

Position of the Academy of Nutrition and Dietetics: The Role of Medical Nutrition Therapy and Registered Dietitian Nutritionists in the Prevention and Treatment of Prediabetes and Type 2 Diabetes



ABSTRACT

It is the position of the Academy of Nutrition and Dietetics that for adults with prediabetes or type 2 diabetes, medical nutrition therapy (MNT) provided by registered dietitian nutritionists (RDNs) is effective in improving medical outcomes and quality of life, and is cost-effective. MNT provided by RDNs is also successful and essential to preventing progression of prediabetes and obesity to type 2 diabetes. It is essential that MNT provided by RDNs be integrated into health care systems and public health programs and be adequately reimbursed. The Academy's evidence-based nutrition practice guidelines for the prevention of diabetes and the management of diabetes document strong evidence supporting the clinical effectiveness of MNT provided by RDNs. Cost-effectiveness has also been documented. The nutrition practice guidelines recommend that as part of evidence-based health care, providers caring for individuals with prediabetes or type 2 diabetes should be referred to an RDN for individualized MNT upon diagnosis and at regular intervals throughout the lifespan as part of their treatment regimen. Standards of care for three levels of diabetes practice have been published by the Diabetes Care and Education Practice Group. RDNs are also qualified to provide additional services beyond MNT in diabetes care and management. Unfortunately, barriers to accessing RDN services exist. Reimbursement for services is essential. Major medical and health organizations have provided support for the essential role of MNT and RDNs for the prevention and treatment of type 2 diabetes.

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POSITION STATEMENT

It is the position of the Academy of Nutrition and Dietetics that for adults with prediabetes or type 2 diabetes, medical nutrition therapy (MNT) provided by registered dietitian nutritionists (RDNs) is effective in improving medical outcomes, quality of life, and is cost effective. MNT provided by RDNs is also successful and essential to preventing progression of prediabetes and obesity to type 2 diabetes. It is essential that MNT provided by RDNs be integrated into health care systems and public health programs, and be adequately reimbursed.

MEDICAL NUTRITION THERAPY (MNT) is an effective intervention for the management of obesity, prediabetes, and diabetes, which have all increased dramatically in the United States and worldwide over the last 30 years.^{1,2} The estimated prevalence among the general US adult population is currently 35% for obesity,³ 33.9% for prediabetes,⁴ and 12.2% for diabetes.⁴ Compared with non-Hispanic whites, the highest rates of diabetes are among non-Hispanic blacks, Hispanics, American Indians, and Asians.^{5,6} Prevalence of obesity and diabetes among youth is also increasing,⁷⁻¹⁰ and approxi-

mately one in three adults 65 years or older has diabetes.⁵ Diabetes is recognized as a costly disease and, in 2012, the total estimated cost of diagnosed diabetes cases in the United States was \$245 billion, a 41% increase from the estimate of \$174 billion in 2007.¹¹ While it is encouraging to note that rates of diabetes-related complications have declined substantially over the past 20 years, unfortunately, the burden of diabetes continues because of the continued increase in prevalence.¹² MNT is defined as "Nutritional diagnostic, therapy, and counseling services for the purpose of disease management which are furnished by a registered dietitian or nutrition professional...".¹³ For the purposes of this article, MNT will be used to describe services provided by a registered dietitian nutritionist (RDN).

CLINICAL EFFECTIVENESS OF MNT IN THE MANAGEMENT OF OBESITY, PREDIABETES, AND TYPE 2 DIABETES

Impact of MNT on Obesity

The Academy of Nutrition and Dietetics has analyzed compelling evidence supporting the effectiveness of MNT in a broad range of topics, including obesity, diabetes prevention, and type 2 diabetes.¹⁴⁻¹⁹ As obesity is a key risk factor for the development of prediabetes and type 2 diabetes, adult weight management MNT delivered by an RDN is both clinically and economically effective for prevention and management.¹⁴ MNT results in both statistically significant and clinically meaningful weight loss in overweight or obese adults, as well as reduced risk for diabetes and disorders of lipid metabolism

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and hypertension.²⁰ The Academy's Adult Weight Management Evidence-Based Nutrition Practice Guideline states: "For weight loss, the RDN should schedule at least 14 MNT encounters (either individual or group) over a period of at least 6 months." To maintain weight loss, the nutrition practice guideline recommends "at least monthly MNT encounters over a period of at least 1 year."¹⁴ The Academy's Medical Nutrition Therapy Effectiveness Systematic Review also reviewed evidence supporting the effectiveness of frequent MNT visits.²¹ "Two to 12 visits (60-minute initial visit and 20- to 45-minute follow-ups) were associated with improved weight (−0.5 kg to −9.0 kg), body mass index (−0.2 to −7.8), waist circumference (−2.0 cm to −14 cm), fasting blood glucose (−5.2 mg to −9.5 mg/dL), total cholesterol (−4.3 mg to −59 mg/dL), low-density lipoprotein cholesterol (−15 mg to −47 mg/dL), low-density lipoprotein cholesterol (+2.0 mg to +11 mg/dL), and triglycerides (−12 mg to −60 mg/dL)."

Impact of MNT on Prediabetes

The primary goal of intervening in individuals with prediabetes, also known as "categories of increased risk for diabetes"²² is to prevent and/or delay progression to type 2 diabetes. Strong evidence supports the role of MNT provided by RDNs as being effective for managing prediabetes^{15,16,23,24} via key positive clinical outcomes on body weight, energy balance, and healthy lifestyle changes.²³⁻²⁸ The Academy's Prevention of Type 2 Diabetes Evidence-Based Nutrition Practice Guideline reports that lifestyle intervention delivered to individuals with prediabetes "over at least a 3-month period" has been shown to decrease fasting blood glucose by 2 to 9 mg/dL (0.11 to 0.5 mmol/L), body weight by 2.6 to 7.1 kg, and waist circumference by 3.8 to 5.9 cm.¹⁵ Greater improvements were found in metabolic and anthropometric outcomes with increased frequency of MNT visits. The systematic review of MNT interventions provided by an RDN reported that in the majority of the publications significant improvements in weight, glycemic outcomes, waist circumference, and blood pressure were documented.¹⁶ Lifestyle interventions focused on healthy eating and physical

activity and, when compared, improved clinical outcomes more than metformin. More recently, the positive impact of lifestyle interventions was reaffirmed by several studies: two among adults with impaired glucose regulation,^{29,30} one among adults with obesity and/or diabetes,³¹ and in two 2017 systematic reviews^{32,33}—all indicated that small improvements in weight loss and waist circumference and/or glycemia can prevent the progression from prediabetes to type 2 diabetes over an extended period of time. Improvements in quality of life, an important measure of health-related outcomes, have also been reported in studies of MNT among adults and pediatric individuals with prediabetes.³⁴⁻³⁶

The Diabetes Prevention Programs (DPPs) showed lifestyle changes improved clinical outcomes more than medication.²⁸ In addition to reducing the progression of prediabetes to diabetes, lifestyle interventions in the DPP, including a weight loss of 3 kg from baseline, also improved cardiovascular risk factors—hypertension and lipid profiles—compared with placebo and metformin therapy.³⁷ In a 15-year report of the DPP, lifestyle intervention continued to reduce diabetes incidence by 17%.³⁸ While the majority of evidence comes from studies in adults, there is also evidence that these efforts are effective in the general pediatric population.^{39,40}

Therefore, reducing obesity and prediabetes prevalence is vital to prevent type 2 diabetes. Substantial evidence indicates that duration and intensity of lifestyle interventions matter. Of interest is the report from the Community Preventive Services Task Force.⁴¹ They reviewed 53 studies (30 of diet and physical activity programs vs usual care; 13 of more intensive vs less intensive programs; and 13 single programs) from 66 programs around the United States. The report concluded that combined healthy diet and physical activity promotion programs are effective at decreasing diabetes incidence and improving cardiovascular disease risk factors in individuals at increased risk. More intensive programs were the most effective, and RDNs were the primary counselors in these programs.⁴¹

Impact of MNT on Type 2 Diabetes

Implementing MNT for the management of type 2 diabetes in adults is

essential and the Academy's Nutrition Practice Guidelines for Type 1 and Type 2 Diabetes in Adults documents the effectiveness of MNT on both clinical and quality of life outcomes.^{17,18} The nutrition practice guidelines recommend that RDNs, in collaboration with other members of the health care team, ensure that all overweight or obese adults at risk are screened for type 2 diabetes, and that all adults with type 2 diabetes be referred for MNT.^{17,18} RDNs should implement three to six MNT encounters during the first 6 months and, based on an individualized assessment, determine whether additional MNT encounters are needed. RDNs should implement a minimum of one annual MNT follow-up encounter based on strong evidence that continued MNT encounters produce maintenance and continued reductions of hemoglobin A1c (HbA1c) in adults with type 2 diabetes.

Strong evidence from the nutrition practice guidelines supports the role of MNT in the management of diabetes.¹⁷⁻¹⁹ In adults with type 2 diabetes, 21 study arms in 18 studies reported that MNT significantly lowered HbA1c by 0.3% to 2.0% at 3 months, and with ongoing MNT support, decreases were maintained or improved for more than 12 months. In studies with a control or usual care group, HbA1c remained unchanged or increased by 0.2%. Although MNT interventions were effective throughout the disease duration, the decreases in A1C were the largest when participants were newly diagnosed and/or had higher baseline HbA1c levels.^{17,18} Twelve study arms from 11 studies reported that MNT resulted in reductions in the dosing or the number of glucose-lowering medications used. However, due to the natural progression of type 2 diabetes, medication changes were needed to achieve glucose goals as study duration increased. Weight gain associated with medication use was also prevented by continued MNT support. Importantly, improvements in quality of life (improved self-perception of health status, increased knowledge and motivation, and decreased emotional stress) were reported.^{17,18}

In these studies, implementing an individualized nutrition therapy intervention was of critical importance. A variety of interventions, such as individualized nutrition therapy, energy

restriction, portion control, sample menus, carbohydrate counting, exchange lists, simple meal plans, and a low-fat vegan diet, were implemented and effective. All approaches resulted in a reduced energy intake.

Additional evidence further supports the Academy's nutrition practice guideline recommendations. Intensive nutrition therapy interventions are reported to improve emotional distress,⁴² as well as blood glucose levels and anthropometric outcomes in adults with type 2 diabetes with elevated HbA1c levels despite optimized medication treatment.⁴³ The LookAHEAD study⁴⁴ found individuals who lost weight saw improvement not only in HbA1c, but also in lipid and blood pressure outcomes; similar findings were reported in a 2015 systematic review.⁴⁵

In summary, MNT is essential for the achievement of treatment goals for both diabetes and prediabetes. Diagnostic criteria for prediabetes and type 2 diabetes, and desired treatment goals are provided by the American Diabetes Association (ADA) Standards of Medical Care in Diabetes, and these standards are updated annually.²²

COST-EFFECTIVENESS OF MNT IN THE PREVENTION AND MANAGEMENT OF DIABETES

Cost effectiveness of lifestyle and MNT for the prevention and management of diabetes has been documented in a number of studies.⁴⁶ The Academy's systematic review of cost effectiveness of MNT reported: "Based on six cost-effectiveness analyses, lifestyle interventions for diabetes prevention were cost effective in terms of cost per quality-adjusted life years gained compared to pharmacotherapy or no intervention."⁴⁶ In addition to the Academy's review, the 10-year follow-up to the DPP, the Diabetes Prevention Program Outcomes Study, also reported lifestyle intervention to be cost-effective.⁴⁷ Furthermore, among people aged 65 years and older, prediabetes lifestyle interventions were shown to be highly cost-effective and possibly cost-saving to a health care insurance payer such as Medicare.⁴⁸ Costs were lower when diabetes prevention programs were delivered to individuals or groups in community or primary care settings.⁴⁹ These results

suggest that it would be fiscally responsible for Medicare and similar payers to provide coverage for MNT for individuals with prediabetes to reduce diabetes risk. In a recent analysis, the Centers for Medicare & Medicaid Services and an independent actuary also found that lifestyle-based DPPs were cost-effective and are slated to cover DPP classes for Medicare enrollees starting in January 2018.⁵⁰

MNT must be provided early in the diabetes disease process to aid in reducing the costs and burdens of this devastating condition. In an economic analysis of 12,308 patients with diabetes, the potential savings from MNT was measured, and the net cost to Medicare of covering these services for Medicare enrollees was estimated. MNT was associated with a 9.5% reduction in use of hospital services and a 23.5% reduction in use of physician services for individuals with diabetes.⁵¹ The authors concluded that after an initial period of implementation, coverage for MNT can result in a net reduction in health services use and costs. In individuals aged ≥ 55 years, the savings exceeds the cost of providing the MNT benefit. Furthermore, RDN visits were more strongly associated with reduced hospitalizations than diabetes classes. Each RDN visit was associated with a substantial reduction in hospital charges,⁵¹ suggesting that providing these services in the primary care setting may be highly cost effective for the health care system. More recently, Howatson and colleagues⁵² also demonstrated that dietetic interventions achieved a significant impact on a number of chronic health conditions, including diabetes, which results in economic benefits.

ROLES AND RESPONSIBILITIES OF RDNs IN DIABETES CARE

Implementation of MNT

As noted, the Academy has published evidence-based nutrition practice guidelines for prediabetes and diabetes that also review MNT implementation.¹⁵⁻¹⁹ Nutrition practice guideline recommendations are incorporated into the Nutrition Care Process, a systematic problem-solving method for RDNs to think critically and make decisions that affect practice-related issues.⁵³ The Nutrition Care Process

involves four key nutrition steps: assessment, diagnosis, intervention, and monitoring and evaluation,⁵⁴ which promote evidence-based practice using the highest-quality evidence available to make practice decisions.

The implementation of the nutrition practice guidelines into practice must be individualized to assist the RDN to successfully integrate MNT into the overall management of diabetes and prediabetes.⁵⁵ Individualization is a collaborative effort between the client and RDN. The goals of diabetes MNT are to achieve positive clinical outcomes including attaining individualized glycemic, lipid, and blood pressure goals, attaining and maintaining body weight goals, and delaying or preventing the complications of diabetes.⁵⁶ For those with prediabetes, the goals of MNT are a modest weight loss and moderate physical activity.

A 2015 joint position statement on self-management education and support in type 2 diabetes from the Academy, ADA, and American Association of Diabetes Educators (AADE) reviews an algorithm of care for adults with type 2 diabetes, which outlines the need and frequency for MNT interventions.⁵⁷ The algorithm defines four critical times to assess, provide, and adjust diabetes self-management education and support (DSMES), including MNT: at diagnosis; annually for assessment of education, nutrition, and emotional needs; when new complicating factors (health conditions, physical limitations, emotional factors, or basic living needs) arise that influence self-management; and when transitions in care occur.

The Diabetes Care and Education Practice Group of the Academy published revised "Standards of Practice and Standards of Professional Performance for Registered Dietitians (Generalist, Specialty, and Advanced) in Diabetes Care,"⁵⁸ which define the three levels of practice in diabetes care.⁵⁹ The standards are regularly reviewed, revised, and designed to promote the provision of safe, effective, and efficient RDN services. RDNs, and nutrition and dietetic technicians, registered under the direction of the RDN, are uniquely qualified to provide nutrition care for individuals with prediabetes and diabetes based on nutrition practice guidelines. [Figures 1 and 2](#) summarize the roles and

<p>Screening and referral: In collaboration with other health care team members, the RDN should ensure that:</p> <ul style="list-style-type: none"> • All individuals are screened for risk of type 2 diabetes using a recognized screening tool, such as the American Diabetes Association Type 2 Diabetes Risk Test • Determine the appropriate actions to be taken based on the results of the screening
<p>MNT encounters: For prevention in high-risk groups (individuals with prediabetes or metabolic syndrome), the RDN should:</p> <ul style="list-style-type: none"> • Provide MNT encounters • Increase frequency of encounters to optimize outcomes
<p>Nutrition assessment: For individuals at high risk for type 2 diabetes, the RDN should assess the following, but not limited to:</p> <ul style="list-style-type: none"> • Glycemia (fasting blood glucose, 2-hour post-prandial blood glucose, and hemoglobin A1c) • Lipid and blood pressure risk factors • Anthropometrics • Physical activity • Medications and supplements • Dietary factors • History of depression • Obesigenic/diabetogenic environment • Socio-economic status • Food security
<p>Nutrition intervention: For individuals at high risk of type 2 diabetes, the RDN should:</p> <ul style="list-style-type: none"> • If overweight or obese, prescribe a weight-reducing eating plan and support weight loss using evidence-based practice guidelines • Individualize the nutrition prescription for macronutrients • Encourage fiber and whole-grain food intake • Encourage moderate intensity physical activity • If prescribed medication, educate on potential food and drug interactions and nutrition-related adverse effects • Counsel based on established, well-defined behavior changes
<p>Coordination of care: Implement MNT and coordinate care with a multi-disciplinary team and important others (eg, family, friends, and colleagues) in a wide variety of settings</p>
<p>Nutrition monitoring and evaluation: Monitor and evaluate the following, but not limited to:</p> <ul style="list-style-type: none"> • Glycemia • Anthropometrics • Lipid profile and blood pressure • Physical activity • Medications and supplements • Dietary factors
<p>Advanced training: Seek specialized training as needed and noted in Figure 2.</p>

Figure 1. Roles and responsibilities of registered dietitian nutritionists (RDNs) providing medical nutrition therapy (MNT) for persons with prediabetes. (Adapted from reference 15.)

responsibilities of RDNs implementing nutrition practice guidelines into the three levels of practice in diabetes care.^{15-19,58}

Role of RDNs beyond MNT

As a team member, the RDN possesses unique skills in the real-world application of food and nutrition, in addition to specialized training in diabetes care. This positions RDNs to adeptly facilitate the overall care of the individual with diabetes in a primary care

practice, clinic, hospital, or other facility. As noted in the Standards of Practice, other activities that RDNs may be involved with include self-blood glucose monitoring training and interpretation, and device training and adjustments (glucose meters, insulin pumps, insulin delivery systems, continuous blood glucose monitoring devices).^{58,60,61} RDNs are also diabetes education program coordinators. According to data in 2015, 34% of current ADA Education Recognition Programs have an RDN program coordinator.

Recognition refers to diabetes education programs who have met or exceeded established guidelines and quality measures as written by the recognition requirements developed by the ADA.⁶² RDNs also are coordinators of diabetes education programs accredited by the AADE Diabetes Education Accreditation Program Diabetes Education Program.⁶³ Other responsibilities include the facilitation of medication adjustments, being disease case managers for insurers and employees, and involvement in corporate

<p>Screening and referral: In collaboration with other health care team members, the RDN should ensure that:</p> <ul style="list-style-type: none"> • All overweight/obese adults at risk are screened for type 2 diabetes • Individuals with type 2 diabetes are referred for MNT
<p>MNT encounters: The RDN should implement:</p> <ul style="list-style-type: none"> • A minimum of three to six MNT encounters during the first 6 months; determine whether additional MNT encounters are needed • A minimum of one annual MNT follow-up encounter
<p>Nutrition assessment: The RDN should assess the following to formulate the nutrition care plan:</p> <ul style="list-style-type: none"> • Biochemical data, medical tests, and medication usage • Nutrition-focused physical findings • Client history • Food/nutrition-related history, including food behavior and habits • Dietary supplement and complementary and alternative medicine practices. • Client's psychological and social situation
<p>Nutrition intervention: The RDN should individualize the nutrition prescription and implement evidence-based guidelines in collaboration with the adult with diabetes:</p> <ul style="list-style-type: none"> • A variety of eating patterns are acceptable • A healthful eating plan is encouraged for appropriate-weight persons with diabetes; a reduced energy healthful eating plan is encouraged for overweight and obese persons with diabetes • Individualize the macronutrient intake composition within the appropriate energy intake • Educate on carbohydrate management strategies including fiber, glycemic index, and sweetener (nutritive and non-nutritive) recommendations • Educate on the role of protein intake in diabetes management • Encourage consumption of a cardio-protective eating pattern within the recommended energy intake • Advise there is no clear evidence of benefit from vitamin, mineral, and/or herbal supplementation in people who do not have underlying deficiencies • If choice is to drink alcohol, it should be done in moderation (one drink/day or less for adult women and two drinks/day or less in adult men) • Encourage an individualized physical activity plan • Educate on self-monitoring of blood glucose and using data to adjust therapy
<p>Coordination of care: Care systems should support team-based care and community involvement to meet person's needs: implement and coordinate care with an interdisciplinary health care team, the person with diabetes, and important others (eg, family, friends, and colleagues).</p>
<p>Nutrition monitoring and evaluation: The RDN should monitor and evaluate to determine effectiveness of MNT:</p> <ul style="list-style-type: none"> • Biochemical data, medical tests, and medication usage • Nutrition-focused physical findings • Client history • Food/nutrition-related history • Dietary supplement and complementary and alternative medicine practices • Client's psychological and social situation
<p>Generalist (competent): Implements Nutrition Practice Guidelines for type 1 and type 2 diabetes using the nutrition care process.</p>
<p>Specialty (proficient): Implements education and training on diabetes self-care tasks/skills/topics such as instruction on self-monitoring of blood glucose; hypoglycemia recognition and treatment; blood glucose targets; assesses blood glucose monitoring results and needs for MNT and medication adjustments; calculates insulin-to-carbohydrate ratios and insulin sensitivity factors; assesses other metabolic outcomes.</p>
<p>Advanced (expert): Implements education and training on devices (monitors, insulin pumps, pods, continuous glucose monitors); recommends meal plan and diabetes medication adjustments, if needed; evaluates management (evaluation of trends, review of glucose data) and other diabetes self-management behaviors; drives and directs clinical practice; conducts and collaborates in research; leads in the advancement of diabetes care.</p>

Figure 2. Roles and responsibilities of registered dietitian nutritionists (RDNs) providing medical nutrition therapy (MNT) for persons with type 2 diabetes. ^{17-19,58}

and facility wellness programs. RDNs are also important in DPPs serving as instructors and/or as coordinators.

RDNs are uniquely positioned to fulfill key needs, and the roles of the RDN continue to expand.^{64,65} They are involved in patient-centered medical homes within physician offices where individuals have a team of providers for care, and accountable care organizations.^{66,67} Furthermore, RDNs can participate in shared medical appointments (also known as shared medical visits, group medical visits, or groups clinics)⁶⁵⁻⁷⁰ by providing expertise to small groups in partnership with a primary care provider. Nutrition counseling via technology is another expanded role with the data supporting the use of frequent MNT via face-to-face, online, or telephone.^{71,72}

Because RDNs possess a variety of attributes that include training in communications, counseling, food science, pathophysiology, biochemical sciences, clinical nutrition and diabetes care skills, cultural and psychosocial awareness, and the ability to use collaborative approaches to providing patient care, they are well-suited to provide value added programs of all types. RDNs also take roles in non-patient-centered arenas. Worksite wellness programs, which are becoming more common throughout the United States, are a venue opportune to the RDN skillset.⁷³⁻⁷⁶ Program, patient care, and data and resource management coordination, whether at the level of an insurance company or within a primary care clinic, are other employment opportunities that lend themselves to the unique skillsets of RDNs. Additional programs RDNs are involved in as coordinator or as a health care professional on the health care team include the Medicare Special Needs Plan, Medicare's Everyone with Diabetes Counts Program, Lower Extremity Amputation Prevention Programs, Chronic Disease Self-Management Program, We Can! Initiatives, Indian Health Services Special Diabetes Programs for Indians, and state government-supported programs.

Barriers to Access for RDN Services

The role of MNT and the RDN is important in both the management and prevention of diabetes.

Unfortunately, national data indicate that only about half of those individuals with diabetes actually receive any diabetes education,⁷⁷ and even fewer see an RDN. In a study of 28,404 individuals with diabetes, only 9.1% had at least one nutrition visit within a 9-year period.⁷⁸ Some of the potential barriers to accessing RDN services include geographic accessibility; variable health insurance benefits for MNT; lack of understanding of benefits and coverage among consumers and health care providers, including RDNs; inability to provide MNT and Diabetes Self-Management Education on the same day; and limitations of provider directories. Those populations at highest risk for obesity, prediabetes, and type 2 diabetes are also often more likely to have difficulties accessing MNT services.⁷⁹

Despite the evidence of effectiveness of RDN services and diabetes education and support, underutilization of RDN services for DSMES is evident in both acute care and outpatient settings.^{57,80} This is true also of referrals for DSMES, as in one study only 6.8% of privately insured individuals with type 2 diabetes diagnosed within the last 12 months received DSMES,⁸¹ and only 4% of Medicare individuals received DSMES or MNT services.⁸² Effectiveness of RDN services to individuals with prediabetes and diabetes and to the health care team providing diabetes care/management and education/support is of proven effectiveness, and reducing barriers to RDN services is essential.

REIMBURSEMENT FOR MNT

Medicare Reimbursement

A physician referral is needed for MNT for Medicare reimbursement. Providers need to follow local and national regulations to be eligible for reimbursement, and qualifications require obtaining a National Provider Identifier number. Current Procedural Terminology and billing procedures for MNT within government-funded programs and private sector insurance plans are varied and have been widely interpreted by carriers and billing agencies. The regulations for billing Medicare Part B for MNT are defined by Centers for Medicare & Medicaid Services. Since January 1, 2002, RDNs have been

able to bill Medicare Part B for MNT provided to individuals with diabetes and/or renal disease using Current Procedural Terminology codes 97802, 97803, or 97804. This Medicare benefit allows 3 hours of MNT in the first referral year and 2 hours in each subsequent calendar year. Medicare may cover additional visits for MNT when there is a documented change in medical condition; however, a new referral is needed using codes G0270 or G0271 for these additional hours beyond the annual benefit.^{83,84} The Medicare benefit also allows 10 hours of DSME the first year of diagnosis and then 2 hours of continuing education thereafter; however, Centers for Medicare & Medicaid Services mandates that DSMES cannot occur on the same day as MNT. (Note that Medicare uses the term *diabetes self-management training* for reimbursement, not DSME or DSMES).

Other Reimbursement for Nutrition Therapy

As of 2016, forty-six states and the District of Columbia had some law that requires health insurance policy coverage for diabetes treatment. These laws impact both the private market place, as well as state Medicaid programs. The US Preventative Services Task Force recommends screening for abnormal blood glucose as part of cardiovascular risk assessment in adults aged 40 to 70 years who are overweight or obese.⁸⁵ Clinicians should offer or refer patients with abnormal blood glucose to intensive behavioral counseling interventions to promote a healthful diet and physical activity.⁸⁶ The recommendation does not guarantee coverage by all plans and does not guarantee RDNs as providers of such services.^{61,87}

Nutrition services, including diabetes education by an RDN, are also generally part of the bundled payment system in acute care settings.^{88,89} Nutrition services for individuals receiving Medicare benefits may be included in long-term care settings as part of bundled payment. MNT provided to Medicare beneficiaries in the home setting could be a component of a bundled payment, or it might be a separately billable service under part Medicare Part B.⁹⁰ The growing adoption of alternative payment models presents an

opportunity to support nutrition services provided by RDNs to individuals with diabetes and prediabetes in multiple settings, based on the cost-effectiveness of MNT and stakeholder focus on improving quality and outcomes, and decreasing the total cost of care.

NUTRITION THERAPY AND DIABETES SELF-MANAGEMENT EDUCATION AND SUPPORT

Nutrition therapy is an integral component of the National Standards for DSMES programs.^{22,53,57,91,92} Multidisciplinary teams are recommended to provide care for people with diabetes.⁹¹ Multiple studies have found that DSMES is associated with improved diabetes knowledge, improved self-care behavior, improved clinical outcomes, such as lower HbA1c, lower self-reported weight, improved quality of life, healthy coping, and lower costs.⁹³ Better outcomes were reported from DSMES interventions that were longer and included follow-up support, that were culturally and age-appropriate, that were tailored to individual needs and preferences, and that addressed psychosocial issues and incorporated behavioral strategies. Both individual and group approaches have been found to be effective. Ultimately, however, individualization is the most important aspect of DSME and MNT for diabetes management and prevention.^{17-19,55,94-96}

Typically, programs involve both an RDN and a registered nurse as instructors and/or coordinators of the DSME program. The ADA and the AADE recognize that RDNs can also function as a diabetes instructor to deliver DSME in a single discipline education program. Instructors in recognized programs must achieve ongoing continued education hours specific to diabetes to maintain their role as a qualified instructor per recognition standards.^{62,63,97}

RDNs have achieved comprehensive education and training and may pursue additional validating professional certification in treating individuals with prediabetes and diabetes. Some RDNs who choose to specialize in diabetes care may become a Certified Diabetes Educator (CDE) and/or become Board Certified in Advanced Diabetes

Management (BC-ADM).⁹⁷ Within their scope of practice, CDEs and BC-ADMs can engage in adjusting medications, treating and monitoring acute and chronic complications, counseling individuals on lifestyle modifications, addressing psychosocial issues, and participating in research and mentoring. According to a 2015 survey report by AADE, approximately 91% of the RDNs who responded were CDEs and 2% were BC-ADMs; and 36% reported volunteering time to diabetes-related activities, which demonstrates significant professional engagement.⁹⁸ RDNs were 35% of the AADE membership respondents, demonstrating the number of RDNs who are involved in diabetes management and education. In addition, in 2015, 5,924 RDNs were members of Diabetes Care and Education Practice Group. Professionals involved in diabetes care contribute to community events and charitable organizations related to diabetes as well.⁹⁸

SUPPORT FOR THE ROLE OF NUTRITION THERAPY AND/OR RDNs

Guidelines from major medical and health organizations have recognized the essential role of MNT for the prevention and treatment of type 2 diabetes and/or the important role of RDNs.^{22,57,99-102} The ADA states that MNT is an integral component of diabetes prevention, management, and self-management education.^{22,57} In addition, all individuals with diabetes should receive individualized MNT, preferably provided by a RDN who is knowledgeable and skilled in providing diabetes MNT. In individuals with diabetes, individualized education sessions and comprehensive group diabetes education programs including nutrition therapy effectively improve blood glucose levels.^{22,94}

One of the founding principles of the Consensus Statement by the American Association of Clinical Endocrinologists and American College of Endocrinologists on the Comprehensive Type 2 Diabetes Management Algorithm¹⁰¹ is lifestyle optimization, which should begin with MNT counseling and education. The American College of Cardiology, the American Heart Association, and The Obesity Society also support the role of the RDN in the management

of overweight and obesity in adults.¹⁰² These professional organizations authenticate the importance of MNT and interventions of the RDN for diabetes care, as well as interventions for associated risk factors leading to the development of the disease.

SUMMARY

Analysis of current research and evidence strongly supports the role of MNT and RDNs in the treatment and prevention of diabetes. Fundamental to the management of type 2 diabetes is the inclusion of MNT into the treatment plan for the individual with diabetes. MNT provided by RDNs can prevent progression of obesity to prediabetes, and from prediabetes to type 2 diabetes. RDNs are uniquely trained and have the skills to practice independently or as a team member in health care systems or public health programs. They have the ability to individualize care based on the person's needs, abilities, and resources and to work collaboratively with individuals and health care providers to improve outcomes. MNT provided by RDNs must be deliberately integrated into diabetes management, diabetes prevention, and diabetes self-management education and support programs. Furthermore, evidence demonstrates the cost-effectiveness of MNT interventions. Diverse MNT interventions should be adequately reimbursed by third-party payers in current and future health care system environments for the treatment and prevention of prediabetes and diabetes.

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AUTHOR INFORMATION

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