Nourish

Clinical Reference Guide and Tx Pathway: preDM, T1DM, and T2DM

Introduction

Definition

A clinical pathway is a tool used to define, standardize, and sequence the interventions specific to conditions treated. Clinical pathways are followed to optimize outcomes, reduce risk, and ensure quality care.

Purpose

Diabetes is a significant health concern in the United States. According to the Centers for Disease Control and Prevention (CDC), in 2021, 38.4 million Americans, or 11.6% of the population, had diabetes. Diagnosed and undiagnosed: Of the 38.4 million adults with diabetes, 29.7 million were diagnosed, and 8.7 million were undiagnosed (1).

Ongoing diabetes self-management education (see below) and support are critical to preventing the development of diabetes, and reducing acute and long-term complications, and empowering people to obtain self-efficacy in the management of the disease. In 2021, 38.4 million Americans, or 11.6% of the population, had diabetes. In addition 97.6 million American adults had prediabetes and many people with prediabetes could develop DM2 within 5 years. Alarmingly, the prevalence of diabetes is forecasted to increase by more than 54% over the next decade (2 - 5).

To date more than 7,000 patients have come to Nourish for help in managing or preventing diabetes. Because of the essential role that lifestyle plays in reducing the progression of, and complications from diabetes, RDs are central to care.

A clinical pathway will serve to standardize care, while allowing for clinical judgment and individuality of counseling style.

Background

Pathophysiology

Diabetes is a complex, chronic condition resulting in elevated glucose levels.

The pathophysiology of diabetes mellitus involves a complex interplay of various factors, primarily related to insulin, glucose, and metabolism. DM2 is predicated by preDM, though this is not always identified. Prediabetes is a condition where blood sugar levels are higher than normal but not yet high enough to be classified as DM2 (6 - 8).

There are several types or classifications of diabetes:

- **Type 1 (DM1)**, which results from autoimmune beta-cell destruction in the pancreas and is characterized by a complete lack of insulin production;
- **Type 2 (DM2)**, which develops when there is an abnormal increased resistance to the action of insulin and the body cannot produce enough insulin to overcome the resistance;
- **Gestational diabetes (GDM)**, which is a form of glucose intolerance that affects some women during pregnancy; and
- A group of other types of diabetes caused by specific genetic defects of beta-cell function or insulin action, diseases of the pancreas, or drugs or chemicals.

Dietary interventions for preDM and DM2 are similar but may vary in intensity and focus, for example, for preDM, the emphasis is often on weight loss (if overweight) via reducing overall caloric intake to promote weight loss and improve insulin sensitivity. Find Clinical Reference Guide and Tx Pathway for Weight loss here, which can be used in conjunction with this Guide. For DM2, the focus is more on achieving and maintaining a healthy weight and managing blood sugar levels through diet. Due to the similarities in MNT interventions for both, this Clinical Reference Guide will accommodate both preDM and DM2, with call-outs when the interventions are discordant.

Key aspects include:

Insulin Production and Function: Insulin is a hormone produced by the beta cells of the pancreas. Its primary role is to regulate blood sugar (glucose) levels by facilitating the uptake of glucose into cells, especially muscle, fat, and liver cells. Insulin also helps to inhibit the production of glucose in the liver.

Insulin Resistance: In DM2, cells become resistant to the effects of insulin, leading to reduced glucose uptake despite normal or elevated insulin levels. This resistance can be caused by genetic factors, obesity, sedentary lifestyle, and other factors.

Beta Cell Dysfunction: In DM2, there is also a progressive decline in beta cell function, leading to reduced insulin secretion over time. This decline is thought to be due to a combination of insulin resistance, metabolic stress, and genetic factors.

Glucose Overproduction: In both DM1 and DM2 diabetes, there is often an overproduction of glucose by the liver, contributing to high blood sugar levels. This occurs due to a lack of insulin action to inhibit glucose production in the liver.

Hyperglycemia: The hallmark of diabetes is hyperglycemia, or high blood sugar levels. This occurs when the balance between insulin production and insulin action is disrupted, leading to inadequate glucose uptake by cells and increased glucose levels in the bloodstream.

Long-Term Complications: Chronic hyperglycemia can lead to various complications over time, including damage to blood vessels (microvascular and macrovascular complications), nerves, and organs. These complications can affect the eyes (diabetic retinopathy), kidneys (diabetic nephropathy), nerves (diabetic neuropathy), and cardiovascular system (increased risk of heart disease and stroke).

Understanding the pathophysiology of diabetes is crucial for developing effective treatment strategies aimed at controlling blood sugar levels, preventing complications, and improving quality of life for individuals with diabetes.

Risk Factors

- Have prediabetes.
- Have a BMI of 25-29.9 (overweight) or >30 (obesity)
- Have central adiposity
- Are 45 years or older.
- Have a parent, brother, or sister with DM2.

- Are physically active less than 3 times a week.
- Have ever had gestational diabetes (diabetes during pregnancy) or given birth to a baby weighing over 9 pounds.
- If you have non-alcoholic fatty liver disease you may also be at risk for DM2.
- Excess body fat, particularly around the abdomen, can lead to insulin resistance, where the body's cells do not respond effectively to insulin. This can eventually lead to high blood sugar levels and the development of DM2.
- Race and ethnicity affect risk. African Americans, Hispanic/Latino Americans, American Indians, Pacific Islanders, and some Asian Americans are at particularly high risk for DM2.
    - Following are the percentage of people in the United States with diagnosed diabetes from 2017 to 2020:
        - Non-Hispanic Blacks – 12.7%
        - Hispanics – 11.1%
        - Non-Hispanic Asians – 11.3%
        - Non-Hispanic Whites – 11.0%

While the above are well documented risk factors, it's important to point out that a few of them are not without challenge. Studies examining the incidence of DM2, for example, in non-obese individuals (<30kg/m2. BMI) have led to exploration of other mechanisms for the development of DM2. The ReTUNE study, for example, suggests that the onset of DM2 is caused by having more fat inside the liver and pancreas than that particular person can handle, leading to suggestions in the paper that there is a "Personal Fat Threshold" that is more prognostic of DM progression than BMI (9).

Diabetes Self-Management Education

Unlike many health conditions, diabetes must be managed in large part by the person that has the disease. Diabetes self-management Education (DSME) refers to the ongoing process by which individuals with diabetes take an active role in managing their condition. This includes monitoring blood sugar levels, making healthy food choices, engaging in regular physical activity, taking medications as prescribed, and managing stress. The goal of

self-management is to achieve optimal blood sugar control, prevent complications, and improve overall health and well-being (10, 11).

The concept of diabetes self-management has evolved over time as our understanding of diabetes and its management has grown. While the idea of individuals managing their diabetes has been around for many years, the formalization of diabetes self-management programs and guidelines began to emerge in the late 20th century (10).

One landmark event in the history of diabetes self-management was the development of the Diabetes Control and Complications Trial (DCCT), an observational study conducted in the 1980s and 1990s that demonstrated the benefits of intensive blood sugar control in reducing the risk of diabetes complications. This study highlighted the importance of self-management practices, such as frequent blood sugar monitoring and insulin adjustment, in improving outcomes for individuals with diabetes (12).

Since then, diabetes self-management education and support programs have become an integral part of diabetes care. These programs aim to empower individuals with diabetes to take control of their health through education, skills training, and ongoing support. The American Diabetes Association (ADA) and other organizations have developed guidelines and standards of care for diabetes self-management education and support, emphasizing the importance of individualized care plans and a multidisciplinary approach to diabetes management.

Interventions

Pharmacological

Several categories of drugs are used to treat diabetes, depending on the type and severity of the condition (13, 14).

Common drugs / drug categories include:

Insulin: Insulin therapy is essential for people with DM1 and may also be used in DM2 when other medications are not sufficient to control blood sugar levels. Insulin is available in different types, such as rapid-acting,

short-acting, intermediate-acting, and long-acting, and can be administered via injections or insulin pumps.

Oral Glucose-Lowering Medications: These medications are used to lower blood sugar levels in DM2. They work in various ways, such as stimulating insulin production, improving insulin sensitivity, or reducing glucose production in the liver. Common classes include

- Biguanides: (e.g., metformin) - improve insulin sensitivity and reduce glucose production in the liver.
- Sulfonylureas: (e.g., glipizide, glyburide) - stimulate the pancreas to release more insulin.
- DPP-4 Inhibitors: (e.g., sitagliptin, saxagliptin) - increase insulin release and decrease glucagon production.
- SGLT-2 Inhibitors: (e.g., canagliflozin, dapagliflozin) - reduce glucose reabsorption in the kidneys and lower blood sugar levels.
- GLP-1 Receptor Agonists: (e.g., liraglutide, dulaglutide) - increase insulin release and reduce glucagon production.
- Thiazolidinediones: (e.g., pioglitazone, rosiglitazone) - improve insulin sensitivity in muscle and fat tissues.

Alpha-glucosidase Inhibitors: (e.g., acarbose, miglitol) - slow down the digestion of carbohydrates, leading to a slower rise in blood sugar levels after meals.

Meglitinides: (e.g., repaglinide, nateglinide) - stimulate the pancreas to release insulin, particularly after meals**.**

Bile Acid Sequestrants: (e.g., colesevelam) - may be used to help lower blood sugar levels in some people with DM2. See Heart Health pathway [here]

Amylin Analog: (e.g., pramlintide) - mimics the effects of amylin, a hormone that helps regulate blood sugar levels.

Combination Therapy: Sometimes, two or more diabetes medications are used together to achieve better blood sugar control.

It's important for individuals with diabetes to work closely with their healthcare team to determine the most appropriate treatment plan, which may include a combination of medications, lifestyle changes, and regular monitoring of blood sugar levels.

Technology

Diabetes technology is the term used to describe the hardware, devices, and software that people with diabetes use to assist with self-management, ranging from lifestyle modifications to glucose monitoring and therapy adjustments. Diabetes technology has been divided into two main categories: insulin administered by syringe, pen, or pump (also called continuous subcutaneous insulin infusion), and glucose as assessed by blood glucose monitoring (BGM) or continuous glucose monitoring (CGM) (15, 16).

Diabetes technology has expanded to include automated insulin delivery (AID) systems, where CGM-informed algorithms modulate insulin delivery, as well as diabetes self-management support software serving as medical devices.

Diabetes technology, when coupled with education, follow-up, and support, can improve the lives and health of people with diabetes; however, the complexity and rapid evolution of the diabetes technology landscape can also be a barrier to implementation for both people with diabetes and the health care team.

All care team members need to understand technology for diabetes management because technology plays a crucial role in modern diabetes care.

Devices include:

Continuous Glucose Monitoring (CGM) Systems: CGM systems provide real-time information about blood glucose levels, trends, and patterns. Dietitians need to understand how these systems work and how to interpret the data to make informed decisions about diet and insulin therapy adjustments.

Insulin Pumps: Insulin pumps deliver insulin continuously, mimicking the function of a healthy pancreas. Dietitians need to understand how insulin

pumps work and how to adjust insulin doses based on carbohydrate intake and blood glucose levels.

Automated insulin delivery (AID) is a technology that combines a continuous glucose monitor (CGM) with an insulin pump, along with a computer algorithm that automatically adjusts insulin delivery based on glucose levels. The first commercial hybrid closed-loop system, which partially automates insulin delivery, was approved by the U.S. Food and Drug Administration (FDA) in 2016. The CGM continuously measures glucose levels in the interstitial fluid, providing real-time data to the algorithm. The algorithm then calculates the amount of insulin needed to maintain target glucose levels and sends commands to the insulin pump to deliver the appropriate dose.

Diabetes Management Apps: There are many apps available that can help individuals with diabetes track their food intake, physical activity, blood glucose levels, and medication usage. RDs can use these apps to help their patients set goals, track progress, and make informed decisions about their diet and lifestyle.

Overall, understanding technology is essential for dietitians working with individuals with diabetes because it can improve the effectiveness, efficiency, and accessibility of care, ultimately leading to better outcomes for patients.

Surgical

Obesity is a potent risk factor for the development and progression of DM2s, and weight loss is a key component of diabetes management. Bariatric surgery results in significant weight loss and remission of diabetes in most patients. After surgery, glycemic control is restored by a combination of enforced caloric restriction, enhanced insulin sensitivity, and increased insulin secretion (17 - 19).

While controversial due to perioperative risks, considerable evidence exists for the use of bariatric surgery to treat DM2 in patients whose body mass index (BMI) is 35 kg/m2 or higher. In obese patients who also have DM2, bariatric surgery can produce remission (defined as normoglycemic control without the need for diabetic medications), with higher rates with the

Roux-en-Y gastric bypass procedure than with the laparoscopic adjustable gastric banding or sleeve procedures. Several mechanisms for improvement have been suggested including: Changes in gut microbiota and hormones; impact on appetite regulating hormones; as well as a reduction in accumulated adiposity in the pancreas and liver which impact insulin insensitivity.

With the recent introduction of more effective drug classes for treating diabetes (e.g.,SGLT2 and GLP-1), surgical intervention is not likely to become the treatment of choice for most patients with DM2. New antidiabetic drugs and modified insulin therapies enable safe, long term blood glucose control in the target range while avoiding hypoglycemia and maintaining good quality of life.

Lifestyle

Research on lifestyle interventions in the prevention of diabetes is copious and demonstrates strong outcomes. Comprehensive lifestyle interventions effectively decrease the incidence of DM2 in high-risk patients. Evidence supports the efficacy and effectiveness of lifestyle diabetes prevention interventions across clinical and community settings, delivery formats (eg, individual-, group-, or technology-based), and implementers (e.g., clinicians, community members) (20, 21).

There is less evidence supporting outcomes of lifestyle interventions in people with diabetes. A recent (2022) systematic review and meta analysis of RCTs examining lifestyle interventions on the cardiovascular and all-cause mortality of subjects with prediabetes and DM2 demonstrated that lifestyle interventions focusing on long-term dietary and physical exercise recommendations were not superior to standard care in reducing cardiovascular and all-cause mortality in populations with DM2.

Medical Nutrition Therapy (MNT)

Evidence shows that MNT improves blood glucose and hemoglobin A1C in people with diabetes. In addition, metabolic outcomes were improved in nutrition intervention studies, both as independent MNT and as part of overall DSMT (Diabetes Self-Management Training). This evidence also

suggests that MNT is most beneficial at the diagnosis of PreDM or initial diagnosis of DM2, but can also be effective at any time during the disease process, and that ongoing evaluation and intervention are essential (22 - 27).

RD delivered MNT incorporates:

Assessment: Assess an individual's current dietary habits, lifestyle factors, and health goals to develop a personalized nutrition plan.

Education: Educate individuals about the importance of a balanced diet, portion control, carbohydrate counting, and the glycemic index to help them make informed choices.

Meal Planning: Help individuals plan meals that are tailored to their nutritional needs, preferences, and cultural background while considering factors such as blood sugar control, weight management, and overall health.

Monitoring: Monitor progress and make adjustments to nutrition care plans as needed to achieve optimal blood sugar control and overall health.

Behavioral Support: Provide support and strategies to help patients overcome barriers to healthy eating, such as emotional eating, stress, and social situations.

Collaboration: Collaborate with other members of the healthcare team, including MD/PA/NPs, RNs and diabetes educators, to ensure coordinated care.

Dietetic Counseling in PreDM and DM2

Counseling for preDM and DM can include:

Healthy Eating Patterns: Emphasizing a balanced diet that includes plenty of fruits, vegetables, whole grains, and lean proteins.

Portion awareness: For carbohydrate ingestion and weight management

Carbohydrate Awareness/Counting: Educating about the impact of carbohydrates on blood sugar levels and how to make healthy carbohydrate choices.

Glycemic Index and Glycemic Load - The impact a carbohydrate has on blood glucose based on a variety of chemical properties that influence the speed of digestion and absorption.

Meal Planning: Help patients develop meal plans that meet their nutritional needs and fit their lifestyle.

Meal Timing - Discuss the importance of regular meal times and spacing meals throughout the day to help maintain stable blood sugar levels.

Healthy Cooking Methods: Provide culinary education to produce balanced meals that are also heart healthy.

Monitoring Blood Sugar Levels: Educate on the importance of regularly monitoring blood sugar levels and how diet and medications can affect these levels.

Behavioral Strategies: Provide support and strategies to help individuals make and sustain healthy lifestyle changes.

Self Monitoring - Educate on how blood sugar, diet, physical activity, sleep and symptoms can provide valuable insight to condition management and health.

Stress Management: Discuss the impact of stress on blood sugar levels and how stress management techniques can help improve blood sugar control.

Enjoyable Activity - Emphasizing the importance of regular, enjoyable, physical activity in managing blood sugar levels, improving insulin sensitivity, and promoting overall health.

Goal Setting - Goals should be specific, measurable, achievable, relevant, and time-bound (SMART) in the following areas:

- Dietary:
- Physical Activity
- Weight Management
- Blood Sugar Monitoring
- Medication Adherence
- Other Lifestyle Modification Goals: (managing stress, getting enough sleep, stop using tobacco, drinking less alcohol if excessive)

Additional Considerations

Socioeconomic Factors and PreDM / DM2

Social Determinants of Health (SDOH) significantly influence the prevalence, diagnosis, management, and outcomes of prediabetes and Type 2 diabetes:

Access to Healthcare: SDOH can impact access to healthcare services. Patients from lower socioeconomic backgrounds may face barriers such as lack of health insurance, transportation issues, and limited availability of healthcare facilities. This can result in delayed diagnosis and inadequate management of prediabetes and Type 2 diabetes.

Health Literacy: Socioeconomic factors such as education level and language proficiency can affect health literacy, which is crucial for understanding and managing diabetes. Individuals with lower health literacy may struggle to comprehend medical information, adhere to treatment plans, and adopt healthy lifestyle changes necessary for diabetes management.

Environmental Factors: Socioeconomic status often correlates with environmental factors such as neighborhood safety, access to healthy food options, and opportunities for physical activity. Communities in low-income neighborhoods may have a higher prevalence of food deserts, limited recreational facilities, and exposure to environmental toxins, all of which contribute to the development and progression of diabetes.

Stress and Mental Health: Socioeconomic stressors, and adverse childhood experiences disproportionately affect individuals from disadvantaged backgrounds. Chronic stress can lead to dysregulation of hormones like cortisol and insulin, contributing to insulin resistance and the development of Type 2 diabetes. Additionally, mental health conditions such as depression and anxiety, which are more prevalent in certain socioeconomic groups, can impact self-care behaviors and exacerbate diabetes management challenges.

At Nourish, incorporating the impact of SDOH on prediabetes and Type 2 diabetes is essential. Care plans that address systemic inequalities and promote health equity, will help empower Nourish patients to make healthy lifestyle choices. Care delivery goals include improving access to healthcare services, promoting health literacy, addressing environmental and social determinants of health, and implementing culturally competent care.

Telemedicine

Unlike many disciplines in medicine and disease management, there is a fair amount of research specifically examining telemedicine interventions for people with preDM and DM2. This research is in part driven by the magnitude of the problem, as well as rapidly evolving global digitalization (eHealth) which offers innovative digital opportunities for intensive diabetes management. Diabetes technology (previously discussed) includes hardware, software, and technical devices that help to control the disease with regard to the therapy components evaluated, with outcomes studied including HbA1c, FBG, BP, body weight, BMI, health-related quality of life (HRQoL), diabetes-related quality of life (DRQoL), cost effectiveness, and time saving.

Several review papers actually support the effectiveness of telemedicine above in "usual" or in-person care (26, 27).

Barriers to Care for PWD:

Ironically, despite the attention and success in the literature of telehealth, the barriers to DM prevention remain noteworthy as patient-, provider-, and health system-based barriers may prevent implementation of evidence-based practices (28).

Many patients with diabetes do not achieve the recommended glycemic, cholesterol, and blood pressure levels despite the availability of evidence-based guidance and encouraging trends in the delivery of care. Most routine diabetes management, particularly of DM2, is undertaken in primary care, drawing on features of the chronic care model such as dedicated review clinics and shared care with specialists. Research indicates that environmental context and resources, knowledge and skill of HCPs, beliefs about consequences, along with limited time prevent dedicated time to educate on diabetes self-care are limited (29).

Primary care clinicians face multiple challenges in the inherently complex management of diabetes. They struggle to meet evolving treatment targets within limited time and resources, and express frustrations with resulting compromises in care. Clinicians lack confidence in their knowledge of guidelines and skills in particular tasks, such as initiating insulin and facilitating patient behavior change. Despite continuing policy drives to promote self-management, clinicians often find it hard to share responsibility effectively with patients and support behavior change (30).

This gap identified in the literature suggests a significant need for RD-delivered interventions.

Intolerance of Weight Bias / Stigma

Weight bias is common among healthcare providers with accumulating evidence that individuals with obesity are perceived as lacking self-control, unmotivated to improve health, noncompliant with treatment, and personally to blame for their weight. Those who perceive bias from their healthcare providers have less trust in them, experience more difficulty and avoid preventive health services and medical appointments. Weight bias in obesity care can interfere with effective obesity treatment (31).

In a systematic review paper, six out of eight studies reported weight stigma expressed by dietitians and nutritionists. Their believed causes of obesity indicated a defined preference for internal factors rather than genetics or biology (32).

Nourish does not tolerate bias in any direction. Our care is evidence-based and patient-centric.

Motivational Interviewing

While not required of every RD in every session, Motivational Interviewing is a foundational counseling technique employed by Nourish RDs.

Most RDs at Nourish have had extensive education and experience with the tools of MI including: Open-ended questions, Rolling with Resistance (or

avoiding the righting reflex), expressing empathy, developing discrepancy (or exploring ambivalence), and supporting self-efficacy among others.

MI is a collaborative, goal-oriented style of communication with particular attention to the language of change. It is designed to strengthen personal motivation for and commitment to a specific goal by eliciting and exploring the person's own reasons for change within an atmosphere of acceptance and compassion. The fundamentals of MI are identifying what the patient would like to accomplish through exploring ambivalence (32).

MI is practiced with an underlying spirit or way of being with people, including:

- **Partnership**. MI is a collaborative process. The MI practitioner is an expert in helping people change; people are the experts of their own lives.
- **Evocation**. People have within themselves resources and skills needed for change. MI draws out the person's priorities, values, and wisdom to explore reasons for change and support success.
- **Acceptance**. The MI practitioner takes a nonjudgmental stance, seeks to understand the person's perspectives and experiences, expresses empathy, highlights strengths, and respects a person's right to make informed choices about changing or not changing.
- **Compassion**. The MI practitioner actively promotes and prioritizes clients' welfare and wellbeing in a selfless manner.

Motivational Interviewing has been studied extensively in people who have diabetes and has been shown to be a more effective care strategy than usual care for improving blood pressure levels and adherence levels and in reducing HbA1c levels in diabetes management (34).

Person-Centered Approach

Shared decision making and patient-driven goal setting are foundational to Nourish's Clinical Philosophy.

Patient-centered care focuses on the patient and the individual's particular healthcare needs. The goal of patient-centered healthcare is to empower

patients to become active participants in their care. Evidence-supported principles guiding care at Nourish include:

- Establishing a positive dietitian-patient relationship
- Displaying humanistic behaviors
- Using effective communication skills
- Individualizing and adapting care
- Redistributing power to the patient
- Allowing adequate session duration to practice patient centered care

Patient-centered care is associated with significant improvements in patients' health outcomes, and has been studied in dietetics and MNT delivery (35).

Evidence-Based Care

Evidence-based practice (EBP) in dietetics involves providing holistic, quality care based on the most up-to-date research and knowledge rather than traditional methods, advice from colleagues, or personal beliefs/bias (36, 37).

EBP is an approach to health care wherein health practitioners use the best evidence possible, i.e., the most appropriate information available, to make decisions for individuals, groups and populations.

EBP values, enhances and builds on clinical expertise, knowledge of disease mechanisms, and pathophysiology. It involves complex and conscientious decision making based not only on the available evidence but also on client characteristics, situations, and preferences. It recognizes that healthcare is individualized and ever changing and involves uncertainties and probabilities.

EBP incorporates successful strategies that improve client outcomes and is derived from various sources of evidence including research, national guidelines, policies, consensus statements, systematic analysis of clinical experience, quality improvement data, specialized knowledge and skills of experts. Evidence-based Medicine (EBM) has been built on the cornerstone of eliminating bias.

It is the expectation of Nourish RDs that they evaluate and utilize the latest research studies, systematic reviews, and meta-analyses related to nutrition and dietetics. This evidence forms the foundation for making informed decisions about dietary interventions for Nourish patients.

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Treatment Pathway

pre	**Referral and Assessment** In advance of appt with the patient, review the information that the patient shared in their signup flow/intake form. Review referral from the healthcare provider indicating diabetes dx or a patient self-referral.

1.0 Sessions 1 - 2	**Assessment** During the initial session for a patient with diabetes, RD will capture complete health history to determine eligibility for the program, and set the stage for goal setting. Documentation in the relevant section of the Nourish chart note is required (Patient's chief complaint, medical history, lifestyle, other patient reported information, patient update and diet recall, metrics). Components of the diabetes assessment include: • Health history • Adult weight hx • Current intake (24-hour recall) / Current dietary habits • Calculate estimated dietary intake (kcal and macros) • Physical activity levels • Surgical hx as it relates to weight • Pharmacological hx and current med inventory • Psychosocial factors affecting eating habits • Knowledge in diabetes self-management • Glucose reports via CGM or glucometer (if available)

1.1 Sessions 1 -2	**Determine Eligibility** Nourish provides diabetes self-management for patients based on the following criteria: • A1C 5.7% - 6.4% (preDM) or 6.5% or above (DM2) • Fasting plasma glucose 126 mg/dl or above • Oral glucose tolerance test 200 mg/dl or above • Random plasma glucose test: 200 mg/dl or above
1.2 Sessions 1 -2	• Collect baseline data and input in the "General Health," "Diabetes" and "Heart Health" (if available) outcomes section in the chart. • If patient is eligible, proceed to 1.3
1.3	**Complete diagnosis (PES) Examples**: As part of the Nutrition Care Process, the RD develops a nutrition diagnosis, which is different from medical/psychiatric diagnosis. Nutrition diagnoses from the list below, as well as other diagnoses, should be documented as PES statements in the chart note. **Examples**:

	Excessive carbohydrate intake related to DM/Food- and nutrition-related knowledge deficit concerning appropriate amount of carbohydrate intake as evidenced by A1C 7.0. *Self Monitoring Deficit related to Food and nutrition related knowledge deficit concerning self-monitoring as evidenced by incomplete self-monitoring glucose records.* *Inadequate blood sugar control due to inconsistent carbohydrate counting and meal planning as evidenced by elevated A1C levels and frequent episodes of hyperglycemia.*
1.4 Sessions 1 -2 (with regular revisitation)	**Establish Patient Goals Related to:** • Weight • Glucose control/A1C • Renal function • Heart health • Physical activity • Collaborate with the patient to set realistic and achievable behavioral goals. • Follow S.M.A.R.T goal format • Consider individual factors such as age, medical conditions, and lifestyle

1.5
 	
Sessions 1 -2 (with regular revisitation)
	Develop Intervention
	• Develop an individualized dietary plan/pattern/approach based on:
	  ○ Caloric needs for weight loss if clinically appropriate (see overweight obesity CRG and Tx pathway [here]
	  ○ Balanced macronutrient distribution
	  ○ Nutrient Density (EN/Kcal)
	  ○ Consideration of cultural and personal food preferences.

1.6 Sessions 2 - 12+	**Share evidence-based tools for diabetes self-care management, including:** **Healthy Eating** • My Plate • Carbohydrate counting/plate method/exchange method • Glycemic Index • Understanding food labels • Fiber • Sugar substitutes • Culinary Medicine • Beverages • Ordering Out • Meal planning • Relationship with food • General enhancement of nutritional knowledge

1.7 Sessions 3 - 12	**Physical Activity** • Safety considerations for activity with DM • Goal setting for activity • Impact of activity on blood sugar. • Physical activity integration
1.8 Sessions 3 - 12	**Monitoring** • Individualize glucose ranges • When to check blood sugar • How to check blood sugar. • GCM Education and usage • What to do if glucose is high • What to do if glucose is low • What is A1C
1.9 Sessions 1 - 12	**Medication (if application)** • MOA of medications • How to take medication • Medication schedule • Nutrition considerations with medications • How to use store insulin • I:C ratio • Sensitivity factor

	• Sliding scale
2.0 Session 1-12+	**Reducing Risk** Know your Numbers Encourage regular check-ups/physicals/annual exams
2.1 Session 12+	**Problem Solving** Managing Sick days Vacation/Travel Social events 42 Factors that impact glucose control (credit Adam Brown)
2.2 Session 12+	**Healthy Coping** Diabetes Burnout Stress Management

2.3 Session 12+	**Evaluation** • Collect outcomes monthly • Evaluate the effectiveness of the intervention based on weight loss progress and improvements in overall health • Collect patient feedback for continuous quality improvement
2.4 Session 1-12+	**Regular Monitoring and Follow-Up** • Schedule regular follow-up appointments to monitor progress • Adjust the dietary plan and goals as needed • Address any challenges or concerns the patient may encounter • Provide ongoing behavioral support to help the patient overcome barriers. • Encourage self-monitoring through food diaries, scale weight, &/or mobile apps. • Discuss strategies for managing social and environmental influences on eating behavior
2.5 Session 12 or completion of program	**Multidisciplinary Collaboration** Collaborate with other healthcare professionals as available, such as physicians, psychologists, and fitness experts, to ensure comprehensive and coordinated care

2.6 Session 12+	**Transition to Maintenance** • Gradually transition the patient to a maintenance phase • Provide guidance on maintaining a healthy weight and preventing relapse • Offer ongoing support through periodic check-ins • Explore with the patient whether there are other nutrition interests / goals with which you might be able to help

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References:

1. Statistics About Diabetes | ADA (last accessed March 20, 2024)
2. https://www.cdc.gov/diabetes/prevention/about-prediabetes.html (Last accessed March 20, 2024)
3. Rowley WR, Bezold C, Arikan Y, Byrne E, Krohe S. Diabetes 2030: Insights from Yesterday, Today, and Future Trends. Popul Health Manag. 2017 Feb;20(1):6-12.
4. Standards of Care in Diabetes—2024 | Diabetes Care | American Diabetes Association (diabetesjournals.org)
5. Polonsky KS. The past 200 years in diabetes. N Engl J Med. 2012 Oct 4;367(14):1332-40.
6. Banday MZ, Sameer AS, Nissar S. Pathophysiology of diabetes: An overview. Avicenna J Med. 2020 Oct 13;10(4):174-188.
7. Papaetis GS, Papakyriakou P, Panagiotou TN. Central obesity, type 2 diabetes and insulin: exploring a pathway full of thorns. Arch Med Sci. 2015 Jun 19;11(3):463-82
8. Galicia-Garcia U, Benito-Vicente A, Jebari S, Larrea-Sebal A, Siddiqi H, Uribe KB, Ostolaza H, Martín C. Pathophysiology of Type 2 Diabetes Mellitus. Int J Mol Sci. 2020 Aug 30;21(17):6275.
9. Taylor R, Barnes AC, Hollingsworth KG, Irvine KM, Solovyova AS, Clark L, Kelly T, Martin-Ruiz C, Romeres D, Koulman A, Meek CM, Jenkins B, Cobelli C, Holman RR. Aetiology of Type 2 diabetes in people with a 'normal' body mass index: testing the personal fat threshold hypothesis. Clin Sci (Lond). 2023 Aug 31;137(16):1333-1346.
10. Hermanns N, Ehrmann D, Finke-Groene K, Kulzer B. Trends in diabetes self-management education: where are we coming from and where are we going? A narrative review. Diabet Med. 2020 Mar;37(3):436-447.
11. Ernawati U, Wihastuti TA, Utami YW. Effectiveness of diabetes self-management education (DSME) in type 2 diabetes mellitus (T2DM) patients: Systematic literature review. J Public Health Res. 2021 Apr 14;10(2):2240.
12. Diabetes Control and Complications Trial (DCCT): results of feasibility study. The DCCT Research Group. Diabetes Care. 1987 Jan-Feb;10(1):1-19.

13. Shi Q, Nong K, Vandvik PO, Guyatt GH, Schnell O, Rydén L, Marx N, Brosius FC 3rd, Mustafa RA, Agarwal A, Zou X, Mao Y, Asadollahifar A, Chowdhury SR, Zhai C, Gupta S, Gao Y, Lima JP, Numata K, Qiao Z, Fan Q, Yang Q, Jin Y, Ge L, Yang Q, Zhu H, Yang F, Chen Z, Lu X, He S, Chen X, Lyu X, An X, Chen Y, Hao Q, Standl E, Siemieniuk R, Agoritsas T, Tian H, Li S. Benefits and harms of drug treatment for type 2 diabetes: systematic review and network meta-analysis of randomised controlled trials. BMJ. 2023 Apr 6;381:e074068.
14. Hughes S, Neumiller JJ. Oral Semaglutide. Clin Diabetes. 2020 Jan;38(1):109-111.
15. ElSayed NA, Aleppo G, Aroda VR, Bannuru RR, Brown FM, Bruemmer D, Collins BS, Hilliard ME, Isaacs D, Johnson EL, Kahan S, Khunti K, Leon J, Lyons SK, Perry ML, Prahalad P, Pratley RE, Seley JJ, Stanton RC, Gabbay RA, on behalf of the American Diabetes Association. 7. Diabetes Technology: Standards of Care in Diabetes-2023. Diabetes Care. 2023 Jan 1;46(Suppl 1):S111-S127
16. Phillip M, Nimri R, Bergenstal RM, Barnard-Kelly K, Danne T, Hovorka R, Kovatchev BP, Messer LH, Parkin CG, Ambler-Osborn L, Amiel SA, Bally L, Beck RW, Biester S, Biester T, Blanchette JE, Bosi E, Boughton CK, Breton MD, Brown SA, Buckingham BA, Cai A, Carlson AL, Castle JR, Choudhary P, Close KL, Cobelli C, Criego AB, Davis E, de Beaufort C, de Bock MI, DeSalvo DJ, DeVries JH, Dovc K, Doyle FJ, Ekhlaspour L, Shvalb NF, Forlenza GP, Gallen G, Garg SK, Gershenoff DC, Gonder-Frederick LA, Haidar A, Hartnell S, Heinemann L, Heller S, Hirsch IB, Hood KK, Isaacs D, Klonoff DC, Kordonouri O, Kowalski A, Laffel L, Lawton J, Lal RA, Leelarathna L, Maahs DM, Murphy HR, Nørgaard K, O'Neal D, Oser S, Oser T, Renard E, Riddell MC, Rodbard D, Russell SJ, Schatz DA, Shah VN, Sherr JL, Simonson GD, Wadwa RP, Ward C, Weinzimer SA, Wilmot EG, Battelino T. Consensus Recommendations for the Use of Automated Insulin Delivery Technologies in Clinical Practice. Endocr Rev. 2023 Mar 4;44(2):254-280.
17. Kashyap SR, Gatmaitan P, Brethauer S, Schauer P. Bariatric surgery for type 2 diabetes: weighing the impact for obese patients. Cleve Clin J Med. 2010 Jul;77(7):468-76.
18. Changes in gut microbiota and hormones after bariatric surgery: a bench-to-bedside review. Tabasi M, Ashrafian F, Khezerloo JK, et al. *Obes Surg.* 2019;29:1663–1674.

19. Outcomes at 10-year follow-up after Roux-en-Y gastric bypass, biliopancreatic diversion, and sleeve gastrectomy. Verras GI, Mulita F, Pouwels S, et al. *J Clin Med.* 2023;12:4973.
20. Zucatti KP, Teixeira PP, Wayerbacher LF, Piccoli GF, Correia PE, Fonseca NKO, Moresco KS, Guerra BA, Maduré MG, Farenzena LP, Frankenberg AD, Brietzke E, Halpern B, Franco O, Colpani V, Gerchman F. Long-term Effect of Lifestyle Interventions on the Cardiovascular and All-Cause Mortality of Subjects With Prediabetes and Type 2 Diabetes: A Systematic Review and Meta-analysis. Diabetes Care. 2022 Nov 1;45(11):2787-2795.
21. Galaviz KI, Narayan KMV, Lobelo F, Weber MB. Lifestyle and the Prevention of Type 2 Diabetes: A Status Report. Am J Lifestyle Med. 2015 Nov 24;12(1):4-20.
22. Pastors JG, Warshaw H, Daly A, Franz M, Kulkarni K. The evidence for the effectiveness of medical nutrition therapy in diabetes management. Diabetes Care. 2002 Mar;25(3):608-13.
23. UK Prospective Diabetes Study 7: Response of fasting plasma glucose to diet therapy in newly presenting type II diabetic patients. *Metabolism* 39:905–912, 1990
24. Franz MJ, Monk A, Barry B, McClain K, Weaver T, Cooper N, Upham P, Bergenstal R, Mazze RS: Effectiveness of medical nutrition therapy provided by dietitians in the management of non-insulin-dependent diabetes mellitus: a randomized, controlled clinical trial. *J Am Diet Assoc* 95:1009–1017, 1995
25. Schellenberg ES, Dryden DM, Vandermeer B, Ha C, Korownyk C. Lifestyle interventions for patients with and at risk for type 2 diabetes: a systematic review and meta-analysis. Ann Intern Med. 2013 Oct 15;159(8):543-51.
26. Tchero H, Kangambega P, Briatte C, Brunet-Houdard S, Retali GR, Rusch E. Clinical Effectiveness of Telemedicine in Diabetes Mellitus: A Meta-Analysis of 42 Randomized Controlled Trials. Telemed J E Health. 2019 Jul;25(7):569-583.
27. Eberle C, Stichling S. Clinical Improvements by Telemedicine Interventions Managing Type 1 and Type 2 Diabetes: Systematic Meta-review. J Med Internet Res. 2021 Feb 19;23(2):e23244.
28. Rushforth B, McCrorie C, Glidewell L, Midgley E, Foy R. Barriers to effective management of type 2 diabetes in primary care: qualitative systematic review. Br J Gen Pract. 2016 Feb;66(643):e114-27

29. Bodenheimer T, Wagner EH, Grumbach K. Improving primary care for patients with chronic illness. JAMA 2002; 288(14): 1775–1779.
30. Tricco AC, Ivers NM, Grimshaw JM, et al. Effectiveness of quality improvement strategies on the management of diabetes: a systematic review and metaanalysis. Lancet 2012; 379(9833): 2252–2261.
31. Jung FU, Luck-Sikorski C, Wiemers N, Riedel-Heller SG. Dietitians and Nutritionists: Stigma in the Context of Obesity. A Systematic Review. PLoS One. 2015 Oct 14;10(10):e0140276.
32. Alberga AS, Edache IY, Forhan M, Russell-Mayhew S. Weight bias and health care utilization: a scoping review. Prim Health Care Res Dev. 2019 Jul 22;20:e116.
33. Rollnick, Stephen; Miller, William R. (October 1995). "What is Motivational Interviewing?". Behavioral and Cognitive Psychotherapy. 23 (4): 325–334.
34. Steffen PLS, Mendonça CS, Meyer E, Faustino-Silva DD. Motivational Interviewing in the Management of Type 2 Diabetes Mellitus and Arterial Hypertension in Primary Health Care: An RCT. Am J Prev Med. 2021 May;60(5):e203-e212.
35. Sladdin I, Ball L, Bull C, Chaboyer W. Patient-centred care to improve dietetic practice: an integrative review. J Hum Nutr Diet. 2017 Aug;30(4):453-470.
36. https://www.andeal.org/evidence-based-practice
37. Shyam A. Bias and the Evidence 'Biased' Medicine. J Orthop Case Rep. 2015 Jul-Sep;5(3):1-2.