 y	8	27.6
≥20 y	12	41.4
Other members of clinical team in practice that care for patients with CKD		
Certified clinical nurse specialists, nurse practitioners, or advanced practice registered nurses	24	80.0
Registered nurses	18	60.0
Registered dietitian nutritionists	16	53.3
Social workers	12	40.0
Interns/residents	10	33.3
Fellows	10	33.3
Physician assistants	4	13.3
Care coordinator or manager	2	6.7
Promotoras/community health workers	1	3.3
Other	3	10.0
Majority owner of practice		
Independent practice majority owned by the physicians in the practice	10	33.3
Hospital or health system	10	33.3
Independent practice majority owned by a medical group/physician owned practice group	3	10.0
Faculty/university practice plan	3	10.0
Department of Veterans Affairs, Department of Defense, or other government	3	10.0
Industry	1	3.3
Most commonly, patients in my practice have the following primary payers:		
Medicare (all types)	20	66.7
Private insurance (all types)	3	10.0
Medicaid (all types)	2	6.7
Other public insurance	2	6.7
I don't know	2	6.7
Other	1	3.3
Quality improvement activities		
Have a quality improvement committee	18	60.0
Have a process for identifying quality improvement goals and track progress toward goals	13	43.3
Have a practice leader(s) who drives forward quality improvement	11	36.7
Have a system for using data to measure progress toward quality improvement goals	10	33.3
Work with a quality improvement coach/facilitator	7	23.3
Use a quality improvement process such as Lean, Six Sigma, PDSA cycles, or other	5	16.7

(Continued)

Table 3 (Cont'd). Self-reported Demographic Characteristics of Participating United States–Based Medical Providers Who Regularly See Adult Patients With Non–Dialysis-Dependent CKD

Characteristic	No.	%
We are not currently conducting quality improvement activities	5	16.7
Have a system or committee for patient and family input and involvement	2	6.7
Other	1	3.3
How often do you refer patients with stage 1 or 2 CKD to an RDN for MNT?		
Never	7	23.3
Rarely	12	40.0
Sometimes	6	20.0
Often	5	16.7
Always	0	0.0
How often do you refer patients with stages 3-5 NDD-CKD to an RDN for MNT?		
Never	2	6.7
Rarely	0	0.0
Sometimes	6	20.0
Often	13	43.3
Always	9	30.0
Do you have an RDN that is co-located in your practice?		
Yes	15	50.0
No	15	50.0
Do you routinely use the CKD Clinical Pathway resource developed by the Interdisciplinary Chronic Disease Collaboration?		
Yes	7	23.3
No	23	76.7

Note: n = 30. The use of “non–dialysis dependent kidney disease” reflects the terminology used in the surveys, which was appropriate at the time. Since then, new KDIGO Nomenclature for Kidney Function and Disease have been developed and are used elsewhere in this article.

Abbreviations: CKD, chronic kidney disease; KDIGO, Kidney Disease: Improving Global Outcomes; MNT, medical nutrition therapy; NDD-CKD, non–dialysis-dependent chronic kidney disease; PDSA, plan, do, study, act; RDN, registered dietitian nutritionist.

Patient and Provider Attitudes and Beliefs Regarding Medical Nutrition Therapy for Patients With CKD Stages G1-G5

Table 4 summarizes patient and provider knowledge, attitudes, and beliefs regarding medical nutrition therapy for patients with CKD stages G1-G5. Nearly all participants agreed that lifestyle changes can reduce complications in CKD and chronic disease. However, patients were more optimistic than medical providers that they were capable of making lifestyle changes, with 44% of patients strongly agreeing with this statement compared with 29% of registered dietitian nutritionists and 13% of medical providers. Almost half the medical providers versus about a third of registered dietitian nutritionists agreed or strongly agreed that nutrition handouts and/or handheld device applications can assist patients in making lifestyle changes, with patients indicating a preference for nutrition handouts over applications.

Most participants agreed that medical nutrition therapy is important in preventing the progression of CKD stages G1-G5 and most agreed that patients are interested in being referred to a registered dietitian nutritionist for medical nutrition therapy. Despite these generally positive attitudes toward medical nutrition therapy, all 3 groups had concerns about the feasibility of medical nutrition therapy access. Less than half the medical providers, registered dietitian nutritionists, and patients agreed that patients can easily afford to see a registered dietitian nutritionist. Most patients (63%) agreed or strongly agreed that they can easily attend another appointment to see a registered dietitian nutritionist; however, fewer than half the medical providers and registered dietitian nutritionists believed that patients can easily attend another appointment. Medical providers generally reported that they have time to refer patients with CKD to a registered dietitian nutritionist, but registered dietitian nutritionists were less sure about whether medical providers had time. Inadequate insurance coverage for medical nutrition therapy for patients with CKD stages G1-G5 was a concern among both registered dietitian nutritionists and medical providers. Although most medical providers (72%) and registered dietitian nutritionists (86%) agreed or strongly agreed that they are professionally connected with one another, both groups also reported that there are not enough registered dietitian nutritionists with expertise in renal nutrition to provide care.

Patient and Provider Knowledge of Medicare No-Cost Share Coverage of Medical Nutrition Therapy for Patients With CKD Stages G3-G5

Table 5 summarizes patient and provider knowledge of Medicare no-cost share coverage of medical nutrition therapy for patients with CKD stages G3-G5. Most medical providers and patients were unaware of Medicare coverage for medical nutrition therapy. Although registered dietitian nutritionists were the most knowledgeable regarding Medicare coverage of medical nutrition therapy, many were not knowledgeable about coverage with a second referral, or coverage beyond the first year that a patient receives medical nutrition therapy.

Provider Experience With Billing, Coding, and Reimbursement for Medical Nutrition Therapy Services for Patients With CKD Stages G1-G5

About half the registered dietitian nutritionists (49%) and medical providers (57%) stated that their practice does not currently bill for medical nutrition therapy, and most reported that their practices also did not bill for medical nutrition therapy in the past. Among those who billed in the past and then stopped, the most common reason they stopped billing was that the process was too complicated. One-third of medical providers and 9% of registered dietitian nutritionists did not know if their practice currently bills for medical nutrition therapy.

Table 4. Patient and Provider Attitudes and Beliefs Regarding Medical Nutrition Therapy for Patients With Non-Dialysis-Dependent CKD

	Strongly Disagree	Disagree	I'm Not Sure	Agree	Strongly Agree
MNT is important in preventing the progression of NDD-CKD.					
Medical providers	1 (3.3%)	0 (0%)	2 (6.7%)	13 (43.3%)	14 (46.7%)
RDNs	1 (1.5%)	0 (0%)	0 (0%)	4 (6.1%)	61 (92.4%)
Patients	2 (0.6%)	12 (3.6%)	57 (17.2%)	121 (36.4%)	140 (42.2%)
Lifestyle changes can reduce complications in CKD/chronic diseases.					
Medical providers	1 (3.3%)	0 (0%)	0 (0%)	10 (33.3%)	19 (63.3%)
RDNs	1 (1.5%)	0 (0%)	0 (0%)	3 (4.5%)	62 (93.9%)
Patients	5 (1.5%)	1 (0.3%)	22 (6.5%)	124 (36.9%)	184 (54.8%)
I/most patients are capable of making lifestyle changes to reduce complications from CKD/chronic disease.					
Medical providers	1 (3.3%)	4 (13.3%)	9 (30.0%)	12 (40.0%)	4 (13.3%)
RDNs	0 (0%)	6 (9.1%)	8 (12.1%)	33 (50.0%)	19 (28.8%)
Patients	5 (1.5%)	2 (0.6%)	27 (8.1%)	154 (46.0%)	147 (43.9%)
Nutrition handouts and/or handheld device applications (eg, a smart phone app) can assist patients in making lifestyle changes to address NDD-CKD.					
Medical providers	1 (3.3%)	6 (20.0%)	9 (30.0%)	11 (36.7%)	3 (10.0%)
RDNs	8 (12.3%)	20 (30.8%)	16 (24.6%)	11 (16.9%)	10 (15.4%)
Patients (handouts)	32 (9.7%)	67 (20.3%)	70 (21.2%)	117 (35.5%)	44 (13.3%)
Patients (apps)	66 (20.6%)	106 (33.0%)	83 (25.9%)	41 (12.8%)	25 (7.8%)
Medical providers can effectively assist patients in making lifestyle changes to address NDD-CKD.					
Medical providers	1 (3.3%)	0 (0%)	1 (3.3%)	25 (83.3%)	3 (10.0%)
RDNs	3 (4.7%)	18 (28.1%)	11 (17.2%)	18 (28.1%)	14 (21.9%)
Patients	30 (9.0%)	62 (18.7%)	58 (17.5%)	130 (39.2%)	52 (15.7%)
I/patients with NDD-CKD can easily afford to see an RDN.					
Medical providers	6 (20.0%)	9 (30.0%)	8 (26.7%)	4 (13.3%)	3 (10.0%)
RDNs	9 (13.6%)	18 (27.3%)	16 (24.2%)	15 (22.7%)	8 (12.1%)
Patients	50 (15.1%)	43 (13.0%)	92 (27.7%)	83 (25.0%)	64 (19.3%)
I/patients with NDD-CKD can easily attend another appointment to see an RDN.					
Medical providers	1 (3.3%)	10 (33.3%)	9 (30.0%)	8 (26.7%)	2 (6.7%)
RDNs	6 (9.2%)	13 (20.0%)	22 (33.8%)	16 (24.6%)	8 (12.3%)
Patients	23 (7.0%)	29 (8.8%)	69 (21.0%)	123 (37.5%)	84 (25.6%)
I/patients with NDD-CKD are interested in being referred to an RDN.					
Medical providers	1 (3.3%)	2 (6.7%)	9 (30.0%)	14 (46.7%)	4 (13.3%)
RDNs	0 (0%)	6 (9.1%)	12 (18.2%)	35 (53.0%)	13 (9.7%)
Patients	22 (6.7%)	38 (11.6%)	67 (20.4%)	95 (29.0%)	106 (32.3%)
Medical providers have adequate time to refer patients with NDD-CKD to an RDN.					
Medical providers	1 (3.3%)	4 (13.3%)	1 (3.3%)	15 (50.0%)	9 (30.0%)
RDNs	5 (7.6%)	10 (15.2%)	16 (24.2%)	23 (34.8%)	12 (18.2%)
Electronic medical records are set up to make it easy to refer patients with NDD-CKD to an RDN.					
Medical providers	5 (16.7%)	8 (26.7%)	3 (10.0%)	8 (26.7%)	6 (20.0%)
RDNs	13 (19.7%)	15 (22.7%)	22 (33.3%)	8 (12.1%)	8 (12.1%)
Patient management systems or patient registries make it easy to identify patients with NDD-CKD who should be referred for MNT.					
Medical providers	3 (10.0%)	8 (26.7%)	7 (23.3%)	8 (26.7%)	4 (13.3%)
RDNs	9 (13.8%)	14 (21.5%)	27 (41.5%)	13 (20.0%)	2 (3.1%)

(Continued)

Among the 42% of registered dietitian nutritionists who report currently billing for medical nutrition therapy, all reported using Current Procedural Terminology codes 97802 (initial assessment and intervention, individual) and 97803 (reassessment or intervention, individual). Only a few used codes G0270 and G0271 (Healthcare Common Procedure Coding System codes used for additional hours of services in the same year). Most practices that billed reported submitting medical

nutrition therapy claims to the following payers: Medicare (96%), private insurance (93%), self-pay patients (including uninsured patients; 70%), and Medicaid (59%). Issues that practices reported encountering include billing for medical nutrition therapy and not getting paid, being paid a very low rate for medical nutrition therapy, and being unable to bill for medical nutrition therapy services the same day as a medical provider office visit.

Table 4 (Cont'd). Patient and Provider Attitudes and Beliefs Regarding Medical Nutrition Therapy for Patients With Non-Dialysis-Dependent CKD

	Strongly Disagree	Disagree	I'm Not Sure	Agree	Strongly Agree
There is adequate insurance coverage for MNT for patients with NDD-CKD.					
Medical providers	6 (20.0%)	6 (20.0%)	6 (20.0%)	11 (36.7%)	1 (3.3%)
RDNs	16 (24.2%)	16 (24.2%)	14 (21.2%)	15 (22.7%)	5 (7.6%)
As a medical provider, I am professionally connected to RDNs who care for patients with NDD-CKD./As an RDN, I am professionally connected to medical providers who care for patients with NDD-CKD.					
Medical providers	2 (6.9%)	4 (13.8%)	2 (6.9%)	10 (34.5%)	11 (37.9%)
RDNs	3 (4.5%)	3 (4.5%)	3 (4.5%)	18 (27.3%)	39 (59.1%)
There are enough RDNs with expertise in renal nutrition to refer to/provide care in our community.					
Medical providers	6 (20.7%)	13 (44.8%)	2 (6.9%)	4 (13.8%)	4 (13.8%)
RDNs	26 (39.4%)	18 (27.3%)	12 (18.2%)	10 (15.2%)	0 (0%)

Note: The use of "non-dialysis dependent kidney disease" reflects the terminology used in the surveys, which was appropriate at the time. Since then, new KDIGO Nomenclature for Kidney Function and Disease have been developed and are used elsewhere in this article.

Abbreviations: CKD, chronic kidney disease; KDIGO, Kidney Disease: Improving Global Outcomes; MNT, medical nutrition therapy; NDD-CKD, non-dialysis-dependent chronic kidney disease; RDN, registered dietitian nutritionist.

Only 3 medical providers (10%) reported that their practice currently submits medical nutrition therapy claims, and 2 of the 3 providers did not know which codes were used, for which payer types their practice submits claims, or whether their practice has experienced issues with billing.

DISCUSSION

This study found that patients, registered dietitian nutritionists, and medical providers generally had positive perceptions of medical nutrition therapy and its potential to slow CKD progression and help manage complications of CKD, and most patients reported that they would be interested in being referred to a registered dietitian nutritionist for medical nutrition therapy. However, there were feasibility concerns associated with access to medical nutrition therapy, such as cost to the patient and a reported lack of available renal registered dietitian nutritionists. In some cases, feasibility concerns differed between providers and patients; for example, most patients thought they could easily attend another appointment to see a registered dietitian nutritionist and that they were capable of making lifestyle changes, but medical providers and registered dietitian nutritionists were less confident on these aspects. There was some indication that patients with diabetes and patients being served by practices with a co-located registered dietitian nutritionist may be more likely to receive medical nutrition therapy services. Patients with diabetes may be more likely to receive medical nutrition therapy services due to mandated insurance coverage for diabetes treatment in many states²³ and to relevant US Preventive Services Task Force grade B recommendations that have to be covered by some health plans since passage of the Affordable Care Act.²⁴ There was low awareness of Medicare no-cost share coverage for medical nutrition therapy across patients and providers. About half the practices did not bill for medical nutrition therapy, and of those that did, there were issues related to being paid and low reimbursement rates.

Many of the perceived barriers to medical nutrition therapy access for patients with CKD stages G1-G5 found in this study are consistent with the existing literature. Specifically, previous studies with patients have reported cost and transportation issues as barriers that limit or prevent access to medical nutrition therapy services for CKD,⁶ and medical providers and registered dietitian nutritionists seem to share these concerns. However, in this study, feasibility concerns regarding time and self-efficacy sometimes differed between providers and patients, indicating a potential opportunity for more patient-centered care and shared decision making around medical nutrition therapy referral.²⁵ In addition, telenutrition services provided by a registered dietitian nutritionist for patients with CKD may address time and transportation issues and have improved health outcomes and patient satisfaction for individuals with other chronic conditions.^{6,15} Rapid changes in telehealth implementation and coverage during the coronavirus disease 2019 (COVID-19) pandemic²⁶ may offer opportunities to more permanently expand remote access to medical nutrition therapy for CKD through legislative and regulatory changes.

Both patients and providers shared concerns about medical nutrition therapy cost. This perceived cost barrier may be due in part to the limited awareness of Medicare coverage for medical nutrition therapy.^{6,27,28} Although a substantial proportion of responding patients had Medicare coverage and most responding medical providers were primarily serving patients with Medicare, a large proportion of both groups were unsure about Medicare coverage for medical nutrition therapy. Consistent with previous surveys examining registered dietitian nutritionist knowledge of medical nutrition therapy billing and coding,²⁷ even some registered dietitian nutritionists lacked awareness of the benefit. Strategies to increase awareness across patients and providers of Medicare no-cost share coverage for medical nutrition therapy should be considered. In addition, 40% of responding medical providers were nonphysicians, who cannot directly refer Medicare patients for medical nutrition therapy. Because advanced practice

Table 5. Patient and Provider Knowledge of Medicare No-Cost Share Coverage of Medical Nutrition Therapy for Patients With Non–Dialysis-Dependent Chronic Kidney Disease

	True (Correct)	False (Incorrect)	I'm Not Sure
Medicare covers 3 hours of medical nutrition therapy for the first year that a patient with chronic kidney disease receives medical nutrition therapy.			
Medical providers	6 (20.0%)	00 (0%)	24 (80.0%)
RDNs	41 (64.1%)	2 (3.1%)	21 (32.8%)
Patients	39 (11.7%)	10 (3.0%)	285 (85.3%)
Medicare covers 2 hours of medical nutrition therapy for patients with chronic kidney disease in each subsequent year.			
Medical providers	7 (23.3%)	1 (3.3%)	22 (73.3%)
RDNs	34 (53.1%)	5 (7.8%)	25 (39.1%)
Patients	23 (6.9%)	13 (3.9%)	295 (89.1%)
Medicare covers additional hours of medical nutrition therapy for patients with chronic kidney disease with a second referral in the same year.			
Medical providers	4 (13.8%)	1 (3.4%)	23 (82.8%)
RDNs	27 (42.2%)	5 (7.8%)	32 (50.0%)
Patients	17 (5.1%)	6 (1.8%)	309 (93.1%)

Note: The use of “non–dialysis dependent kidney disease” reflects the terminology used in the surveys, which was appropriate at the time. Since then, new KDIGO Nomenclature for Kidney Function and Disease have been developed and are used elsewhere in this article.

Abbreviations: CKD, chronic kidney disease; KDIGO, Kidney Disease: Improving Global Outcomes; RDN, registered dietitian nutritionist.

providers are increasingly involved in both primary and specialty care,^{29,30} this may be an important barrier to address at a policy level.

For patients with other public and private insurance, potential interventions to increase medical nutrition therapy referrals and use may be more complicated. Public and private payers vary in their coverage for medical nutrition therapy, making it difficult to provide standard guidelines for referral, coding, and billing practices. The complexity associated with billing and coding for medical nutrition therapy across payers was indicated as one reason that about half the registered dietitian nutritionists and providers do not bill for medical nutrition therapy. Among practices that bill, there were reported issues with lack of reimbursement and low reimbursement; these issues have been reported in other surveys with registered dietitian nutritionists examining payment for medical nutrition therapy.²⁷ The reported lack of reimbursement may be due to the differences in coding requirements across payers, and concerns around low reimbursement rates may lead practices to not spend time learning how to properly code for medical nutrition therapy across other public and private payers or submit claims.²⁷

While issues related to inconsistent coverage, coding, and reimbursement for medical nutrition therapy can likely be best addressed at the policy and payer level, the Academy has resources available to help registered dietitian nutritionists and others navigate billing and coding

Box 1. Potential Interventions That Could Be Tested to Assess Impact on Medical Nutrition Therapy Referrals, Patient Use of Medical Nutrition Therapy, and Patient Outcomes for CKD Stages G1-G5

- More widespread implementation of medical nutrition therapy delivered via telehealth for CKD stages G1-G5
- Better coordination of nutrition care for patients with diabetes and/or hypertension and CKD stages G1-G5
- Development and testing of a group class model for promoting self-management skills for patients with CKD stages G1-G5
- Promotion of patient-centered care and shared decision making around medical nutrition therapy referral
- Increased co-location of registered dietitian nutritionists in practices caring for patients with CKD stages G1-G5
- Strategies to improve provider and patient awareness of no-cost share Medicare coverage for medical nutrition therapy
- Policy changes to allow advanced practice providers to directly refer patients for medical nutrition therapy
- Policy- and payer-level actions to achieve consistent coverage and coding for medical nutrition therapy and enhanced payment for such services among other public and private payers
- Quality improvement activities to implement guidelines for nutrition care in CKD in medical practices
- Development and increased marketing of updated generalist registered dietitian nutritionist trainings on providing medical nutrition therapy for CKD

Abbreviation: CKD, chronic kidney disease.

challenges,³¹ with several toolkits for medical practices in development. In general, registered dietitian nutritionists need to increase their understanding of billing and coding issues related to medical nutrition therapy²⁷ for advocacy purposes because despite a shift to value-based payments, fee-for-service reimbursement continues to drive service provision within US health systems.

In some cases, patient and practice characteristics made it more likely that a patient would receive or be referred for medical nutrition therapy, demonstrating opportunities to increase medical nutrition therapy access for CKD stages G1-G5 by better coordinating nutrition care for diabetes and CKD and increasing the co-location of registered dietitian nutritionists in medical practices. Additionally, opportunities exist to increase access to virtual and in-person self-management training for CKD stages G1-G5 through group classes, a model that has been successfully used in diabetes care.³²⁻³⁵ Given the large proportion of practices in this study reporting quality improvement capacity, quality improvement activities focused on guideline implementation could increase medical nutrition therapy referral. The Academy recently collaborated with the NKF's Kidney Disease Outcomes Quality Initiative to update the clinical practice guidelines for nutrition in CKD and provide explicit recommendations related to medical nutrition therapy for CKD.¹²

Finally, concerns about the number of available registered dietitian nutritionists trained to provide medical nutrition therapy for patients with CKD stages G1-G5 may be legitimate.³⁶ There have been efforts to address this issue over the last 10 years, with the National Kidney Disease Education Program of the National Institutes of Health developing a recently updated Chronic Kidney Disease Nutrition Management Training program to prepare generalist registered dietitian nutritionists to counsel patients with CKD, and the Academy promoting the training through its online Certificate of Training program,³⁷ NKF also offers annual preconference workshops at the Spring Clinical Meetings for new and experienced renal registered dietitian nutritionists.³⁸

Box 1 lists several potential interventions at patient, provider, payer, and policy levels that could be tested to assess the impact on medical nutrition therapy referrals, patient use of medical nutrition therapy, and patient outcomes for CKD stages G1-G5.

A major strength of this study was the inclusion of patient perspectives in addition to provider perspectives. However, our inability to calculate accurate response rates for providers is a limitation in assessing generalizability. In particular, the overall number of providers that responded was small, and we may not have reached some medical providers or registered dietitian nutritionists providing care to patients with CKD stages G1-G5 through the recruitment channels that were used. The number of responding patients was also relatively small, and patients may not have been able to accurately self-report their current CKD grade. However, patients could likely accurately identify if they were receiving dialysis, which is perhaps most relevant to this study. There is also the potential for self-selection bias in that individuals with a strong interest in nutrition may have been more likely to respond to the survey, and for nonresponse bias. Additionally, there is the potential for social desirability bias, although this risk may have been reduced by assuring respondents of their anonymity. Because this was an anonymous survey, it was not possible to guarantee that respondents only completed the survey once.

In conclusion, there are significant opportunities to design and test interventions to address barriers and promote facilitators of medical nutrition therapy access for patients with CKD stages G1-G5.

SUPPLEMENTARY MATERIAL

Supplementary File (PDF)

Item S1: Complete survey questions for patients, registered dietitian nutritionists, and medical providers.

ARTICLE INFORMATION

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What are barriers and facilitators to accessing medical nutrition therapy (MNT) for patients with CKD?

Kidney
Medicine

Methods and Cohort

Cross Sectional Study



Patients with CKD G1-G5
n = 348



Registered Dietitian Nutritionists
(RDNs)
n = 66



Medical providers
n = 30

Anonymous Surveys (via email)



Measure knowledge, attitudes, experiences
and practices regarding MNT
Beliefs about barriers and facilitators
Distributed via the NKF/Academy of
Nutrition and Dieticians databases

Findings

Perceived facilitators for MNT



Interest in MNT referral



Perceptions of MNT
preventing progression
of CKD



Positive perceptions of
MNT

Perceived barriers



Lack of renal RDNs



Lack of insurance coverage



Low reimbursement rates

Conclusions: There are significant opportunities to design and test interventions to address barriers and promote facilitators of MNT access for patients with CKD G1-G5.

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