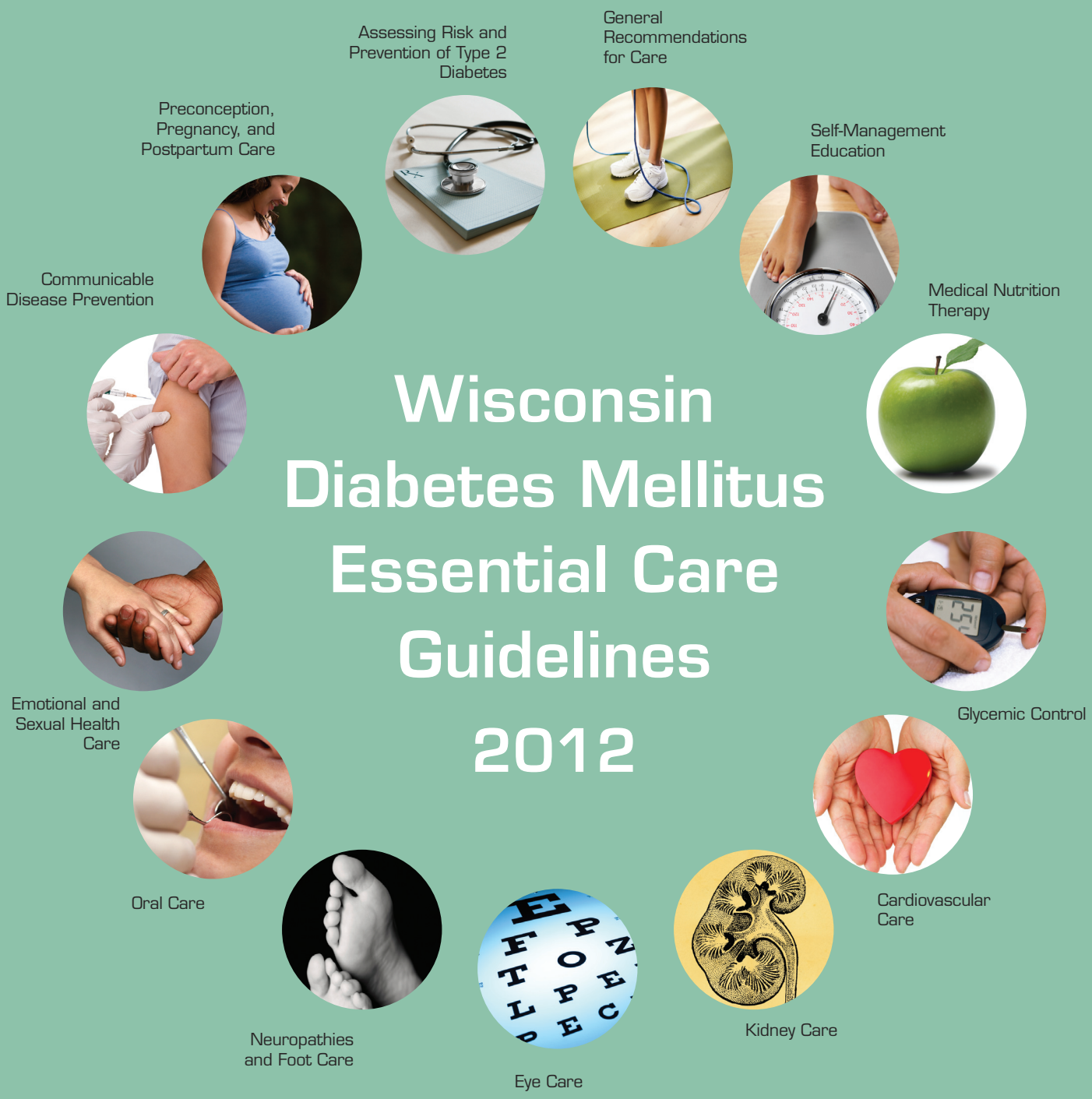
Wisconsin Diabetes Mellitus Essential Care Guidelines 2012



Quick References and Tools Included

DISCLAIMER

These *Guidelines* are designed to serve as a tool to support and influence health care provider decision making to promote consistent, comprehensive, and preventive diabetes care. With the goal of improving care statewide, the *Guidelines* include recommended screening tests, lab tests, exams, medical checks, and essential education.

The *Guidelines* are population-based and therefore intended to be appropriate for most people with diabetes, but not intended to define the optimal level of care for an individual. Clinical judgment should always indicate the need for adjustments appropriate to the needs of each particular person, with goals individualized for person's age, medical condition(s), complication(s), and any other risk identified by the primary care provider. These *Guidelines* are an evolving process and, as such, will be reviewed periodically to reflect advances in research and medical knowledge.

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Overview

Diabetes in Wisconsin

There are an estimated 475,090 adults (10.1% of population) and 4,500 children with diabetes in Wisconsin. Approximately 128,900 of those adults have diabetes that is undiagnosed. In addition, approximately 1,460,250 Wisconsin adults age 20 years and older have pre-diabetes. In the United States, approximately 25.8 million people have diabetes and 27% are unaware that they have the disease.

Diabetes can lead to devastating complications, such as blindness, end-stage renal disease, amputations, heart disease, and stroke. These complications are the cause of the major morbidity, mortality, and economic burden of diabetes. For additional information on the 2011 diabetes prevalence and the burden of related complications, go to the following website: http://www.dhs.wisconsin.gov/diabetes/factsandfigures.htm.

Wisconsin Diabetes Mellitus Essential Care Guidelines

The *Wisconsin Diabetes Mellitus Essential Care Guidelines* were published in 1998, revised in 2001, 2004, 2008, 2011 and 2012 by the Wisconsin Diabetes Prevention and Control Program, members of the Wisconsin Diabetes Advisory Group and other health care professionals with expertise in diabetes care and management. This document is divided into 13 sections, each providing pertinent information and references related to specific areas of essential diabetes care. Helpful tools and resources once included at the end of each section are now located in a new section titled "Tools." These various tools may assist providers and others with integrating diabetes care recommendations contained in the *Guidelines* into everyday practice.

These *Guidelines* provide a simple translation of diabetes care standards that align with the *American Diabetes Association (ADA) Clinical Practice Recommendations*. They can be used by primary care providers, other health care professionals, health systems (e.g., managed care organizations, other insurers, clinics purchasers, etc.) and a companion piece for consumers interested in learning about essential diabetes care.

The Appraisal of Guidelines for Research and Evaluation (AGREE) instrument is a tool used to assess the quality of clinical practice guidelines. Team members involved in the 2012 update applied this instrument to the 2011 Guidelines to provide a framework for the 2012 update. Several area of improvement to the Wisconsin Guidelines were identified.

Implementing the Wisconsin Diabetes Mellitus Essential Care Guidelines

Implementation and adoption of the *Wisconsin Diabetes Mellitus Essential Care Guidelines (Guidelines)* in a health system or organization is one way to improve care and enhance quality of life for people with diabetes. These evidence-based *Guidelines* set a standard of care that organizations can use to measure quality and monitor improvement. As continuous quality improvement is constantly evolving, the *Guidelines* offer a promising strategy to make dramatic improvements in population health outcomes.

Summary of Changes: Wisconsin Diabetes Mellitus Essential Care Guidelines 2012

Section	Updates/Additions/ Deletions	Section-page number
Acknowledgements	▪ **Updated:** Workgroup Members and Reviewers (pp. ix-x)	
Overview	▪ **Updated:** Diabetes in Wisconsin and Wisconsin Care Guidelines (p. 1)	
Quick References	▪ Updated: Guidelines at a glance (p. 8) Other Tests: Points to Consider (p. 11)	
Tools	▪ **Updated:** Meal Planning with the Plate Method (pp. 31-32) How to Use a Food Label to Select Foods (pp. 35-36) Type 2 Diabetes: Ambulatory Glycemic Control Pathway (p. 38) Intervention/ Treatment Pearls 2012 (p.39) Diabetes Mellitus Medications 2012 (pp. 40-42) Insulin Therapy 2012 (p. 43) Insulin Pearls (p. 44)	
Section 1. General Recommen-dations for Care	▪ **Updated:** Physical Activity text (pp. 1-3 to 1-4) Physical Activity for Adults text (p. 1-5) Bariatric Surgery text (p. 1-9) Sharps Disposal text (p. 1-12) Web-Based Repository text (p. 1-12) ▪ **Added:** Table 1-4: Sleep Assessment Tools (p. 1-11) ▪ **Deleted:** Management Practice Tools (p. 1-3)	
Section 2. Self-Management Education	▪ **Updated:** Referral to a Diabetes Education Program text (p. 2-4) Conversation Maps text (p. 2-8)	

Summary of Changes: Wisconsin Diabetes Mellitus Essential Care Guidelines 2012

Section	Updates/Additions/ Deletions	Section-page number
Section 3. Medical Nutrition Therapy	▪ **Updated:** Concern/Care/Frequency text (p. 3-1) Main Topics Included In This Section text (p. 3-1) Nutrition Care Process text (p. 3-2) Frequency of Visits (p. 3-3) Recommended Amount of Daily Carbohydrates text (p. 3-4) Dietary Fats and Cholesterol text (p. 3-5) Other Important Nutritional Factors text (p. 3-6) Dietary Fiber and Whole Grains text (p. 3-7) Nutritional Guidance for Non- Dietitian Health Professionals (p. 3-8) ▪ **Added:** Soluble Fiber text (p. 3-5) Vegetarian diet option (p. 3-6) Dietary Fiber and Whole Grains text (p. 3-7) Nutritional Guidance for Non-Dietitian Health Professionals: Meal Planning/ MyPlate text (p. 3-8)	
Section 4. Glycemic Control	▪ **Updated:** Table 4-2: Important Considerations in Individualizing Glycemic Goals (p. 4-3) A1C text (p. 4-6) Self- Monitoring of Blood Glucose text (p. 4-8) Table 4-5: Self-Monitoring of Blood Glucose Suggestions (p. 4-9) Continuous Glucose Monitor text and Table (pp. 4-6 to 4-10) Insulin Pump Therapy (p. 4-11) Acute Complications: Hypoglycemia text (p. 4-12) ▪ **Added:** Alternate Site Testing text (p. 4-9) Continuous Glucose Monitors text (p. 4-10) Insulin- U-500 (p. 4-11)	
Section 5. Cardiovascular Care	▪ **Updated:** Concern/Care/Frequency: Statin Adults (p. 5-1) Lifestyle Modifications text (p. 5-2) Standard Lipid Assessment and Monitoring in Adults text (p. 5-5) Treatment text (p. 5-6) Additional Risk Stratification text (p. 5-7) Lipid Screening and Treatment in Children and Adolescents text (p. 5-8) Blood Pressure Control text (p. 5-8) ▪ **Added:** Concern/Care/Frequency: limit total sodium (p. 5-1) Accurate Blood Pressure Measurement: Toolkit Resource (p. 5-9) ▪ **Deleted:** Lipid Screening and Treatment in Children and Adolescents text (p. 5-8)	
Section 6. Kidney Care	▪ **Updated:** Progression of diabetic kidney disease text (p. 6-2)	
Section 7. Eye Care	▪ **Updated:** Annual Dilated Eye Exam: pregnancy text (p. 7-2) Referral to an Ophthalmologist or Optometrist and Coordination of Care text (p. 7-3)	
Section 8. Neuropathies and Foot Care	▪ **Updated:** Assessing Vibration Perception with Tuning Fork text (p. 8-7)	

Summary of Changes: Wisconsin Diabetes Mellitus Essential Care Guidelines 2012

Section	Updates/Additions/ Deletions	Section-page number
Section 9. Oral Care	▪ **Updated:** Concern/Care/Frequency: Oral exam by general dentist or periodontal specialist (p. 9-1) Main Topics Included In This Section text (p. 9-1) Visual Oral Inspection and Oral Health Education by Primary Provider (p. 9-2) Oral Examination by Dentist text (p. 9-3) Identifying Undiagnosed Periodontal Disease in the Primary Care Setting: Strategies for medical professionals to consider text (p. 9-6)	
Section 10. Emotional and Sexual Health Care	▪ **Updated:** Treatment for Depression text (p. 10-8) Other Psychological Disorders: Stress text (p. 10-10)	
Section 11. Communicable Diseases Prevention	▪ **Updated:** Main topics Included In This Section: Hepatitis B Vaccine and Tuberculosis Entire text for all sections (pp. 11-2 to 11-5) ▪ **Added:** Section Title Change: Communicable Disease Prevention Concern/Care/Frequency: Provide Hepatitis B series and Screen for Tuberculosis Hepatitis B Vaccine text (p. 11-4) Tuberculosis text (p. 11-5) ▪ **Deleted:** Section Title: Influenza and Pneumococcal Immunization	
Section 12. Preconception, Pregnancy, and Postpartum Care	▪ **Updated:** Preconception, Intrapartum, Postpartum Care Recommendations: Self-Management/ Self-Monitoring Section and Postpartum Care Section (pp. 12-4 to 12-5) Table 12-2: Common Medications Screening and Diagnosis (p. 12-7) Care of Women with Gestational Diabetes text (pp. 12-8 to 12-9) ▪ **Added:** Main Topics Included In This Section: Maternal/Child Risks Associated with Diabetes (p. 12-2) Screening for Pre-Existing Diabetes at First Prenatal Visit (p. 12-3)	
Section 13. Assessing Risk and Prevention of Type 2 Diabetes	▪ **Updated:** Concern/Care/Frequency: text change (p. 13-1) Pre-Diabetes and Categories of Increased Risk for Developing Type 2 Diabetes and Type 2 Diabetes Risk Factors text (p. 13-2) The National Diabetes Prevention Program text (p. 13-5) Table 13-2: Diet and Physical Activity Considerations for Reducing Risk for Type 2 Diabetes and Metabolic Syndrome (Recommendations) text (p. 13-9)	

Quick References

- 2012 Wisconsin Diabetes Guidelines at a Glance
- Diabetes Types/Classifications
- Tests to Diagnose Diabetes
- Test Criteria: Type 2 Diabetes in Children and Adolescents
- Other Tests: Points to Consider
- Diabetes-related International Classification of Diseases-9 (ICD-9) Codes
- Summary of Research: Landmark National and International Research Studies Impacting Diabetes Care

2012 Wisconsin Diabetes Guidelines at a Glance

For details and references for each specific area, as well as the disclaimer, please refer to the supporting documents and implementation tools in the full-text Guidelines available via the Internet at http://www.dhs.wisconsin.gov/diabetes/ or telephone: (608) 261-6855.

Concern	Care/Test	Frequency
General Recommendations for Care	• Perform diabetes-focused visit	*Type 1*: Every 3 months❖ *Type 2*: Every 3 – 6 months❖
	• Review management plan; assess barriers and goals	Each focused visit; revise as needed
	• Assess physical activity level	Each focused visit
	• Assess nutrition/weight/growth	Each focused visit
Self-Management Education	• Refer to diabetes educator, preferably a CDE in an ADA Recognized or AADE Accredited Program	At diagnosis, then every 6 – 12 months, or more as needed
Medical Nutrition Therapy	• Refer for medical nutrition therapy (MNT) provided by a registered dietitian (RD), preferably a CDE	At diagnosis or first referral to RD: 3 to 4 visits, completed in 3 to 6 months; then, 1-2 hours of routine RD visits annually. RD determines additional visits per needs/goals.
Glycemic Control	• Check A1C, general goal: < 7.0% (individualize; see Table 4 - 2)	Every 3 months if not at goal; every 6 months if at goal
	• Review goals, change in lifestyle/meals pattern, medications, side effects, and frequency of hypoglycemia	Each focused visit
	• Assess self-blood glucose monitoring schedule	Each focused visit, 2 – 4 times/day, or as recommended
Cardiovascular Care	• Check fasting lipid profile Adult goals: Total Cholesterol < 200 mg/dL Triglycerides < 150 mg/dL HDL ≥ 40 mg/dL (men) HDL ≥ 50 mg/dL (women) Non-HDL (Cholesterol) < 130 mg/dL Non-HDL (Cholesterol) < 100 mg/dL (for **very** high risk) LDL < 100 mg/dL (optimal goal without overt CVD) LDL < 70 mg/dL (optimal goal with overt CVD)	*Children*: After age 2 then follow AAP and or NHLBI Guidelines *Adults*: Annually, except for those with low risk repeat every 2 years. If abnormal, follow NCEP III guidelines.
	• Start statin with ongoing lifestyle changes	Adults with overt CVD; Age > 40 yrs without CVD and one or more risk factors for CVD; < age 40 individualize
	• Check blood pressure, Adult goal: < 130/80 mmHg ✦ (limit total sodium to < 1500 mg/day)	*Children*: Each focused visit; follow National High Blood Pressure Education Program recommendations for Children and Adolescents *Adults*: Each office visit
	• Assess smoking/tobacco use status	Each office visit; (5As: Ask, Advise, Assess, Assist, Arrange)
	• Start aspirin therapy (unless contraindicated)	Age > 50 yrs for most men and > 60 yrs for most women with diabetes and at least one other major risk factor; Men ≤ 50 yrs, and women ≤ 60 yrs, individualized based on risk
Kidney Care	• Check albumin/ creatinine ratio for microalbuminuria using a random urine sample; Goal < 30 mg/g	*Type 1*: 5 years after diagnosis, then annually *Type 2*: At diagnosis, then annually
	• Check serum creatinine to estimate GFR and stage CKD	At diagnosis, then annually
	• Perform routine urinalysis	At diagnosis, then as indicated
Eye Care	• Dilated and comprehensive eye exam by an ophthalmologist or optometrist	*Type 1*: If age ≥ 10 yrs within 5 years after diagnosis, then annually *Type 2*: At diagnosis, then annually; every 2-3 years with one or more normal exams Two exceptions exist
Neuropathies and Foot Care	• Assess/screen for neuropathy (autonomic and DPN)	*Type 1*: Five years after diagnosis, then annually *Type 2*: At diagnosis, then annually
	• Visual inspection of feet with shoes and socks off	Each focused visit; stress daily self-exam
	• Perform comprehensive lower extremity/foot exam	At diagnosis, then annually
	• Screen for PAD (consider ABI)	At diagnosis, then annually
Oral Care	• Simple inspections of gums and teeth for signs of periodontal disease	At diagnosis, then each focused visit
	• Dental exam by general dentist or periodontal specialist	At diagnosis, then individualize based on an oral assessment and risk as more often may be needed
Emotional and Sexual Health Care	• Assess emotional health; screen for depression	Each focused visit
	• Assess sexual health concerns	Each focused visit
Communicable Diseases Prevention	• Provide influenza vaccine	Annually, if age ≥ 6 months
	• Provide pneumococcal vaccine	Once; then per Advisory Committee on Immunization Practices
	• Provide Hepatitis B series	Once at diagnosis for age 19 - 59 years of age; individualize for ≥ 60 years of age
	• Screen for Turberculosis infection or disease	As needed
Preconception, Pregnancy, and Postpartum Care	• Ask about reproductive intentions/assess contraception	At diagnosis and then every visit ◈
	• Provide preconception counseling/assessment	3 – 4 months prior to conception ◈
	• Screen for undiagnosed type 2 diabetes in women with known risk	At first prenatal visit ◈
	• Screen for GDM in all women not known to have diabetes	At 24 – 28 weeks gestation ◈
	• Screen for type 2 diabetes in women who had GDM	At 6 – 12 weeks postpartum then at least every 3 years lifelong
Assessing Risk and Prevention of Type 2 Diabetes	• Check A1C test, fasting plasma glucose test, or oral glucose tolerance test	Test all adults ≥ age 45 yrs or with BMI ≥ 25 kg/m2 and one other risk factor. If normal, retest in 3 years or less. (see Quick Reference: Test Criteria: Type 2 diabetes in children and adolescents)
	• Assess lifestyle management and diabetes risk status	At each visit; refer to evidenced-based prevention resources as indicated

❖ Consider more often and/or if A1C is ≥ 7.0% and/or individual risk and/or complications exist or less often if at goal and individual risk and or complication do not exist
◈ Consider referring to provider experienced in care of women with diabetes during pregnancy
✦ More or less stringent Blood Pressure goals must be individualized if < 130/80 is not reasonable to achieve

Diabetes Types/Classifications

Type/Classification	Definition
Type 1 Diabetes	Type 1 diabetes was formerly known as insulin-dependent diabetes mellitus (IDDM), juvenile/childhood-onset diabetes, adult-onset type 1 diabetes, and ketosis-prone diabetes (beta-cell destruction commonly leading to absolute insulin deficiency). Approximately 5-10% of people with diabetes have type 1 diabetes. Type 1 diabetes is usually diagnosed before the age of 30.
Type 2 Diabetes	Type 2 diabetes (formerly known as non-insulin-dependent or adult-onset diabetes) is usually diagnosed after the age of 40. Type 2 diabetes is increasingly being diagnosed in young adults and children. Type 2 diabetes is the most common type of diabetes. Insulin resistance is a distinguishing feature of type 2 diabetes.
Monogenic Diabetes	Monogenic diabetes is a rare form of diabetes resulting from an inherited gene mutation change. There are two main forms: Maturity-onset of the Young (MODY) and Neonatal Diabetes. MODY is the most common form occurring in children and adolescents. Neonatal diabetes is rare and usually occurs in the first six months of life. These forms of diabetes can be mistakenly diagnosed as type 1 or type 2 diabetes. A combination of genetic testing and an assessment of clinical factors can assist with proper diagnosis and guide appropriate treatment as some of these people can be successfully treated with sulfonylureas instead of insulin. Additional information can be found at: www.ispad.org.
Gestational Diabetes (GDM)	Gestational diabetes is a condition unique to pregnancy. Blood glucose levels are elevated because of insufficient insulin production and or insulin resistance in the mother. Women who have had gestational diabetes are at greater risk of developing type 2 diabetes.
Pre-Diabetes	Pre-diabetes is a condition in which blood glucose levels are higher than normal but not high enough for a diagnosis of type 2 diabetes. People with pre-diabetes have increased risk for developing type 2 diabetes in the future. Categories of increased risk are: 1) fasting plasma glucose (FPG) of 100-125 mg/dL, referred to as impaired fasting glucose (IFG), 2) oral glucose tolerance (OGTT) 2-hour result of 140-199 mg/dL, referred to as impaired glucose tolerance (IGT), and 3) A1C of 5.7-6.4%.
Other Types of Diabetes	Other specific types of diabetes exist due to various causes (e.g., genetic abnormality in beta-cell function and insulin action, other diseases of the exocrine pancreas such as cystic fibrosis and drug or chemical induced). For a detailed list of etiological classifications of diabetes mellitus, see page 65 of the 2012 *ADA Clinical Practice Recommendations.*

Tests to Diagnose Diabetes

Four tests are available to diagnose diabetes. The chart below indicates how each test is performed, normal test results, and abnormal results indicating a diagnosis. For more on who to test and how often, see *Section 13: Assessing Risk and Prevention of Type 2 Diabetes*.

Test	Hemoglobin (A1C)⊙	Fasting Plasma Glucose (FPG)	Oral Glucose Tolerance Test (OGTT)	Random/Casual Plasma Glucose (with symptoms)
How Performed	Measured at anytime regardless of eating.⊙	Must be measured after at least an 8 hour fast	75-gram glucose load (drink) is ingested after at least an 8 hour fast; blood glucose is measured at 2 hours	Can be measured at any time regardless of eating
Normal	≤5.6 %	< 100 mg/dL (< 5.6 mmol/L)	< 140 mg/dL (< 7.8 mmol/L)	
Diabetes Mellitus	≥ 6.5%❖	≥ 126 mg/dL❖ 7.0 mmol/L	≥ 200 mg/dL❖ (≥ 11.1 mmol/L)	≥ 200 mg/dL ⌘ (≥ 11.1 mmol/L) (with symptoms)

Adapted from: *American Diabetes Association Clinical Practice Recommendations, 2012*

⊙A1C levels when performed using the National Glycohemoglobin Standardization Program (NGSP) method and standardized to the Diabetes Control and Complications Trial (DCCT) reference assay, *not* point-of-care testing

❖In the absence of high blood glucose signs and symptoms test should be repeated to confirm diagnosis, preferable using same test

⌘ It is not appropriate to have a person eat a meal and then draw a random glucose two hours after

Test Criteria: Type 2 Diabetes in Children and Adolescents

The chart below provides information on testing for type 2 diabetes in asymptomatic children and adolescents.

Criteria for Testing	
• Overweight (BMI > 85th percentile for age and sex, weight for height > 85th percentile, or weight > 120% of ideal for height)	
Plus any two of the following risk factors:	
• Family history of type 2 diabetes in first- or second-degree relative • Race/ethnicity (e.g., Native American, African American, Hispanic/Latino, Asian American, and Pacific Islander) • Signs of insulin resistance or conditions associated with insulin resistance (e.g., acanthosis nigricans, hypertension, dyslipidemia, PCOS, or small for gestational-age birth weight) • Maternal history of diabetes or GDM during the child's gestation	
Age of initiation:	age 10 years or at onset of puberty if puberty occurs at a younger age
Frequency:	every 3 years
Test:	FPG, OGTT, A1C

Adapted from: *American Diabetes Association Clinical Practice Recommendations, 2012*

Other Tests: Points to Consider

C-peptide Test

- C-peptide is an assessment of endogenous insulin secreted in the absence of very high glucose levels.
- When glucose toxicity is present, the C-peptide level may be low when in fact there is still adequate beta-cell reserve.
- A C-peptide level does not help determine if a person has type 1 or type 2 diabetes.
- The C-peptide test should not be used to decide when to start insulin therapy.
- The lab report should include the specific reference range for the test result.
- C-peptide can accumulate in the setting of renal disease; therefore, the test can be inaccurate.
- The Centers for Medicare and Medicaid Services (CMS) may require a fasting glucose test and C-peptide test for insulin pump approval.

Glutamic Acid Decarboxylase Antibodies (GAD) Test

- GAD antibodies have been found to be more specific than C-peptide or islet cell antibodies in assessing relative or absolute insulin deficiency.
- A GAD test may assist with determining type of diabetes and early appropriate therapy.
- The GAD65 and GADA tests are more specific and sensitive, especially in non-obese adults.
- The Centers for Medicare and Medicaid Services (CMS) may require a GAD test for insulin pump approval.

Insulin Level Test

- An insulin level is not a valuable test for diagnosis of diabetes.
- May be used in some specific cases such as polycystic ovary syndrome (PCOS).

Diabetes-Related International Classification of Diseases-9 (ICD-9) Codes

This table lists several diabetes-related International Classification of Diseases-9 (ICD-9) codes including: impaired fasting glucose, metabolic syndrome, and pre-diabetes.

Condition	ICD-9 Code
Abnormal glucose *Excludes:* *diabetes mellitus (250.00-250.93)* *dysmetabolic syndrome X (277.7)* *gestational diabetes (648.8)* *glycosuria (791.5)* *hypoglycemia (251.2)* *that complicating pregnancy, childbirth, or the puerperium (648.8)* (There are codes below this one [790.21, 790.22, 790.29] that define this diagnosis in greater detail; do not use 790.2 on a reimbursement claim.)	790.2
Impaired fasting glucose *Elevated fasting glucose*	790.21
Impaired glucose tolerance test (oral) *Elevated glucose tolerance test*	790.22
Other abnormal glucose *Abnormal glucose NOS* *Abnormal non-fasting glucose* *Hyperglycemia NOS* *Pre-diabetes NOS*	790.29
Metabolic Syndrome (dysmetabolic syndrome X) *Use additional code for associated manifestation, such as:* *cardiovascular disease (414.00-414.07)* *obesity (278.00-278.01)*	277.70
Polycystic Ovaries *Isosexual virilization Stein-Leventhal syndrome*	256.4

NOS = Not otherwise specified

Summary of Research: Landmark National and International Research Studies Impacting Diabetes Care

Diabetes Control and Complications Trial (DCCT)	The DCCT was a 10-year clinical study funded by the National Institute of Diabetes, Digestive, and Kidney Diseases and included 1,441 volunteers with type 1 diabetes. This study conclusively demonstrated that tight glycemic control (in the intensively-treated group) delayed the onset of microvascular complications and slowed progression of complications already present. Results included a 76% reduced risk of diabetic retinopathy, a 50% reduced risk of nephropathy, and a 60% reduced risk of neuropathy. Benefits of tight glycemic control were seen for all participants regardless of age, sex, duration of diabetes, and history of poor or good control. Factors that enhanced care included: a physician-coordinated team approach to a complex, chronic disease; an emphasis on preventive care, education, intensive monitoring, increased intervention, and frequent follow-up; and access to consultation with specialists, such as endocrinologists, ophthalmologists, podiatrists, and dentists. For more information, go to the following links: http://diabetes.niddk.nih.gov/dm/pubs/control/ http://content.nejm.org/cgi/content/short/353/25/2643
United Kingdom Prospective Diabetes Study (UKPDS)	This prospective, multicenter, randomized controlled study of 5,102 newly diagnosed people with type 2 diabetes showed significant reduction in microvascular, but NOT macrovascular disease, with intensive control of blood glucose. In addition, this study evaluated tight blood pressure control and documented reduced microvascular complications and improved morbidity with a decrease seen in the incidence of congestive heart failure (CHF) and cardiovascular accident (CVA). Of further importance, nearly 50% of participants had one or more complications of diabetes at diagnosis, emphasizing the need for early diagnosis and treatment of diabetes. For more information, go to the following link: http://www.ncbi.nlm.nih.gov/pubmed/9742976
Diabetes Prevention Program (DPP)	This large clinical trial demonstrated that modest weight loss (5-7% of initial body weight) and regular physical activity resulted in a 58% reduction in the development of type 2 diabetes in persons at risk for the disease. These impressive results were obtained in all ethnic groups and especially for people over age 60 years. For more information, go to the following link: http://diabetes.niddk.nih.gov/dm/pubs/preventionprogram/
Action to Control Cardiovascular Risk in Diabetes (ACCORD)	This multicenter clinical trial sponsored by the National Heart, Lung and Blood Institute (NHLBI) with over 10,000 participants was the first trial to create controversy in the medical community regarding achievement of intensive glucose control. Results were released in 2008 when the glucose arm of this study was stopped based on increased all-cause mortality in adults with type 2 diabetes at high risk for heart attack and stroke. Intensive glucose control in these subjects did not reduce risk of major cardiovascular events. Data from the blood pressure and lipid control arms of this study were released in 2010. Intensive blood pressure control (to lower-than-standard guidelines) reduced risk of stroke, but was not shown to reduce risk of cardiovascular (CV) events or CV death. Lipid control was also evaluated with attention to comparison of use of statins alone, placebo, and statins plus fibrates. For more information, go to the following links: https://www.accordtrial.org/public/index.cfm?CFID=603757&CFTOKEN=9ecbc983c467fed3-34526245-03F4-68EC-BC0649BB33701EB7 http://content.nejm.org/cgi/content/full/NEJMoa0802743?query=TOC
Epidemiology of Diabetes Interventions and Complications (EDIC)	The EDIC study is a follow-up study of more than 90% of the DCCT participants. Experts will use this information to evaluate the incidence and predictors of diabetes and cardiovascular complications (eye, kidney, and nerve complications, as well as heart attack, cardiovascular accident, and heart surgery). The EDIC study also will study intensive control in evaluating cost effectiveness and impact on quality of life. For more information, go to the following link: http://diabetes.niddk.nih.gov/dm/pubs/control/

Summary of Research: Landmark National and International Research Studies Impacting Diabetes Care (continued)

Rosiglitazone Evaluated for Cardiovascular Outcomes in Oral Agent Combination Therapy for Type 2 Diabetes (RECORD)	The RECORD study is a randomized clinical trial sponsored by GlaxoSmithKline of 4,447 people with type 2 diabetes on metformin or a sulfonylurea. Participants were randomized to one of five multi-drug therapy protocols. Researchers found that rosiglitazone did not increase the overall risk of cardiovascular morbidity or mortality. Increased risk of heart failure and some fractures (mainly in women) were seen in participants randomized to rosiglitazone. For more information, go to the following links: http://clinicaltrials.gov/ct2/show/NCT00379769 http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(09)60953-3/abstract
Action in Diabetes and Vascular Disease: Preterax and Diamicron Modified Release Controlled Evaluation (ADVANCE)	The ADVANCE Clinical Trial included over 11,000 high-risk people with type 2 diabetes from 215 clinical centers in 20 countries. In addition to evaluating tight control of blood glucose and blood pressure, ADVANCE also included sub-studies to evaluate heart and eye function after intervention, cost-effectiveness and quality of life, and genetic factors. Data from this trial contrasts with ACCORD data, in that it provides no evidence of increased risk of death with intensive diabetes control (goal A1C ≤ 6.5%). Results demonstrated that aggressive blood pressure control (with Perindopril and Indapamide) – even in normotensive patients – led to improved survival and reduced renal and coronary events. For more information, go to the following links: http://www.advance-trial.com/static/html/prehome/prehome.asp http://content.nejm.org/cgi/reprint/358/24/2560.pdf
Prospective Pioglitazone Clinical Trial in Macrovascular Events (PROactive)	This cardiovascular outcomes study of 5,238 persons with type 2 diabetes compared the addition of pioglitazone or placebo in patients already being treated for type 2 diabetes. The cardiovascular end point was major adverse cardiovascular events (MACEs). In persons with advanced type 2 diabetes at high risk for cardiovascular events, pioglitazone-treated patients had significant risk reductions in MACE end points to three years. For more information, go to the following link: http://www.ncbi.nlm.nih.gov/pubmed/18371481
A Diabetes Outcome Progression Trial (ADOPT)	The ADOPT study is a randomized, double-blind which investigated the effectiveness of three oral antidiabetic agents in treating type 2 diabetes and their influence for preventing progression of the risk factors related to long-term complications. Monotherapy with Rosiglitizone maintained glycemic control and progression of pathophysiological abnormalities compared to metformin or glyburide. For more information, go to the following link: http://care.diabetesjournals.org/content/25/10/1737.fullpdf+html
Diabetes Reduction Assessment with Ramipril and Rosiglitazone Medication (DREAM)	This clinical trial evaluated the likelihood of progression of type 2 diabetes over a three-year period among 5,269 people with pre-diabetes. The trial reduced the risk of developing type 2 diabetes by 62 percent relative to placebo among people at high risk of developing type 2 diabetes. The DREAM did not show that Ramipril prevents type 2 diabetes in population tested; however, it did demonstrate an effect on regression to normal glucose levels. Results suggest that Ramipril may have favorable effects on glucose metabolism, a finding that is constant with other reports on studies of ACE inhibitors (when used for established indicators). For more information, go to the following link: http://www.ameinfo.com/99017.html

Tools

The "tools section" provides useful material for providers as well as consumers. Information compiled here is intended to augment individual best practice guidelines by helping to inform and guide diabetes care. These tools should be tailored using individual training, background, and clinical judgment and those using these tools are responsible for appropriate use. (Supporting references for these tools are included at the end of each section in this document.)

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PRESCRIPTION TEMPLATE: PRACTICE PREVENTION

PRACTICE PREVENTION:
IT WORKS!

Name: _____ Date: _____

℞ for Prevention

Follow-up: _____

Signatures: _____ (Provider) _____ (Patient)

PRACTICE PREVENTION:
IT WORKS!

Name: _____ Date: _____

℞ for Prevention

Follow-up: _____

Signatures: _____ (Provider) _____ (Patient)

PRACTICE PREVENTION:
IT WORKS!

Name: _____ Date: _____

℞ for Prevention

Follow-up: _____

Signatures: _____ (Provider) _____ (Patient)

PRACTICE PREVENTION:
IT WORKS!

Name: _____ Date: _____

℞ for Prevention

Follow-up: _____

Signatures: _____ (Provider) _____ (Patient)

BODY MASS INDEX (BMI) TABLE FOR ADULTS

Body Mass Index Table

	Normal						Overweight					Obese										Extreme Obesity														
BMI	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**
Height (inches)	**Body Weight (pounds)**																																			
58	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167	172	177	181	186	191	196	201	205	210	215	220	224	229	234	239	244	248	253	258
59	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173	178	183	188	193	198	203	208	212	217	222	227	232	237	242	247	252	257	262	267
60	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179	184	189	194	199	204	209	215	220	225	230	235	240	245	250	255	261	266	271	276
61	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185	190	195	201	206	211	217	222	227	232	238	243	248	254	259	264	269	275	280	285
62	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191	196	202	207	213	218	224	229	235	240	246	251	256	262	267	273	278	284	289	295
63	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197	203	208	214	220	225	231	237	242	248	254	259	265	270	278	282	287	293	299	304
64	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204	209	215	221	227	232	238	244	250	256	262	267	273	279	285	291	296	302	308	314
65	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210	216	222	228	234	240	246	252	258	264	270	276	282	288	294	300	306	312	318	324
66	118	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216	223	229	235	241	247	253	260	266	272	278	284	291	297	303	309	315	322	328	334
67	121	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223	230	236	242	249	255	261	268	274	280	287	293	299	306	312	319	325	331	338	344
68	125	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230	236	243	249	256	262	269	276	282	289	295	302	308	315	322	328	335	341	348	354
69	128	135	142	149	155	162	169	176	182	189	196	203	209	216	223	230	236	243	250	257	263	270	277	284	291	297	304	311	318	324	331	338	345	351	358	365
70	132	139	146	153	160	167	174	181	188	195	202	209	216	222	229	236	243	250	257	264	271	278	285	292	299	306	313	320	327	334	341	348	355	362	369	376
71	136	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250	257	265	272	279	286	293	301	308	315	322	329	338	343	351	358	365	372	379	386
72	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250	258	265	272	279	287	294	302	309	316	324	331	338	346	353	361	368	375	383	390	397
73	144	151	159	166	174	182	189	197	204	212	219	227	235	242	250	257	265	272	280	288	295	302	310	318	325	333	340	348	355	363	371	378	386	393	401	408
74	148	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272	280	287	295	303	311	319	326	334	342	350	358	365	373	381	389	396	404	412	420
75	152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	279	287	295	303	311	319	327	335	343	351	359	367	375	383	391	399	407	415	423	431
76	156	164	172	180	189	197	205	213	221	230	238	246	254	263	271	279	287	295	304	312	320	328	336	344	353	361	369	377	385	394	402	410	418	426	435	443

Source: Adapted from *Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults: The Evidence Report.*

GROWTH CHART: BOYS BODY MASS INDEX-FOR-AGE PERCENTILES, 2 TO 20 YEARS

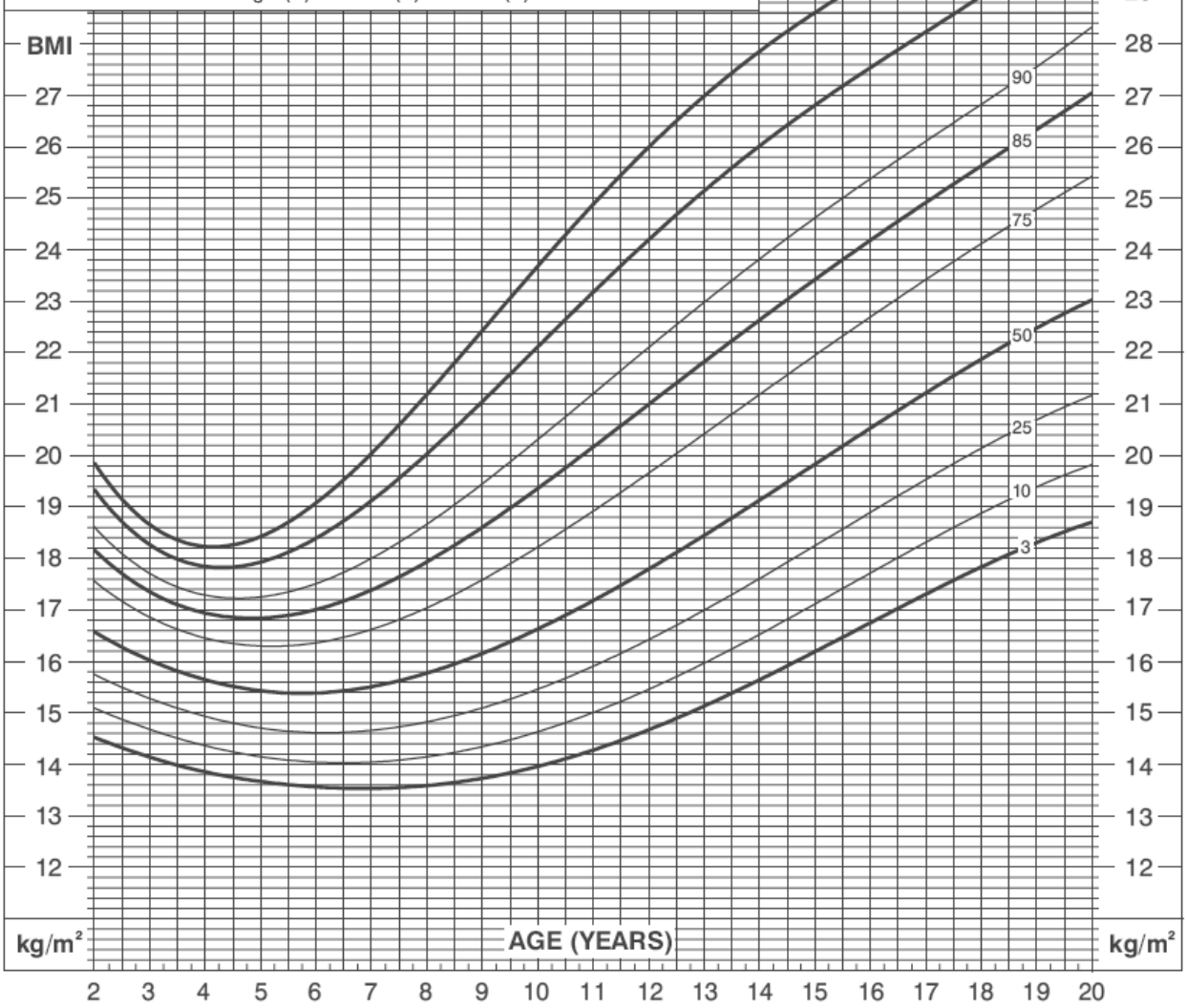
2 to 20 years: Boys
Body mass index-for-age percentiles

NAME _____

RECORD # _____

Date	Age	Weight	Stature	BMI*	Comments

***To Calculate BMI:** Weight (kg) ÷ Stature (cm) ÷ Stature (cm) x 10,000
or Weight (lb) ÷ Stature (in) ÷ Stature (in) x 703



Published May 30, 2000 (modified 10/16/00).
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).
http://www.cdc.gov/growthcharts

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GROWTH CHART: GIRLS BODY MASS INDEX-FOR-AGE PERCENTILES, 2 TO 20 YEARS

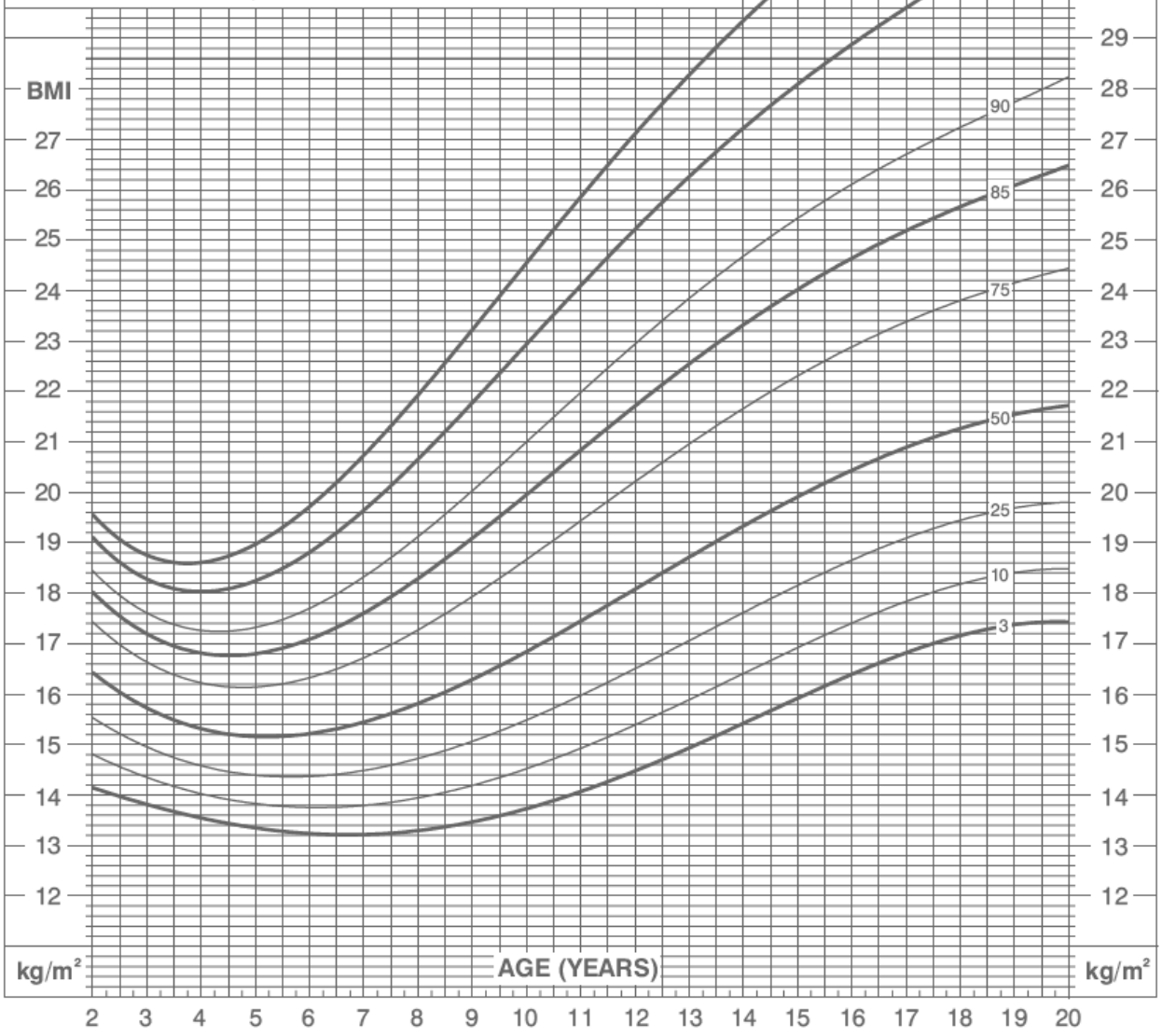
2 to 20 years: Girls
Body mass index-for-age percentiles

NAME _____

RECORD # _____

Date	Age	Weight	Stature	BMI*	Comments

***To Calculate BMI**: Weight (kg) ÷ Stature (cm) ÷ Stature (cm) x 10,000
or Weight (lb) ÷ Stature (in) ÷ Stature (in) x 703



Published May 30, 2000 (modified 10/16/00).
SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).
http://www.cdc.gov/growthcharts

CDC
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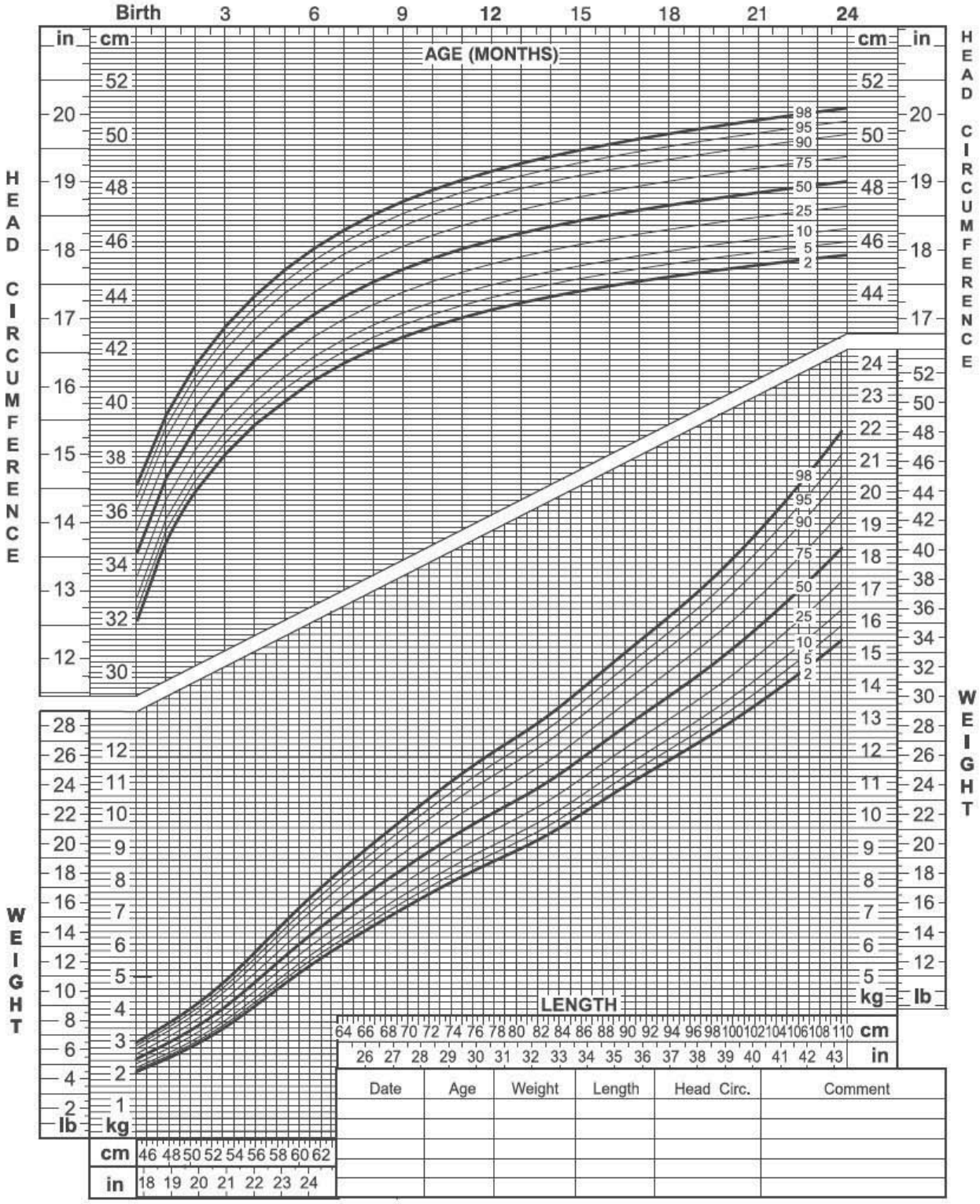
GROWTH CHART: BOYS WEIGHT-FOR PERCENTILES, BIRTH TO 24 MONTHS

Birth to 24 months: Boys
Head circumference-for-age and
Weight-for-length percentiles

NAME _____

RECORD # _____



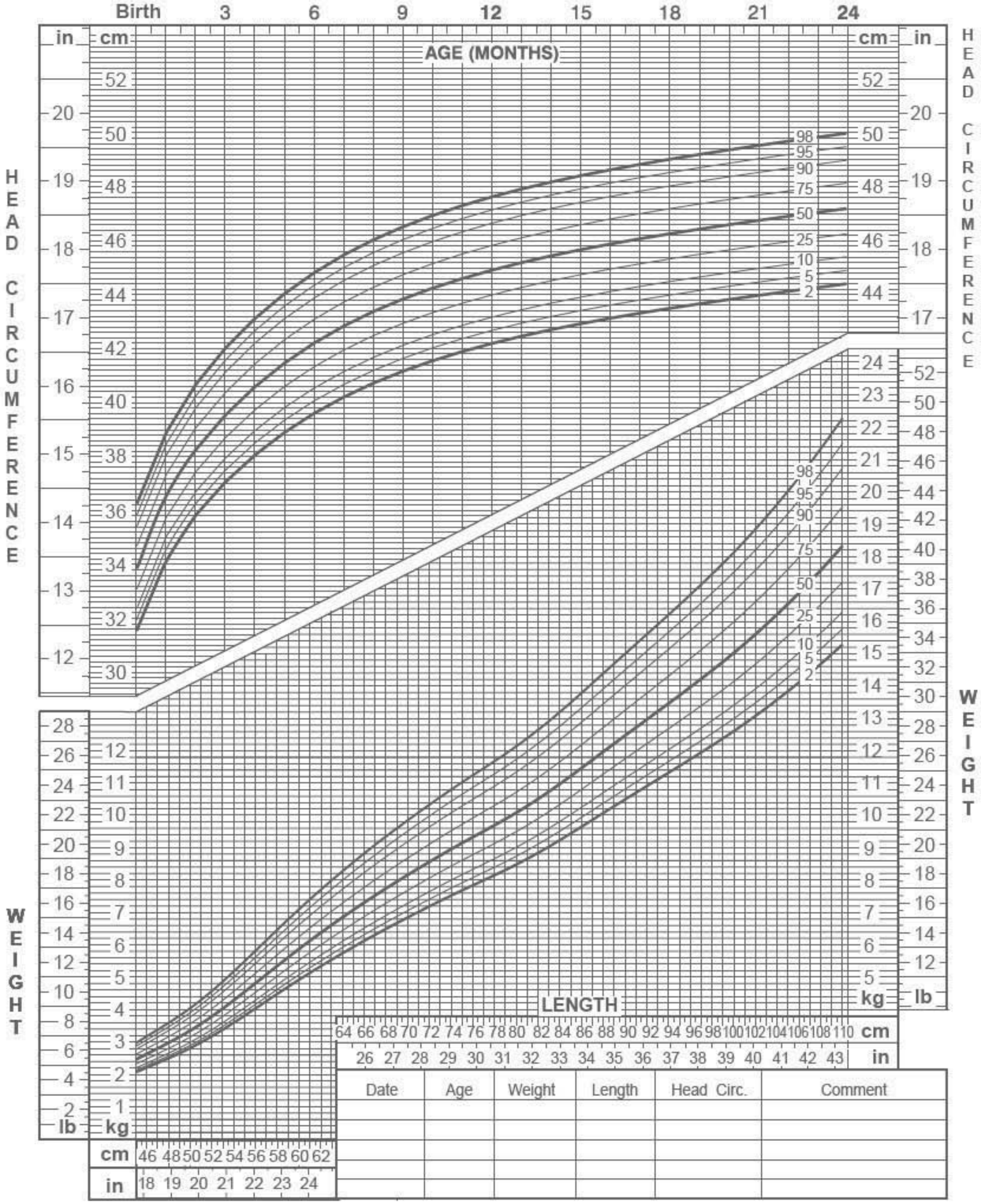
Published by the Centers for Disease Control and Prevention, November 1, 2009
SOURCE: WHO Child Growth Standards (http://www.who.int/childgrowth/en)

GROWTH CHART: GIRLS WEIGHT-FOR-LENGTH PERCENTILES, BIRTH TO 24 MONTHS

Birth to 24 months: Girls
Head circumference-for-age and
Weight-for-length percentiles

NAME _____

RECORD # _____

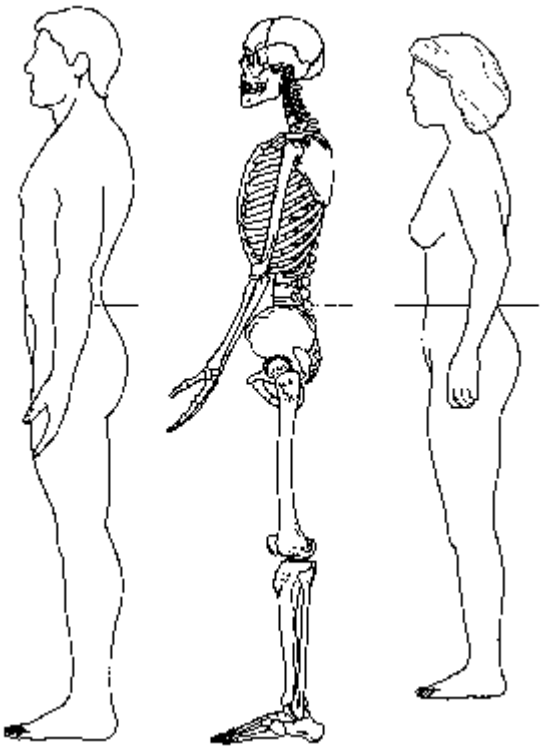


Published by the Centers for Disease Control and Prevention, November 1, 2009
SOURCE: WHO Child Growth Standards (http://www.who.int/childgrowth/en)

WAIST CIRCUMFERENCE MEASUREMENT AND RISK ASSESSMENT

Although waist circumference and body mass index (BMI) are interrelated, waist circumference provides an independent prediction of risk over and above that of BMI. Waist circumference measurement is particularly useful in patients who are categorized as normal or overweight on the BMI scale. At a BMI ≥ 35 kg/m^2, waist circumference has little added predictive power of disease risk beyond that of BMI. It is therefore not necessary to measure waist circumference in individuals with a BMI ≥ 35 kg/m^2.

Measuring Tape Position for Waist (Abdominal) Circumference

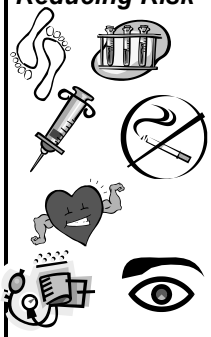


The waist circumference at which there is an increased relative risk is defined as follows. Waist circumference cutpoints lose their incremental predictive power in patients with a BMI ≥ 35 kg/m^2 because these patients will exceed the cutpoints noted below. Lower thresholds for waist circumference have been recommended for Asian populations by the World Health Organization due to recent research findings.

HIGH RISK	
Men: > 102 cm (> 40 in) Women: > 89 cm (> 35 in)	Asian Men: > 89 cm (> 35 in) Asian Women: > 79 cm (> 31 in)

Source: www.nhlbi.nih.gov

DIABETES SELF-MANAGEMENT BEHAVIOR GOALS WITH GRAPHICS

Self-Management Goals	*Choose a goal(s) that is realistic and obtainable. Use the extra space to personalize your goal(s).*	*Follow-up Date/Comment*
Goal 1: ***Be Active***	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____
Goal 2: ***Healthy Eating***	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____
Goal 3: ***Taking Medicine***	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____
Goal 4: ***Monitoring***	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____
Goal 5: ***Problem Solving***	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____
Goal 6: ***Reducing Risk*** 	*I will decrease my risk of complications through these preventive care goals:* ❑ Lower or maintain my A1C at _____. ❑ Get a dilated eye exam ❑ Have a fasting lipid panel ❑ Check my kidney function ❑ Stop tobacco use ❑ See my provider every 3 to 6 months ❑ Have my blood pressure checked each visit ❑ Get a flu shot each year and pneumonia shot ❑ Check my own feet daily List additional goal:_____	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____
Goal 7: ***Healthy Coping***	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____

DIABETES SELF-MANAGEMENT BEHAVIOR GOALS WITHOUT GRAPHICS

Self-Management Goals	*Choose a goal(s) that is realistic and obtainable. Use the extra space to personalize your goal(s).*	*Follow-up Date/Comment*
Goal 1: ***Be Active***	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____
Goal 2: ***Healthy Eating***	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____
Goal 3: ***Taking Medicine***	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____
Goal 4: ***Monitoring***	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____
Goal 5: ***Problem Solving***	_____ _____ _____ _____ _____	_____ _____ _____ _____ _____
Goal 6: ***Reducing Risk***	*I will decrease my risk of complications through these preventive care goals:* ❑ Lower or maintain my A1C at _____. ❑ Get a dilated eye exam ❑ Have a fasting lipid panel ❑ Check my kidney function ❑ Stop tobacco use ❑ See my provider every 3 to 6 months ❑ Have my blood pressure checked each visit ❑ Get a flu shot each year and pneumonia shot ❑ Check my own feet daily List additional goal:_____	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____
Goal 7: ***Healthy Coping***	_____ _____ _____ _____	_____ _____ _____ _____

FOLLOW-UP INSTRUCTION FORM FOR A PERSON WITH DIABETES

Name:_____ **Date:** _____

Provider:_____ **Educator:**_____

Goals:

1. _____

_____

2. _____

_____

Medicine Changes:

1. _____

2. _____

3. _____

4. _____

5. _____

Blood Sugar Testing:

DATE	BEFORE BREAKFAST	AFTER BREAKFAST	BEFORE LUNCH	AFTER LUNCH	BEFORE DINNER	AFTER DINNER	BEDTIME	2 TO 3 AM

Call (_____) or fax (_____) your blood sugars on (_____)
clinic phone clinic fax date

When you fax or phone in blood sugars, please give us a phone number so that we can call you.

Phone number _____

Health Literacy Universal Precautions Toolkit
AHRQ Pub. No. 10-0046-EF
Available at: http://www.nchealthliteracy.org/toolkit/tool6A.doc

COMPLEMENTARY PROGRAMS TO SUPPORT SELF-MANAGEMENT FOR PEOPLE WITH DIABETES

The evidenced-based Stanford Chronic Disease Self-Management Program (CDSMP) known as ***Living Well with Chronic Conditions*** in Wisconsin compliments the American Diabetes Association Diabetes Self-Management Education (DSME) Program. The differences between these two programs are explained below.

DSME	CDSMP
Specific to diabetes	Addresses all chronic conditions
Participants all have diabetes	Participants have a variety of chronic conditions
Focuses on knowledge, skills and problem solving	Focuses on problem solving/action planning
Is content-oriented	Is process-oriented
Professional educators	Lay person who has chronic condition
Focuses on medical management and self-management of disease	Focuses on management of lifestyle behaviors and integrates emotional aspects
10 hours (1-2 hours individual counseling; 8-9 hours in group)	15 hours, all in group (2.5 hours/week for 6 weeks)
Standard content for ADA recognized DSME programs to implements national standards	Content scripted with no deviation; timed processes for each session
Content areas: • Diabetes disease process and treatment options • Incorporating nutrition management, physical activity, and utilizing medication(s)/insulin • Monitoring blood glucose and using results to self-manage and improve control • Preventing, detecting, and treating acute and chronic complications • Goal setting and problem solving • Integrating psychosocial adjustment • Preconception care and management during pregnancy (if applicable)	Content areas: • Anger, frustration, fear, stress, anxiety • Techniques to deal with problems such as fatigue, pain, and isolation • Appropriate physical activity for strength, flexibility, and endurance • Using medications appropriately • Communicating effectively with family, friends, and health professionals • Overcoming barriers to healthful eating • Evaluating new treatments

DSME addresses more content in fewer hours, typically engaging people soon after diabetes is diagnosed. Hence, the focus is on gaining knowledge/skills for diabetes self-management and solving problems. DSME and CDSMP complement each other, and provide disease-specific knowledge and skills along with practical problem-solving and action planning.

CDSMP is a good complement to the ADA recognized DSME programs because people who have diabetes typically have other chronic conditions and stressful issues at home competing for their time and attention. Compared to diabetes “support” groups, the CDSMP has more structure and accountability.

Adapted from Vermont Department of Health 3/17/05

DIABETES SELF-MANAGEMENT EDUCATION RECORD

NAME: _____ DATE: _____/_____/_____

Diabetes Type (check): ☐Type 1 ☐Type 2 ☐Pre-diabetes ☐Preconception ☐Pregnancy ☐Gestational

INITIAL VISIT (Date):	**CHANGES IN READINESS/BARRIERS** (Date, Initials, Comments)			
☐ Yes ☐ No Demonstrates ability to understand. ☐ Yes ☐ No Asking questions. ☐ Yes ☐ No Indicates need for clarification. Instructions Given to: _____ ☐ Individual Education ☐ Group Education ☐ Class				

BARRIERS TO SELF-CARE/LEARNING/LIMITATIONS:			**CHANGES IN READINESS/BARRIERS** (Date, Initials, Comments)			
☐ None Identified	☐ Hearing	☐ Physical				
☐ Cultural/Religious	☐ Psychosocial	☐ Speech				
☐ Emotional	☐ Literacy	☐ Visual				
☐ Lack of desire to learn	☐ Cognitive	☐ Financial				

LEARNING NEEDS: (Document those that apply on the lines below.)

Teaching Activity Key (TAK)		**Pre-Program Assessment/Post-Program Outcome Codes**
I = Instructed	AV = Audiovisual	+ Yes, verbalizes understanding or performs skill
R = Review/Reinstruct	D = Demonstrated	- No, unable to verbalize/perform skill
H = Handout		* See comments/note

Topic/Outcome Verbalizes/demonstrates	Pre-Program Assessment code/initial/date	Teaching Activity Key (code/initial/dates) Initial	Reinforce	Reinforce	Reinforce	Post-Program Outcomes code/initial/date	Comments
A. Disease Process and Overview							
Definition, types, diagnostic criteria							
Causes, risk factors, symptoms							
Self-management education/MNT/DSME							
Treatment options and need for control							
Importance of diabetes control, ongoing education, and possible treatment changes							
B. Psychosocial							
Effect of stress on blood glucose							
Healthy coping strategies							
Community resources and support systems							
Depression risk screening							
C. Nutrition*							
Effect of timing, amt, and type of carb on BG							
Effect of weight status							
Strategies for weight management							
Understanding of personalized meal plan							
Nutrition strategies for lipid, BP management							
Understanding of nutrition labels in meal planning							
Effects of alcohol on BG (hypoglycemia)							
Understanding of healthy food prep (cooking methods, recipe modification)							
Healthy dining out practices							
Skills for adapting meal plan to altered meal times, travel, holidays, sick days, schedule changes, unplanned physical activity							
Understanding of nutritional/herbal supplements on diabetes control							
D. Physical Activity							
Effects of physical activity on BG (general health benefits)							
Develop a physical activity plan/goals (types, frequency, duration, intensity)							
Guidelines for a safe activity (stress test, hypoglycemia prevention)							
Adjusting food and BG testing for planned or unplanned activity							

E. Medication – Insulin*/Oral Medication(s)/Other Injectables							
Insulin (type, dose, schedule, action, preparation, injection technique, delivery devices, side effects)							
Storage of insulin and disposal of sharps							
Pattern management							
Pre-meal correction bolus; insulin:carb ratio							
Insulin adjustments/supplements (meals, activity, changes, travel, surgery)							
Basic pump information							
Oral medication(s) (name, dose, action, schedule, side effects)							
OTC medications							
Other injectables							
F. Monitoring*							
Blood Glucose (purpose, testing times, care of meter/strips, correct technique, log, meter Q/A, alternative site testing, lancet disposal)							
Blood glucose targets: _____							
Factors affecting BG levels							
Action for results outside target range							
A1C (define, state goal, test schedule)							
Urine Ketone Testing (why, when, how)							
G. Acute complications* (prevent, detect, treat)							
Hypoglycemia (risk, causes, signs, symptoms, treatment, prevention)							
Hypoglycemia unawareness							
Problem solving: contact MD/diabetes team							
Glucagon (prescription); support person instructed _____							
Safe driving practices; need for medical ID use							
Hyperglycemia (risk, causes, signs, symptoms, treatment, prevention)							
Sick Day (effect of illness on BG and guidelines for sick day self-care)							
Problem solving: contacting medical provider							
H. Chronic Complications (prevent, detect, treat)							
Risk reduction strategies (controlling BG and HTN, smoking cessation, increased activity, diet, wt/BMI reduction)							
DM-focused visits every 3-6 months							
Tests (A1C, lipids, albumin/creatinine ratio, eGFR)							
Annual dilated eye (with drops in eyes)							
Dental visits and proper oral health care							
Annual comprehensive lower extremity exam							
Teach self-foot exam, routine foot care/foot wear; S/S of problems/infection and contact MD/team							
Immunizations							
Skin care/hygiene							
I. Goal setting and problem solving							
Problem solving strategies							
Behavior change strategies							
Personal self-care goals (AADE7™)							
J. Preconception care/pregnancy/gestational							
Preconception counseling/care, good BG control							
BG control prior to conception and during pg							
Maternal and fetal risk and complications with poor control							
Monitoring and care frequency when pregnant							
Gestational: treatment, BG monitoring/goals, F/U testing postpartum, risk reduction							

* denotes survival skills

Signature/Initial/Date	Signature/Initial/Date

DIABETES FLOW SHEET/CHART AUDIT TOOL

Name _____ ID _____ Birthdate _____/_____/_____

Type of Diabetes: ☐Type 1 ☐Type 2 ☐Gestational ☐Other Date of Dx: _____/_____/_____

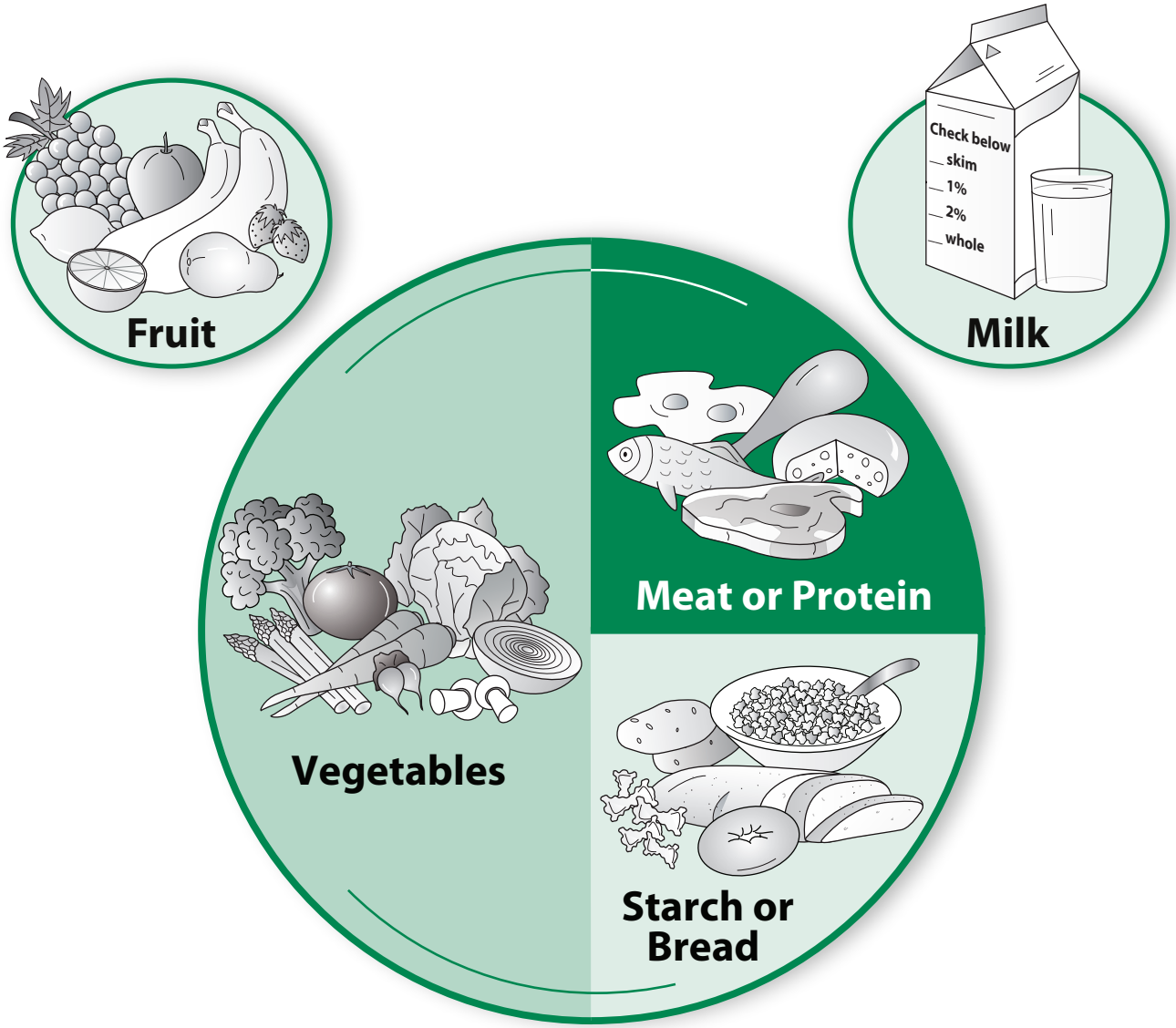
SBGM: ☐Yes ☐No Treatment (check all that apply): ☐Insulin ☐Oral Medication(s) ☐Diet ☐Physical Activity

Instructions: Please indicate date of exam/test, "A" for abnormal or "N" for normal, as well as the actual results, when appropriate (e.g., lab value), "D" if done elsewhere, and "R" if referred. Write additional explanations in the patient's clinical notes.

General Recommendations for Care	date/results	date/results	date/results	date/results	date/results	date/results
Review management plan *Type 1: every 3 months Type 2: every 3-6 months*						
Review physical activity *each visit*						
Weight						
Height						
BMI						
Self-Management Education						
At diagnosis, then every 6-12 months or more as needed						
Medical Nutrition Therapy						
At diagnosis or first referral to RD: 3 to 4 visits, completed in 3 to 6 months. Then1-2 hours annually.						
Glycemic Control						
A1C test *every 3-6 months*						
Review A1C target goal *each visit*						
Cardiovascular Care						
Fasting lipid profile *Children: after age 2 but before age 10, repeat annually if abnormal; Adults: annually*						
Total Cholesterol						
TG						
HDL						
Non-HDL						
LDL						
Blood pressure *each visit*						
Tobacco use status *each visit*						
Tobacco cessation referral *if indicated*						
Aspirin therapy *if indicated*						
Kidney Care						
Albumin to creatinine ratio *Type 1: begin with puberty or after 5 yrs duration, then annually Type 2: at dx, then annually*						
Protein to creatinine ratio *annually after microalbumin > 300 mg/24 hrs.*						
Serum creatinine for eGFR *annually*						
ACE/ARB therapy						
Eye Care						
Dilated eye exam *Type 1: If age > 10 years, within 3-5 years of onset, then annually Type 2: At diagnosis, then annually*						
Neuropathies and Foot Care						
Inspect bare feet and stress self-exam *each visit*						
Comprehensive lower extremity exam *annually*						
Oral Care						
Inspect gums and teeth *each visit*						
Refer to dentist *every 6 months*						
Emotional and Sexual Health Care						
List: _____						
List: _____						
Immunizations						
Influenza *annually*						
Pneumococcal *once; revaccination per ACIP*						
Preconception and Pregnancy Care						
Assess contraception/discuss family planning *at diagnosis and each focused visit during childbearing yrs*						
Preconception consult *3-4 months prior to conception*						
Screen for type 2 diabetes post-GDM						

MEAL PLANNING WITH THE PLATE METHOD: LUNCH/DINNER

The Plate Method is a method of meal planning that provides an even distribution of carbohydrates, a lower fat intake, and a greater amount of fruits and vegetables. Plan your meals by dividing up your plate in this way:



Starch or Bread, Fruit, and Milk food groups raise blood sugar.

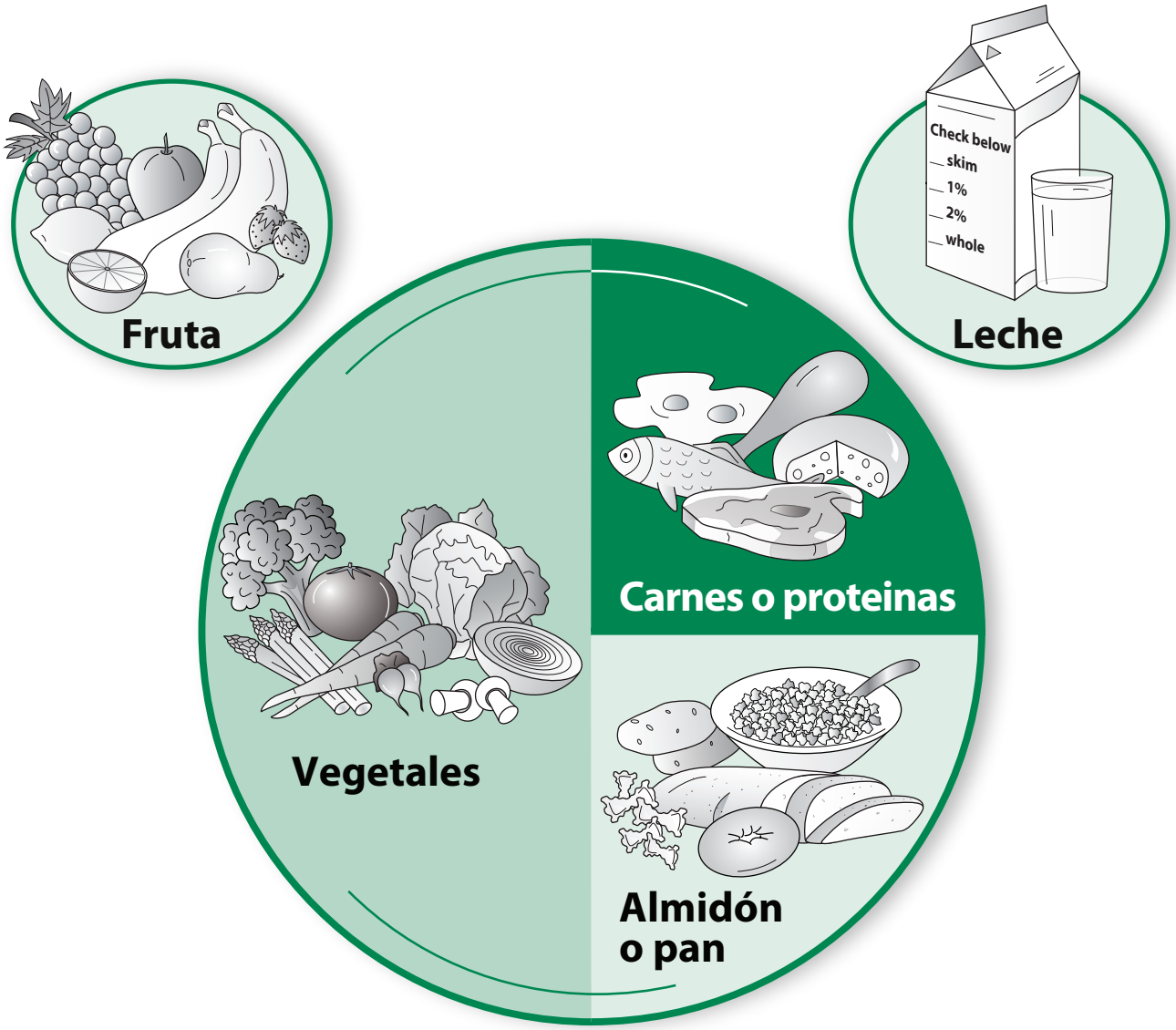
Low carbohydrate vegetables raise blood sugar in tiny amounts.

Meat/Protein foods raise blood sugar in tiny amounts.

1. Myplate http://teamnutrition.usda.gov/myplate.html
2. Other Plate Method Resources: Idaho Plate Method: http://www.platemethod.com
3. Prescription Solutions: https://www.prescriptionsolutions.com/vgnlive/HCP/Assets/PDF/PlatePlannerEnglish_LetterSize_UPDATED.pdf

PLANIFICACIÓN DE LAS COMIDAS CON EL MÉTODO DE PLATOS: ALMUERZO/CENA

El método de platos es un método de planificación de comidas que proporciona una distribución uniforme de los carbohidratos, un consumo más bajo de grasa y una mayor cantidad de frutas y vegetales. Planifique sus comidas al dividir sus platos de la manera siguiente:



El grupo de alimentos tales como almidón y pan, frutas y leche elevan el nivel de azúcar en la sangre.

Los vegetales con pocos carbohidratos elevan muy poco el nivel de azúcar en la sangre.

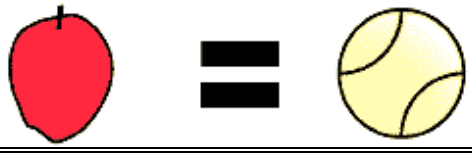
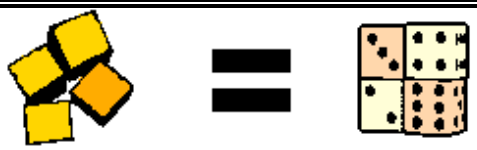
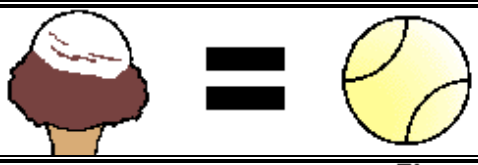
Las carnes o proteínas elevan muy poco el nivel de azúcar en la sangre.

1. Myplate http://teamnutrition.usda.gov/myplate.html
2. Other Plate Method Resources: Idaho Plate Method: http://www.platemethod.com
3. Prescription Solutions: https://www.prescriptionsolutions.com/vgnlive/HCP/Assets/PDF/PlatePlannerEnglish_LetterSize_UPDATED.pdf

SEVEN WAYS TO SIZE UP YOUR SERVINGS

Measure food portions so you know exactly how much food you're eating.
When a food scale or measuring cups aren't handy, you can still estimate your portions.

Remember:

1	3 ounces of meat is about the size and thickness of a deck of playing cards or an audiocassette tape.	
2	A medium apple or peach is about the size of a tennis ball.	
3	1 ounce of cheese is about the size of 4 stacked dice.	
4	1/2 cup of ice cream is about the size of a racquetball or tennis ball.	
5	1 cup of mashed potatoes or broccoli is about the size of your fist.	
6	1 teaspoon of butter or peanut butter is about the size of the tip of your thumb.	
7	1 ounce of nuts or small candies equals one handful.	

MOST IMPORTANT

If you're cutting calories, remember to keep your diet nutritious:

- 2-4 servings/day from the Milk Group for calcium
- 3-5 servings/day from the Vegetable Group for vitamin A
- 2-3 servings/day from the Meat Group for iron
- 2-4 servings/day from the Fruit Group for vitamin C
- 6-11 servings/day from the Grain Group for fiber

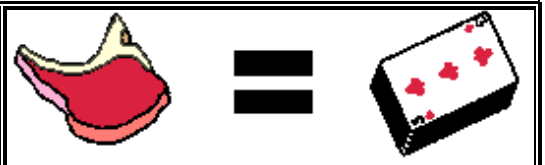
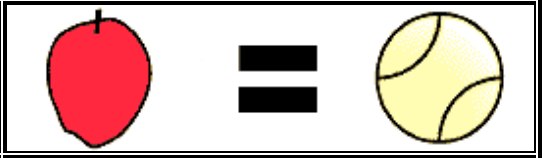
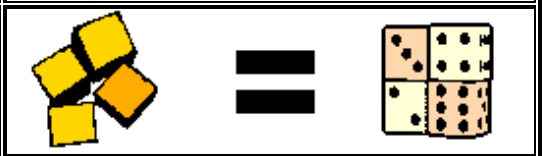
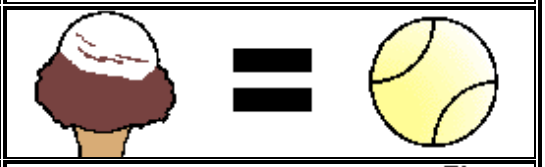
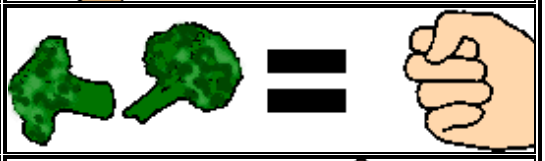
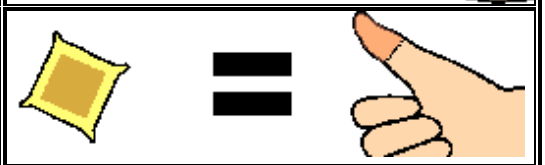
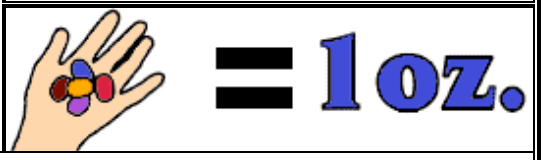
Courtesy of the National Dairy Council.

Other Portion Control Resources: *Prescription Solutions*:
https://www.prescriptionsolutions.com/vgnlive/HCP/Assets/PDF/PlatePlannerEnglish_LetterSize_UPDATED.pdf
National Heart Lung and Blood Institute website: www.nhlbi.nih.gov/

SIETE MANERAS DE MEDIR SUS PORCIONES

Mida las porciones de comida para saber exactamente cuánto está comiendo. Cuando una pesa de comida o las tazas de medida no resulten prácticas, todavía puede estimar sus porciones.

Recuerde:

1	3 onzas de carne es más o menos el tamaño y espesor de un mazo de cartas o un cassette de audio.	
2	La mitad de una manzana o melocotón es más o menos el tamaño de una bola de tenis.	
3	1 onza de queso es más o menos el tamaño de 4 dados apilados.	
4	1/2 taza de helado es más o menos el tamaño de una bola de ráquetbol o tenis.	
5	1 taza de puré de papas o brócoli es más o menos el tamaño de su puño.	
6	1 cucharadita de mantequilla o crema de cacahuete es más o menos el tamaño de la punta de su dedo pulgar.	
7	1 onza de nueces o caramelos pequeños es igual a un manojo.	

LO MÁS IMPORTANTE

Si está reduciendo calorías, recuerde mantener una dieta nutritiva:

- 2 a 4 porciones por dia del grupo de lácteos para calcio
- 3 a 5 porciones por dia del grupo de vegetales para vitamina A
- 2 a 3 porciones por dia del grupo de carnes para hierro
- 2 a 4 porciones por dia del grupo de frutas para vitamina C
- 6 a 11 porciones por dia del grupo de granos para fibra

Cortesía del Consejo Nacional de Productos Lácteos.

Other Portion Control Resources: *Prescription Solutions*:
https://www.prescriptionsolutions.com/vgnlive/HCP/Assets/PDF/PlatePlannerEnglish_LetterSize_UPDATED.pdf
National Heart Lung and Blood Institute website: www.nhlbi.nih.gov/

HOW TO USE A FOOD LABEL TO SELECT FOODS – ENGLISH

1. Locate the serving size

- The information on the label is for this serving size.
- How does it compare to your serving size?

2. Locate the total carbohydrate grams (g)

- **Women:** 150-180 g total carbohydrate per day
  45-60 g per meal 0-15 g per snack
- **Men:** 200-225 g total carbohydrate per day
  60-75 g per meal 0-30 g per snack
- 15 g carbohydrate = 1 carbohydrate serving

3. Locate dietary fiber grams (g)

- Aim for 25-35 g fiber per day.
- Aim for 3-5 g fiber per serving.
- Fiber does not turn to sugar like other carbohydrate does.
- You can divide the dietary fiber amount on your label by 2 and subtract half of the dietary fiber grams from the total carbohydrate grams.

Total carb grams (30)
– Dietary Fiber grams (10/2 = 5)
= Net carb grams that you count (30 – 5 = 25)

- Soluble fiber may help lower cholesterol levels.
- Soluble fiber sources = oats, beans, lentils, vegetables, fruits.

Breakfast Cereal

Nutrition Facts
Serving Size 1 cup (52 g)
Servings per container 8

Amount Per serving	
Calories 148	Calories from Fat 9
	% Daily Value*
Total Fat 1 g	2%
Saturated Fat 0g	1%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 86mg	4%
Total Carbohydrate 30g	10%
Dietary Fiber 10g	41%
Sugars 6g	41%
Protein 14g	
Vitamin A 1%	Vitamin C 0%
Calcium 7%	Iron 14%

*Percent Daily Values are based on a 2000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.

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4. Locate total fat grams (g)

- **Women**
  60 g fat or less per day
  15 g or less as saturated fat

  Men
  75 g fat or less per day
  20 g or less as saturated fat
- "Low fat" = less than 3 g fat per serving.
- Choose cheese with less than 5 g total fat per ounce.
- Choose frozen entrees with less than 15 g total fat each.

5. Locate cholesterol milligrams (mg)

- Aim for 200 mg cholesterol or less per day.
- Cholesterol is found in animal foods (meat, egg, milk, cheese, butter, etc.).

6. Locate sodium milligrams (mg)

- Aim for 1500 mg sodium or less per day.
- Choose frozen entrees with less than 800mg sodium.

Adapted from material provided by: UW Health Medical Foundation, Health Education and Nutrition Department.

CÓMO USAR LAS ETIQUETAS DE COMIDAS PARA SELECCIONARLAS

1. Localice el tamaño de la porción

- La información en la etiqueta es para este tamaño de porción.
- ¿Cómo se compara al tamaño de su porción?

2. Localice los gramos (g) totales de carbohidratos)

- **Mujeres:** 150 a 180 g totales de carbohidratos por día
  45 a 60 g por alimento 0 a 15 g por bocadillo
- **Hombres:** 200 a 225 g totales de carbohidratos por día
  60 a 75 g por alimento 0 a 30 g por bocadillo
- 15 g de carbohidratos = 1 porción de carbohidratos

3. Localizar los gramos (g) de fibra dietética

- Procure consumir de 25 a 35 gramos de fibra por día.
- Procure consumir de 3 a 5 gramos de fibra por porción.
- La fibra no se convierte en azúcar como lo hacen otros carbohidratos.
- Puede sustraer la mitad de los gramos de fibra dietética del total de gramos de carbohidratos.

Gramos totales de carbohidratos (30)
– Gramos de fibra dietética (10/2 = 5)
= Gramos de carbohidratos netos que usted cuenta (30 – 5 = 25)

- Las fibras solubles ayudan a bajar los niveles de colesterol.
- Fuentes de fibras solubles = avenas, frijoles, lentejas, vegetales y frutas.

*Cereal de desayuno

Datos de nutrición	
Tamaño de la porción 1 taza (52 g)	
Porciones por recipiente 8	
Cantidad por porción	
Calories 148	Calorías de grasa 9
	Valores diarios y %*
Total de grasa 1g	2%
Grasa saturada 0g	1%
Ácido graso 0g	
Cholesterol 0mg	0%
Sodio 86mg	4%
Total de carbohidratos 30g	10%
Fibra dietética l0g	41%
Azúcares 6g	41%
Proteina 14g	
Vitamina A 1%	Vitamina C 0%
Calcio 7%	Hierro 14%
*Percent Daily Values are based on a 2000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.	

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4. Localizar los gramos (g) totales de grasa

- **Mujeres**
  60 g de grasa o menos por día
  15 g o menos de grasa saturada

  Hombres
  75 g de grasa o menos por día
  20 g o menos de grasa saturada
- "Grasa baja" = menos de 3 g de grasa por porción.
- Escoja un queso con menos de 5 g de grasa total por onza.
- Escoja platos congelados con menos de 15 g de grasa total cada uno.

5. Localice los miligramos de colesterol (mg)

- Procure consumir 200 mg o menos de colesterol por día.
- El colesterol se encuentra en comidas que provienen de animales (carne, huevo, leche, queso, mantequilla y otros).

6. Localice los miligramos de sodio (mg)

- Procure consumir 1500 mg o menos de sodio por día.
- Escoja platos congelados que tengan menos de 800 mg de sodio.

Adaptado del material proporcionado por la Fundación Médica y de Salud UW, Departamento de Educación de la Salud y Nutrición.

UNDERSTANDING SUGAR ALCOHOLS

- **Sugar alcohol is incompletely absorbed.**
- **Only half of the sugar in sugar alcohol will be absorbed and will affect blood sugar.**

Nutrition Facts - Lainie's Cookies Serving Size 4 Cookies (34 g)	
Amount Per serving	
Calories 200	Calories from Fat 80
	% Daily Value*
Total Fat 9 g	14%
Saturated Fat 3g	15%
Trans Fat 0g	
Sodium 85mg	4%
Total Carbohydrate 24g	8%
Dietary Fiber 2g	8%
Sugar Alcohol 6g	
Protein 2g	
Vitamin A 0%	Iron 10%
Not a significant source of trans fat, cholesterol, sugars, vitamin C, calcium.	
*Percent Daily Values are based on a 2000 calorie diet. Ingredients: None listed for this example.	

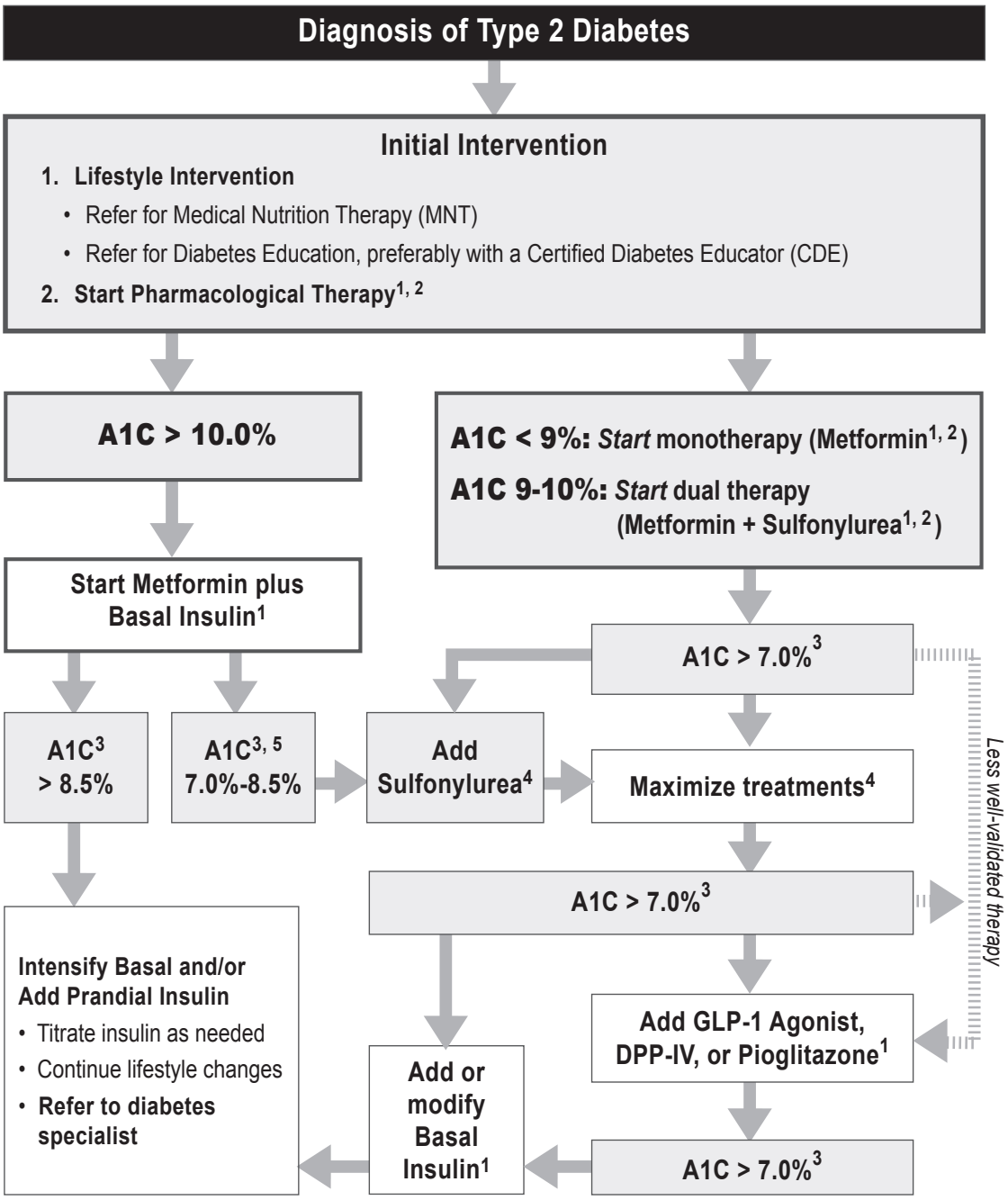
Example: Calculating Sugar Alcohol

- Total carbohydrate per serving = 24 grams
- Total sugar alcohol = 6 grams
- Divide total sugar alcohol by 2. (6 ÷ 2 = 3) Thus one-half of the sugar in the sugar alcohol per serving is: 3 grams of carbohydrate

Total Carbohydrate per serving accounting for sugar alcohol is:

- 24 grams of carbohydrate - 3 grams of carbohydrate from sugar alcohol = 21 grams of carbohydrate

TYPE 2 DIABETES: AMBULATORY GLYCEMIC CONTROL PATHWAY



Footnotes:

1. See tools "Diabetes Mellitus Medications 2012" and "Insulin Therapy 2012" for specific dosing information
2. Some agents mainly affect basal hyperglycemia, others target post-prandial hypoglycemia. Control of basal hyperglycemia is usually the first task.
3. Check A1C three months after titration to maximize effective dose
4. Increased risk of hypoglycemia if A1C is < 7.5%
5. If using < 30 units of basal insulin, will likely be able to titrate off insulin

Disclaimer: Throughout therapy use, assess for frequency, severity, and unexplained episodes of hypoglycemia.

INTERVENTION / TREATMENT PEARLS 2012

Intervention/ Treatment	Expected decrease in A1C with monotherapy (%)	Primary Action	When to Choose/Use	Cost
Lifestyle changes in diet/physical activity to promote weight loss	1.0-2.0	Broad benefits to health	• Improvement in lifestyle possible • Person can begin immediately	Free-$
Metformin	1.0-2.0	Lowers fasting plasma glucose	• All patients unless contraindicated or not tolerated	$
Sulfonylurea	1.0-2.0	Lowers fasting plasma glucose	• Second agent for most patients • Hypoglycemia risk high	$
Alpha Glucosidase Inhibitors	0.5-1.0	Lowers post-prandial glucose	• Slow carbohydrate • Taken orally	$-$$
Meglitinides	0.5-1.5	Lowers post-prandial glucose	• Sulfa allergy • Lower risk hypoglycemia	$-$$
Pioglitazone	0.6-1.0	Lowers post-prandial glucose	• Insulin resistance high • High triglycerides and low HDL if using maximum dose	$$-$$$
GLP-1 Agonist	0.8-1.5	Lowers post-prandial and fasting glucose	• Weight loss desired • No hypoglycemia	$$$
DPP-IV Inhibitors	0.6-0.8	Lowers post-prandial glucose	• Weight neutral • Taken orally • May use in renal insufficiency	$$$
Pramlintide	0.4-0.6	Lowers post-prandial glucose	• Wide fluctuating post-prandial glucose	$$$

Guiding Principles:

- The tool “Type 2 Diabetes: Ambulatory Glycemic Control Pathway” provides a framework for approaching the management of type 2 diabetes
- Use the tool “Diabetes Mellitus Medications 2012” for specific drug-related information
- General Glycemic control goals: A1C < 7.0% (always individualize); Fasting Plasma Glucose (FPG) 70-130 mg/dL; two-hour post-prandial < 180 mg/dL
- Selection of medications should be based on patterns of hyperglycemia (e.g., elevated FPG and/or elevated post-prandial)
- Medication should be titrated to maximal effective doses

DIABETES MELLITUS MEDICATIONS 2012

ORAL GLUCOSE-LOWERING AGENTS

RX	Avail. Dosage	Initial Dose	Initial Dose (elderly)	Dose Adjustment Schedule	Usual Maint. Dosage	Max. Effecttive Dose	A1C Lowering	Wt	Renal Dosing	Hepatic Dosing	Lab Monitoring	Common Side Effects	Contraindications/ Precautions
Drug Class: Sulfonyureas Actions: Stimulates insulin secretion; lowers fasting plasma glucose Indications: Type 2 diabetes as monotherapy or in combination with insulin, metformin, DPP-IV inhibitors, incretin mimetics, or TZDs													
Glipizide	5 mg 10 mg	5 mg	2.5 mg/day	Increase by 2.5 to 5 mg (> 15 mg/day = BID) after 1-2 wks	5-15 mg/ day	20 mg/day	1.0-2%	+	N/A	Start at 2.5 mg/ day	N/A	• hypoglycemia • weight gain	• Use caution in people with sulfa allergies • Use glyburide with caution due to greater risk of hypoglycemia • Use caution with renal or hepatic insufficiency (glipizide or glimepiride preferred choices) • Immediate release and extended release glipizide doses are not equivivalent
Glipizide ER	2.5 mg 5 mg 10 mg		5 mg/day	Increase by 5 mg after 1-2 wks	5-10 mg/ day	20 mg/day							
Glimepiride	1 mg 2 mg 4 mg	1-2 mg	1 mg	Increase by 1-2 mg after 1-2 wks	1-4 mg/ day	8 mg/day			Start at 1 mg/ day and monitor	Mild--start at 1 mg (monitor) Severe--avoid			
Glyburide	1.25 mg 2.5 mg 5 mg	2.5-5 mg	1.25 mg/ day	Increase by 2.5-5 mg after 1-2 wks	1.25-10 mg/day	10 mg/day			Do NOT use if CrCl < 50 ml/min	Conser-vative 1.25 mg/ day			
Drug Class: Biguanides Actions: Targets hepatic cells; decreases hepatic glucose production; does not stimulate insulin secretion; lowers fasting plasma glucose Indications: Type 2 diabetes as monotherapy or in combination with any other agent or insulin; overweight; dyslipidemic; children (approved for ≥ age 10)													
Metformin	500 mg 850 mg 1000 mg	500 mg BID	Use with caution, especially if > 80 years	Increase by 500 mg after 1-2 wks	1000-2000 mg/day	2550 mg/day (10-16 yo = 2000 mg/day)	1.0-2%	0/-	Contrain-dicated if SCr ≥ 1.5 males, ≥ 1.4 females or eGFR < 50	Avoid due to risk of lactic acidosis	BUN, Cr & CBC: prior to initiation then yearly. LFTs: prior to initiation. Vitamin B12 levels: every year for those at high risk of Vitamin. B12 deficiency	• diarrhea • nausea • abdominal bloating • anorexia	• Do not use with hepatic insuf-ficiency • Consult with diabetes specialist is recommended for SCr > 1.5 or eGFR < 50 • Uncompensated CHF • Excessive alcohol intake • Over age 80 (caution) • Acetazolamide • Withhold therapy for 48 hours after iodinated contrast media is used • May cause ovulation to resume in anovulatory, premenopausal women
Metformin ER	500 mg 750 mg	500 mg			500-2000 mg/day	2000 mg/ day							
Drug Class: TZD (Thiazolidinediones) Actions: Regulates insulin responsive genes necessary for glucose and lipid metabolism; improves sensitivity to insulin in skeletal and adipose tissue Indications: Type 2 diabetes as monotherapy or in combination with any other agents; Actos is also approved for use with insulin **Note: Rosiglitazone is not listed on this chart due to restricted use by FDA. For more information, see:** http://www.fda.gov/Drugs/DrugSafety/PostmarketDrugSafetyInformationforPatientsandProviders/ucm226976.htm													
pioglitazone (Actos)	15 mg 30 mg 45 mg	15-30 mg	Same	Increase by 15 mg 6-12 wks	15-45 mg/ day	45 mg/day (30 mg if on insulin)	1-1.5%	+	N/A	Do NOT use if ALT > 2.5X ULN	LFTs: prior to initiation then periodically	• weight gain, edema • heart failure symptoms, macular edema • increased fracture rate • increase risk of bladder cancer	• CHF III & IV or any symptomatic heart failure • Clinical evidence of liver disease or ALT > 2.5 ULN • Do not use rosiglitazone in combina-tion with insulin or nitrates (may increase risk of MI) • Use caution in females at high risk for fractures • Monitor for increase edema • May cause ovulation to resume in anovulatory, premenopausal women

DIABETES MELLITUS MEDICATIONS 2012

ORAL GLUCOSE-LOWERING AGENTS

RX	Avail. Dosage	Initial Dose	Initial Dose (elderly)	Dose Adjustment Schedule	Usual Maint. Dosage	Max. Effecttive Dose	A1C Lowering	Wt	Renal Dosing	Hepatic Dosing	Lab Monitoring	Common Side Effects	Contraindications/ Precautions
Drug Class: Meglitinides Actions: Augments glucose induced insulin output; more rapid onset of effect and shorter duration of action than sulfonylureas Indications: Type 2 diabetes as monotherapy or in combination with other oral agents; people with sulfa allergies; hypoglycemia on low doses of sulfonylureas													
repaglinide (Prandin)	0.5 mg 1 mg 2 mg	A1C < 8%: 0.5 mg w/ each meal A1c>8:1-2 mg w/each meal	Same (caution if Renal Dz)	Double after 1-2 wks	0.5-4 mg before meals	16 mg/day	1-1.5%	+/-	CrCl < 40 ml/min, start at 0.5 mg	Use Caution	N/A	• hypoglycemia • weight gain	• nateglinide: active metabolites, renal excretion • repaglinide: no active metabolites, minimal renal excretion, more effective than nateglinide in clinical trials
nateglinide (Starlix)	60 mg 120 mg	60-120 mg before meals	Same (caution if Liver Dz)	Increase by 60mg at each meal after 1-2 wks	60-120 mg before meals	120 mg TID	0.5-1%		N/A				
Drug Class: Alpha-glucosidase Inhibitors Actions: Slows absorption of carbohydrates; reduces post-prandial blood glucose Indications: Type 2 diabetes as monotherapy or in combination with sulfonylurea,metformin or insulin; post-prandial hyperglycemia													
acarbose (Precose)	25 mg 50 mg 100 mg	25 mg TID with meals	Same	Double current dosing regimen after 4-8 wks	25-100 mg TID **with meals**	Wt. < 60 kg = 50 mg TID Wt. > 60 kg = 100 mg TID	0.5-1%	0	Treat-ment not recom-mended if SCr > 2	N/A	Serum Transaminases q 3 mo. X 1 year	• flatulence • diarrhea • abdominal pain (less severe if titrated slowly)	• The mechanism of action shows the correction of hypoglycemia so treat hypoglycemia with glucose tablets • Chronic intestinal disease • Renal dysfunction • (creatinine > 2.0) (Glyset) • Cirrhosis (Precose)
miglitol (Glyset)					50-100 mg TID **with meals**	100 mg TID					N/A		
Drug Class: Dipeptidyl Peptidase 4 Inhibitors (DPP-IV) Actions: Increases insulin release and decreases glucagon levels in the circulation in a glucose-dependent manner Indications: Type 2 diabetes as monotherapy or in combination with sulfonylureas, metformin, or TZDs													
sitagliptin (Januvia)	25 mg 50 mg 100 mg	100 mg daily	Same	If making adjustments, wait 4-6 wks	100 mg daily	100 mg daily	0.6-0.8%	0/-	CrCl 30-50 ml/min: 50 mg daily CrCl < 30 ml/min: 25 mg daily	N/A	BUN, Cr prior to initiation then yearly	• headache, naso- • pharyngitis, upper respiratory tract infection • rarely severe allergic reactions	• If using in combination with solfonuylurea and metglitinide, may need lower dose of sulfonylurea to prevent hypoglycemia • At the reduced doses suggested for stage 4 or worse CKD, the medications maybe ineffective; use with extreme caution, if at all in Stage 5 CKD.❖
saxagliptin (Onglyza)	2.5 mg 5 mg	2.5 or 5 mg daily (2.5 mg for renal impairment of if given with a CYP3A4/5 Inhibitor)	Same	N/A	5 mg daily	5 mg daily	0.5-0.8%	0	CrCl < 50 ml/min: 2.5 mg daily	N/A	BUN, Cr prior to initiation and then yearly		
linagliptin (Tradjenta)	5 mg	5 mg daily with or without food	Same	N/A	5 mg daily	5 mg daily	0.4% mono-therapy	0	No ad-justment needed	N/A	N/A	• nasopharyngitis 5.8%, monotherapy (placebo 5.5%-not statistically significant)	• If used with sulfonylurea or metglitinide, consider lowering dose to prevent hypoglycemia • Strong P-glycoprotein/CYP 3A4 inducer

❖ Based on expert opinion.

DIABETES MELLITUS MEDICATIONS 2012

INJECTABLE NON-INSULIN GLUCOSE-LOWERING AGENTS

RX	Avail. Dosage	Initial Dose	Dose Adjustment Schedule	Max. Dose	Meal Timing	A1C Lowering	Wt	Renal Dosing	Hepatic Dosing	Lab Monitoring	Stability	Common Side Effects	Contraindications/ Precautions
Drug Class: GLP-1 agonist Actions: stimulates the pancreas to increase insulin production and suppress glucagon secretion. Secondary actions include inhibition of gastric emptying and reduction of appetite and food intake. Indications: Type 2 diabetes as monotherapy or in combination with sulfonylureas, metformin, or TZDs. See individual drug insert recommendations for when it is appropriate to use with a specific type of basal insulin in adults with type 2 diabetes. Not approved for use with type 1 diabetes.													
exenatide (Byetta)	5 mcg per dose, 60 doses, 1.2 mL prefilled pen 10 mcg per dose, 60 doses, 2.4 mL prefilled pen	Type 2 DM: 5 mcg BID at any time within the 60-minute period before the 2 main meals of the day, approximately 6 hours or more apart	Type 2 DM: May be increased to 10 mcg BID after one month of therapy	10 mcg twice a day	Within 60 minute period before morning and evening meals	1%	-	Do not use if CrCl < 30 ml/min	N/A	Monitor INR for patients on warfarin	Store unused pen in refrigerator. After first use, may be kept at room temp (up to 77° F) for up to 30 days.	• nausea • other GI disturbance	• Severe gastro-esophageal reflux disorder (GERD) • Gastroparesis • Pancreatitis
exenatide extended-release (Bydureon)	2 mg single dose trays	2 mg every 7 days	None	2 mg/ week	Independent of meals	1.60%	-	Do not use if CrCl < 30 ml/min Use with caution if 30 - 50 CrCl	N/A	Monitor INR for patients on warfarin	Administor immediately after suspension	• nausea, other GI disturbance • Injection site nodules	• Avoid use in people with risk for pancreatitis, previous pancreatitis and or very elevated triglycerides • Avoid in people with risk for pancreatitis • Severe gastro-esophageal reflux disorder (GERD) • Gastroparesis • Pancreatitis • See Black Box Warning: Thyroid C-Cell Tumors, Medullary Thyroid Carcinoma (MTC) and Multiple Endocrine Neoplasia Syndrome Type 2- (MEN 2)
liraglutide (Victoza)	0.6 mg/mL 3 mL prefilled syringes	Type 2 DM: 0.6 mg subcuta-neously once a day for 1 week◎	Type 2 DM: Titrate to 1.2 mg after 1 week then may increase to 1.8 mg if 1.2 mg reveals no signifi-cant changes	1.8 mg one time daily	Independent of meals	1-1.5%	-	No dosage adjustment necessary. Caution w/ renal impairment N/A	No dosage adjustment necessary, caution w/ hepatic impairment	N/A	Store unused pen in refrigerator. After first use can be kept in refrigerator or room temp (up to 86° F) for up to 30 days. Keep pen cap on.	• nausea • other GI disturbance	
Drug Class: Amylin analogue Actions: slows gastric emptying, decreases glucagon secretion, centrally modulates appetite Indications: Type 1 & 2 diabetes as adjunct treatment to those who use meal-time insulin and fail to achieve postprandial glucose control Note: A specialist should prescribe Symlin due to the complexity of dosing guidelines.													
pramlintide (Symlin)	0.6 mg/mL 5 mL vials 1 mg/mL prefilled pens	Type 1 DM: 15 mcg immediately prior to major meals Type 2 DM: 60 mcg immediately prior to major meals ⌘	Type 1 DM: Titrate at 15 mcg increments to a maintenance dose of 30 or 60 mcg, as tolerated Type 2 DM: Increase to a dose of 120 mcg as tolerated ❖	120 mcg before major meals	Immediately before meals containing ≥ 250 kcal or ≥ 30 grams of carbo-hydrate	0.4 – 0.6%	0/-	N/A	N/A	N/A	Discard 28 days after first use. Open bottles may be refrigerated or kept at room temp.	• nausea	• Avoid combination with GLP-1 agonist • Gastroparesis

◎ May be given at any time of day independent of meals

⌘ Reduce preprandial, rapid-acting or short-acting, insulin dosages, including fixed-mix insulins by 50%

❖ Dose titrations should occur only when **no** clinically significant nausea has been seen for 3 days

INSULIN⦿ THERAPY 2012

CLASS	INSULIN TYPE	BRAND	FORMULATIONS	ONSET of Action	PEAK	DURATION of Action	BASAL/ BOLUS	MEAL TIMING	APPEARANCE
Rapid Acting	Lispro	Humalog✣	Vials, cartridges, pens	5-15 min	1-2 hours	2-4 hours	Bolus	15 min before or immediately after	Clear
	Aspart	Novolog	Vials, cartridges, pens			2-4 hours		5-10 min before	
	Glulisine	Apidra	Vials, pen			2-4 hours		Within 15 min before or within 20 min after starting a meal	
Short Acting	Regular	Humulin R✣	Vials	30-60 min	2-4 hours	4-6 hours	Bolus	30 min before meals	Clear
		Novolin R	Vials						
Intermediate Acting	NPH	Humulin N✣	Vials, cartridges	1-2 hours	4-8 hours	10- 20 hours	Basal	Within 15 min before meals when mixed with rapid-acting insulin; 30 min before meals when mixed with regular insulin	Cloudy
		Novolin N	Vials						
	Detemir	Levemir	Vials, pen	1-2 hours	6-8 hours	Dose-dependent #	Basal	N/A	Clear
Long Acting	Glargine	Lantus	Vials, pens	1-2 hours★	Flat◆	~24 hours ⏏			
	Detemir	Levemir	Vials, pen	1-2 hours	6-8 hours	Dose-dependent #	Basal	N/A	
Combination	70 NPH/30 Regular	Humulin 70/30✣	Vials, pens	30-60 min		10-16 hours		Approximately 30 min before meals	Cloudy
		Novolin 70/30	Vials						
	70 aspart protamine/30 insulin aspart	Novolog Mix 70/30	Vials, cartridges, pens	10-20 min				Within 15 min of meal	
	75 lispro protamine/25 lispro	Humalog Mix 75/25	Vials, pens	Less than 30 min		15-18 hours			
High Strength U-500 Insulin	Regular	Humulin RU-500⌘	Vials	30 min	2-4 hours	6.5-8 hours	Basal/ Bolus	Varies⌘	Clear

⦿ The time course of action (onset of action, peak, duration of action) of any insulin may vary in different individuals or at different times in the same individual and can sometimes be dependent on dose. Time periods indicated should be considered a general guide only. Time may vary based on initial and subsequent doses. Consult with insulin package insert for additional information.

⌘ U-500 is a high-strength concentration of insulin (5-fold higher concentration than U-100 insulin) and typically used in people with very high insulin resistance; consultation with a diabetes specialist is recommended. See Section 4: Glycemic Control for more information related to U-500 use and precautions.

◆ Some people may have a peak at 10-14 hours and the duration may be <24 hours.

Dose response studies indicate an approximate duration of action of 6-12 hours for Detemir dose of <0.4 units/kg and duration of action of 20-24 hours for Detemir dose of ≥0.4 units/kg.

★ A 4-5 hour onset of action with initial dosing may occur based on expert opinion.

⏏ Some people may benefit from a BID dose schedule.

✣ Available in Humulin®/ReliOn® insulin manufactured for Walmart by Eli Lilly

INSULIN PEARLS

Rapid-Acting Analogues: Lispro, Aspart and Glulisine

- Convenient administration immediately prior to or after meals
- Fast onset of action
- Limits post-prandial hyperglycemic peaks especially when taken 15-20 minutes prior to meal
- Risk of hypoglycemia if meal delayed >20 minutes after administration
- Short duration of activity (reduces late post-prandial hypoglycemia, but may cause frequent late post-prandial hyperglycemia)

Short-Acting Insulin: Regular

- Slower onset of action; requires administration 20-40 minutes prior to meal; risk of hypoglycemia if meal further delayed
- Possible mismatch with post-prandial hyperglycemic peak (less mismatch if gastroparesis present)
- Long duration of activity; potential for late post-prandial hypoglycemia
- May work better in people with high insulin requirements
- Can be an increase in hypoglycemia risk compared to rapid acting analogue insulin
- Less expensive than rapid acting analogue insulin

Intermediate-Acting Insulins: NPH and Detemir

NPH

- Significant variability in absorption within the same individual and injection site
- Has definite peak that can cause excessive hypoglycemia, especially at night
- Can be an increase in hypoglycemia risk compared to long-acting analogue insulin
- Requires at least two injections if using as basal insulin
- Consider using for people on prednisone, as the action profile matches the prednisone effect well
- Less expensive than long-acting analogue insulin

Detemir

- Duration of action of 6-12 hours for Detemir dose of < 0.4 units/kilogram and duration of action of 20-24 hours for Detemir dose of > 0.4 units/kilogram
- May be dosed 1-2 times per day based on duration of activity
- At lower doses detemir may act more like NPH and at higher doses more like glargine
- Cannot mix with other insulins

Long-Acting Basal Insulins: Glargine and Detemir

Glargine

- Once-daily dosing for most people is adequate
- Some people may have a peak at 10-14 hours and the duration may be < 24 hours, thus to optimize glucose control two injections may be needed
- Less nocturnal hypoglycemia compared to NPH
- Cannot mix with other insulins

Detemir

- Duration of action of 6-12 hours for Detemir dose of < 0.4 units/kilogram and duration of action of 20-24 hours for Detemir dose of ≥ 0.4 units/kilogram
- May be dosed 1-2 times per day based on duration of activity
- At lower doses detemir may act more like NPH and at higher doses more like glargine
- Cannot mix with other insulins

Combinations/Pre-Mixed

- See information for rapid-acting analogues, short-acting insulin and intermediate-acting insulin
- Pre-mixed or combinations are used when less complicated regimens are needed

Disclaimer: "Insulin Pearls" provides a collection of expert opinion from health care providers, thus may or may not be evidence-based.

THE BASAL INSULIN/BOLUS INSULIN CONCEPT

Basal Insulin

- Suppresses glucose production between meals and overnight
- 50% of daily needs which is given by one or two injections per day or per insulin pump

Bolus Insulin (Meal Time or Post-prandial)

- Limits hyperglycemia after meals
- Immediate rise and sharp peak at 1 hour
- 10-20% of total daily insulin requirement at each meal

INSULIN REGIMENS

Regimen Considerations:

- Depends on individual characteristics (e.g., daily schedule, timing of meals, physical activity, age, and medication adherence)
- Willingness to monitor and take multiple injections
- Current pattern of high and low blood glucoses
- History of hypoglycemia unawareness

Common Insulin Regimens			
Intensive Insulin Regimens	**Pre-Mixed or Split Mixed (NPH/Regular or Rapid-Acting Analogue twice a day)**	**Modified Split Mixed (NPH and Regular in AM, Regular in evening meal, NPH at bedtime)**	**Basal Insulin Only**
▪ Combines a basal insulin with injections of rapid-acting insulin before each meal ▪ Typically 3-4 injections/day ▪ More flexible with regard to timing of meals, content of meals, and activity ▪ Allows for frequent adjustments/ corrections ▪ Requires frequent monitoring of glucose ▪ Can get the best A1C with less hypoglycemia compared to conventional regimens	▪ 2 injections per day ▪ Inflexible (need to eat meals of consistent content and consistent times with snacks to avoid hypoglycemia) ▪ More hypoglycemia with this regimen when control is tight ▪ Does not allow for adjustment of insulin through the day	▪ Less nocturnal hypoglycemia and better control of fasting glucose ▪ 3 injections per day ▪ Need consistent meals through the day ▪ Substitute rapid acting insulin (Aspart, Lispro, glulisine) for Regular to further decrease risk of hypoglycemia	▪ May reduce fasting plasma glucose ▪ Used to improve glucose control when used with oral medications

Initiating Insulin Type 2 Diabetes: Examples of Various Options to Consider

- 10 units NPH or 0.1 to 0.15 units/kg at bedtime
- 10 units glargine or 0.1 to 0.15 units/kg once (morning or bedtime)
- 10 units detemir or 0.1 to 0.15 units/kg once daily (morning or at bedtime)
- 10 units of premixed insulin once a day (pre-breakfast or pre-dinner)
- 10 units premixed insulin twice daily (pre-breakfast and pre-dinner)

Diabetes Sick Days Plan

Check ketones

GREEN ZONE

Green Zone—All Clear

- Blood glucose within goal range of 80 to 140 mg/dl
- Taking usual pills and/or insulin
- Eating and drinking normally
- No fever
- Diabetes is under control
- Test blood glucose 4 times a day while sick
- Continue to take your diabetes medication
- Keep on hand: fluids with sugar (such as apple juice), fluids with salt (such as broth)

Check ketones

YELLOW ZONE

Yellow Zone—Caution

- Glucose tests greater than 140 mg/dl more than once in 6 hours
- Symptoms of high blood glucose are present: thirst, dry mouth, blurred vision, frequent urination
- Nausea, vomiting or diarrhea interfere with eating and drinking
- Fever
- Glucose tests lower than 70 mg/dl more than once in 6 hours
- Test blood glucose at least every 4 hours and record results
- Continue to take your diabetes pills and/or insulin
- Drink at least 4 oz (1/2 cup) of fluids every 30 minutes
- Fluids should be sugar-free unless blood glucose is low or you are replacing a meal with the liquids. Treat low glucose with 15 gm of carbohydrate (see other side) and retest in 15 minutes; repeat treatment every 15 minutes until glucose is between 80–140 mg/dl

Check ketones

RED ZONE

Red Zone—Call Your Doctor

- Glucose remains above 300 mg/dl for more than 6 hours or below 70 mg/dl after repeated treatment
- Vomiting and diarrhea for more than 6 hours
- You are dehydrated: very dry mouth, can't urinate after 4 hours, rapid weight loss since becoming ill
- Confusion, sleepiness, seizures
- Call your doctor _____

  _____
- Information to have ready:
  - Blood glucose test results
  - Symptoms you have had, including fever, nausea, diarrhea and vomiting
  - Medication you have taken, including times and doses of insulin
  - What you have had to eat and drink

Adapted from Dean Health System

Diabetes Sick Days Plan

Soft foods may be an option during illness. They are usually easy to eat and require little preparation. Below is a **sample menu** to consider during periods of illness.

BREAKFAST

- 1 cup of skim milk
- ½ cup of cooked cream of wheat and 1 slice of toast
- ½ cup of fruit canned in juice or fruit juice

LUNCH

- 2 oz. American cheese
- 1 cup of tomato juice
- 6 saltine crackers and ¼ cup of sherbet
- ½ cup of fruit juice

DINNER

- 1 cup of cottage cheese or tuna
- 1 cup of vegetable juice
- 1 English muffin or 1 cup of mashed potatoes
- ½ cup of fruit canned in juice or fruit juice

BEDTIME SNACK

- ½ cup of sugar-free pudding
- ¼ cup of cottage cheese or 1 oz. of American cheese
- ½ cup of fruit canned in juice or fruit juice

If your blood glucose is in the normal range (80-140 mg/dL) and you cannot tolerate soft foods, try sipping clear liquids. The following items are **examples** of clear liquids containing 15 grams of carbohydrates.

CLEAR LIQUIDS	SERVING/ CARBOHYDRATE AMOUNT	CLEAR LIQUIDS	SERVING/ CARBOHYDRATE AMOUNT
Apple Juice	➔ ⅓ – ½ cup/15 grams	Gatorade	➔ 1 cup/15 grams
Cranberry Juice	➔ ⅓ – ½ cup/15 grams	Pedialyte	➔ 2 ½ cups/15 grams
Regular Soda	➔ ½ cup/15 grams	Soup (broth based)	➔ 1 cup/15 grams
Regular Jell-O	➔ ½ cup/15 grams	Popsicles	➔ 1 Popsicle/15 grams

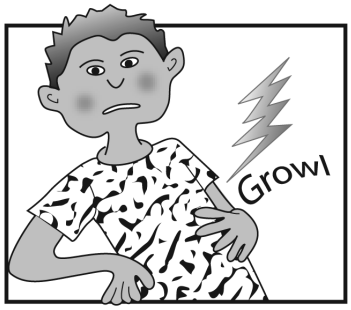
Adapted from Dean Health System

Adapted from: Children's Diabetes Foundation at Denver

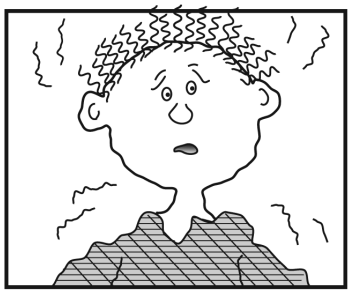
HYPOGLYCEMIA

LOW BLOOD GLUCOSE
KNOW THE SYMPTOMS

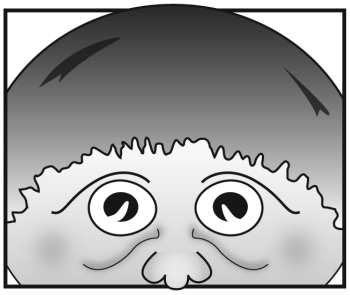
An individual may not always recognize symptoms of low blood glucose. These common symptoms, and others, may indicate low blood glucose.



Hungry



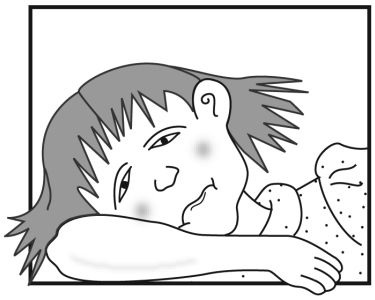
Shaky/weak/clammy



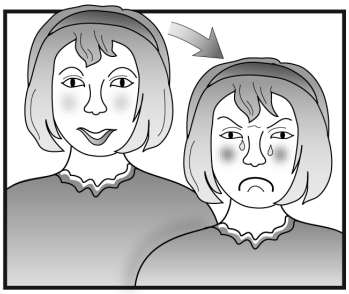
Blurred vision/ glassy eyes

Dizzy/headache

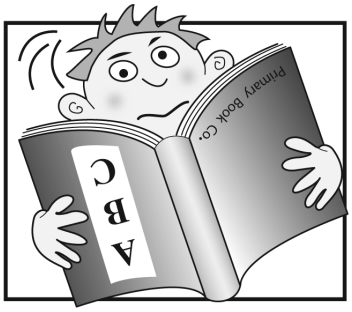
Sweaty/flushed/hot



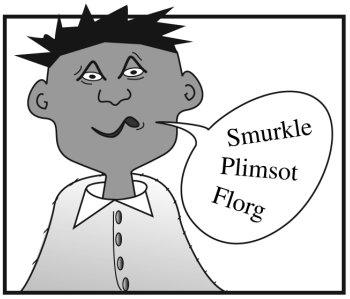
Tired/drowsy



Mood/ behavior change



Inattentive/spacey



Slurred/ garbled speech

If individual is confused/unable to follow commands, unable to swallow, unable to awaken (unconscious), or is having a seizure or convulsion,

GIVE GLUCAGON

Adapted from: Children's Diabetes Foundation at Denver

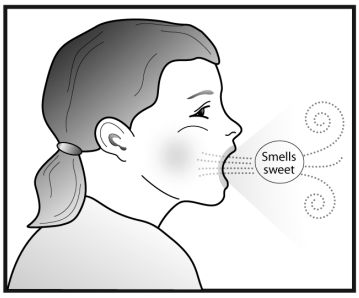
HYPERGLYCEMIA

HIGH BLOOD GLUCOSE
KNOW THE SYMPTOMS

An individual may not always recognize symptoms of high blood glucose. These common symptoms, and others, may indicate high blood glucose.

Frequent urination
(bedwetting in children)

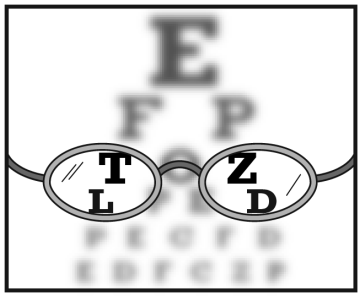
Extreme thirst/ dry mouth



Sweet, fruity breath

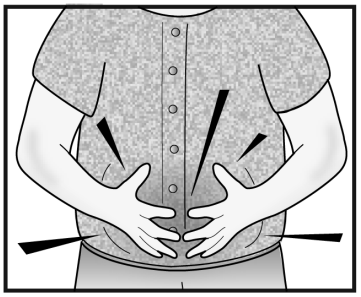
Tiredness/fatigue

Increased hunger

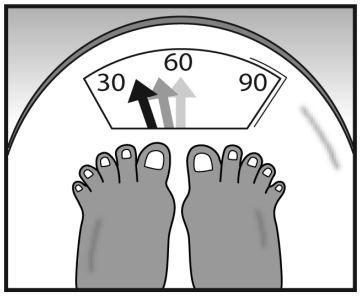


Blurred vision

Nausea/vomiting



Stomach pain/ cramps



Unusual weight loss

If individual has labored breathing, weakness, is confused or unconscious,
SEEK MEDICAL ASSISTANCE

Available at: http://www.ctri.wisc.edu/HC.Providers/healthcare_FDA_Meds.htm.

Tobacco Treatment Chart

Help your patients quit smoking by following the 5 A's:

1. **ASK.** "Do you smoke?" Record in every patient record at every visit.
2. **ADVISE.** "I strongly advise you to quit smoking for your health and the health of your friends and family."
3. **ASSESS.** "Are you ready to quit within the next 30 days?"
4. **ASSIST:**
   - Brief counseling.
   - Prescribe medications or recommend OTC.
   - Refer to 1-800-QUIT-NOW or a local tobacco-cessation program.
5. **ARRANGE.** Advise the patient to set a follow-up appointment with his/her PCP.

MEDICATIONS CHART*

Medication	Cautions	Side Effects	Dosage	Use	Availability
Bupropion SR 150	Not for use if you: • Currently use a monoamine oxidase (MAO) inhibitor • Use bupropion in any other form • Have a history of seizures • Have a history of eating disorders	• Insomnia • Dry mouth	• Days 1-3: 150 mg each morning • Day 4-end: 150 mg twice daily	Start 1-2 weeks before your quit date; use 2 to 6 months	Prescription Only: • Generic • Zyban: • Wellbutrin SR
Nicotine Gum (2 mg or 4 mg)	• Caution with dentures • Don't eat or drink 15 minutes before or during use	• Mouth soreness • Stomach ache	• 1 piece every 1 to 2 hours • 6-15 pieces per day • 2 mg: If smoking 24 cigarettes or less per day • 4 mg: If smoking 25+ cigs	Up to 12 weeks or as needed	OTC Only: • Generic • Nicorette
Nicotine Inhaler	• May irritate mouth/throat at first (but improves with use) • Don't eat or drink 15 minutes before or during use	• Local irritation of mouth and throat	• 6-16 cartridges/day • Inhale 80 times/cartridge • May save partially-used cartridge for next day	Up to 6 months; taper at end	Prescription Only: Nicotrol inhaler
Nicotine Lozenge (2 mg or 4 mg)	• Do not eat or drink 15 minutes before or during use • One lozenge at a time • Limit 20 in 24 hours	• Hiccups • Cough • Heartburn	• 2 mg: If you don't smoke for 30 minutes or more after waking • 4 mg: If you smoke within 30 minutes of waking • Wks 1-6: 1 every 1-2 hrs • Wks 7-9: 1 every 2-4 hrs • Wks 10-12: 1 every 4-8 hrs	3-6 months	OTC Only: • Generic • Commit
Nicotine Nasal Spray	• Not for patients with asthma • May irritate nose (improves over time) • May cause dependence	• Nasal irritation	• 1 "dose" = 1 squirt per nostril • 1 to 2 doses per hour • 8 to 40 doses per day • Do NOT inhale	3-6 months; taper at end	Prescription Only: Nicotrol NS
Nicotine Patch	Do not use if you have severe eczema or psoriasis	• Local skin reaction • Insomnia	• One patch per day • If > 10 cigs/day: 21 mg 4 wks, 14 mg 2-4 wks, 7 mg 2-4 wks	8-12 weeks	OTC: • Generic • Nicoderm CQ • Nicotrol Prescription: • Generic
Varenicline	Use with caution in patients: • With significant renal impairment • With serious psychiatric illness • Undergoing dialysis FDA Warning: Varenicline patients have reported depressed mood, agitation, changes in behavior, suicidal ideation and suicide.	• Nausea • Insomnia • Abnormal, vivid or strange dreams	• Days 1-3: 0.5 mg every morning • Days 4-7: 0.5 mg twice daily • Day 8-end: 1 mg twice daily	Start 1 week before quit date; use 3-6 months	Prescription only: Chantix
Combinations 1. Patch+bupropion 2. Patch+gum 3. Patch+lozenge OR inhaler	• Only patch + bupropion is currently FDA-approved • Follow instructions for individual medications	• See individual medications above	• See individual medications above	See above	See above

See FDA package inserts for more information

* Based on the 2008 Clinical Practice Guideline: *Treating Tobacco Use and Dependence*, U.S. Public Health Service, June 2008

PLAN TO QUIT

Quitting takes hard work, but you can do it! The plan below can help.

Get Ready.

List your reasons for quitting and tell your friends and family about your plan. See your doctor to find out if medication is right for you. Think of whom to reach out to when you need help, like a support group or the **Wisconsin Tobacco Quit Line, it's free** and available at **1-800-QUIT-NOW** (800-784-8669). The Quit Line can help you create a plan that's tailored to your needs. Stop buying tobacco. Set a quit date. **My quit date is: _____**.

Purchase Medication.

Ask your doctor if quit-smoking medication is right for you. If so, buy either over-the-counter nicotine patches, lozenges or gum--or get a prescription from your doctor for the nicotine inhaler, patch, nasal spray, or one of the non-nicotine pills: Bupropion SR 150 (Zyban) or varenicline (Chantix). *Note that patients should start taking bupropion SR 150 one to two weeks prior to the quit date. Patients should begin varenicline a week prior to quitting.* **Medication(s) I will use:**

_____

Change Your Routine.

Think of routines you may want to change. For example, take walks or work out when you normally smoke or chew. Pay attention to when and why you smoke or chew. Clean your clothes to get rid of the smell of cigarette smoke. Think of new ways to relax or things to hold in your hand instead of a cigarette or chew. **List things to do instead of smoking/chewing:**

_____

Plan For More Money.

Make a list of the things you could do with the extra money you will save by not buying tobacco. **Things I will do with the money:** _____

_____

Plan Your Rewards.

Think of rewards you will get yourself after you quit. Make an appointment with your dentist to have your teeth cleaned. At the end of the day, throw away all tobacco, matches or tins. Put away or toss lighters and ashtrays. **My reward for quitting tobacco will be:**

_____

Quit Day

Keep very busy. Change your routine when possible, and do things that don't remind you of smoking/chewing. Remind family, friends, and coworkers that this is your quit day, and ask them to help and support you. Avoid alcohol. Call the Quit Line for ongoing support at 1-800-QUIT-NOW. Buy yourself a treat, or do something to celebrate. **You can do it!**

Day After You Quit: Congratulations!

Congratulate yourself. When cravings hit, do something else that isn't connected with smoking/chewing, like taking a walk, drinking a glass of water or taking deep breaths. Call your support network or the Quit Line. Eat snacks or chew gum.

www.ctri.wisc.edu
Produced by the University of Wisconsin Center for Tobacco Research & Intervention June 2008

WHAT HAPPENS WHEN YOU QUIT

Quitting improves your appearance:

- ☑ Healthier skin.
- ☑ Fresher breath.
- ☑ Whiter, healthier teeth.

Other benefits:

- ☑ Your clothes and hair smell better.
- ☑ Your senses of taste and smell improve.
- ☑ Work and exercise without losing your breath.
- ☑ You'll have more money.

REAP THE BENEFITS – FAST.

Everyone knows your health improves when you quit smoking/chewing. But you might be surprised at how fast it happens.

20 minutes after quitting: Your blood pressure drops to a level close to that before the last cigarette. The temperature of your hands and feet increases to normal.

12 hours after quitting: The carbon monoxide level in your blood begins to drop to normal.

24 hours after quitting: Your chance of a heart attack decreases.

2 weeks to 3 months after quitting: Your circulation and lung function improve.

1 to 9 months after quitting: Coughing, sinus congestion, fatigue and shortness of breath decrease; cilia (tiny hair-like structures that move mucus out of the lungs) regain normal function in the lungs, increasing the ability to clean the lungs and reduce infection.

1 year after quitting: The excess risk of coronary heart disease is half that of a tobacco user.

5-15 years after quitting: Your stroke risk is reduced to that of a nonsmoker.

10 years after quitting: The lung cancer death rate is about half that of a continuing tobacco user. The risk of cancer of the mouth, throat, esophagus, bladder, kidney and pancreas decrease.

15 years after quitting: The risk of coronary heart disease falls to that of a nonsmoker's.

Sources: U.S. Surgeon General's Reports

www.ctri.wisc.edu
Produced by the University of Wisconsin Center for Tobacco Research & Intervention June 2008

SCREENING AND INITIAL RECOMMENDATIONS FOR DIABETIC KIDNEY DISEASE PATHWAY (Microalbuminuria, Macroalbuminuria and eGFR)

TYPE 1: At puberty or after 5 years duration, then annually
OR
TYPE 2: At diagnosis, then annually

Test

Serum Creatinine to measure estimated GFR

- Estimate glomerular filtration rate (eGFR) using the MDRD equation online calculator at: **http://www.kidney.org/professionals/kdoqi/gfr_calculator.cfm**
- Evaluate and stage chronic kidney disease (Table 6-2)
- Repeat annually or as needed

Test

Albumin/Creatinine Ratio
from a random urine sample

Negative
(< 30 mg/g)

Follow-up

- Repeat albumin/creatinine ratio annually
- Optimize glycemic control (target A1C < 7.0%)
- Optimize blood pressure control (target < 130/80 mmHg)❖

Positive
(≥ 30 mg/g)

Confirm within 3-6 months:
2 out of 3 random urine samples

Diagnose diabetic kidney disease:
- Microalbuminuria (30 to 300 mg/g)

Diagnose diabetic kidney disease:
- Macroalbuminuria (> 300 mg/g)

Recommend

- Initiate ACE inhibitor or ARB therapy
  - Even if blood pressure is normal
  - Maximize dose as tolerated
- Optimize glycemic control (target A1C < 7.0%)
- Optimize blood pressure control (target < 130/80 mmHg)❖

Follow-up - Microalbuminuria (30 to 300 mg/g)

- Repeat albumin/creatinine ratio every 3 months to monitor response to therapy
- When stable, repeat annually

Follow-up - Macroalbuminuria (> 300 mg/g)

- Repeat protein/creatinine ratio every 3 months to monitor response to therapy
- When stable, repeat annually

❖If blood pressure is ≥130/80 mmHg, see KDOQI Guidelines on Hypertension **http://www.kidney.org/professionals/kdoqi/guidelines.cfm**

Wisconsin Lions Foundation, Inc.

EDUCATIONAL DVD ORDER FORM

The Links to Chronic Kidney Disease: Diabetes, High Blood Pressure, and Family History

Date of Request: _____ **Number of DVDs Requested:** _____

Person Making Request: _____

Address: _____

City: _____ **State:** _____ **Zip Code:** _____

Phone: (_____) _____ **Email:** _____

The partners who developed this educational DVD thank you for helping to prevent chronic kidney disease through the education of people at risk.

Your opinions about the DVD are important. Please provide your comments about this DVD to the Wisconsin Lions Foundation. If commenting via email, please use diabetes@wlf.info.

A ***voluntary*** $10 donation to the Wisconsin Lions Foundation is welcome and appreciated. If you are making a voluntary donation, please make the check payable to:

Wisconsin Lions Foundation Diabetes Education Fund.

Send this order form (and check if making a donation) to:

Liz Shelley
Wisconsin Lions Foundation, Inc.
3834 County Road A
Rosholt, WI 54473

Email: lshelley@wlf.info
Fax: (715) 677-4527
Phone: (877) 463-6953 (toll free)

DILATED RETINAL EYE EXAM COMMUNICATION FORM

This form is to document dilated eye exam results. Place form directly in the person's medical record.

I, _____ give consent to release this medical information.

Step #1: Patient

Patient: Fill out your name, date of birth, phone number, and the names of your Primary Care Clinician and Eye Care Specialist. After your yearly dilated eye exam, please make sure that this form or a copy of this form is returned to your Primary Care Clinician.

Name _____ **Date of Birth**_____ **Phone** _____

Last A1c:_____**%** **Date:**_____ **BP:** _____/_____ **Date:**_____

Primary Care Clinician	Eye Care Specialist
Name	Name
Clinic/Office	Clinic/Office
Address	Address
Phone	Phone
Fax	Fax

Step #2: Eye Care Specialist

Eye Care Specialist: Please complete the information below and return this form or a copy of this form to the patient's Primary Care Clinician listed above.

Eye Exam Date: _____ Were eyes dilated for this exam? ☐ Yes ☐ No

Dear Primary Care Clinician: I have performed an eye exam on your patient. A brief report is provided below.

Retinal Examination Findings:

- ☐ No diabetic retinopathy
- ☐ Diabetic retinopathy requiring no treatment
- ☐ Diabetic retinopathy requiring treatment
- ☐ Other eye disease
- ☐ Report sent to patient's Primary Care Clinician

Follow-up Eye Exam Recommendations:

- ☐ 3 Months
- ☐ 6 Months
- ☐ 1 Year
- ☐ Other: _____

Eye Care Specialist's Signature_____

Step #3: Primary Care Clinician

Primary Care Clinician: Please place this Dilated Retinal Eye Exam Information Form in the patient's medical record.

EYE DVD ORDER FORM

How many DVD(s) would you like to order (indicate number in space) . . .

_____ *Protect Your Vision: the Dilated Eye Exam*

_____ *Diabetic Retinopathy: A Potential Consequence of Uncontrolled Diabetes*

Requesting Company/Organization Information

Contact Name: _____ **Date of Request:** _____

Company/Organization Requesting: _____

Contact Email: _____ **Contact Phone:** (_____) _____

Shipping Address: _____

City: _____ **State:** _____ **Zip:** _____

Share with us how you plan to use the DVD (check all that apply) . . .

☐ Waiting Rooms ☐ Exam Rooms ☐ Support Groups ☐ Community Presentations

☐ Health Fairs ☐ Lunch and Learns ☐ Home Health Visits ☐ Professional Education

☐ Medical Library Resource

Other: _____

_____

Help us evaluate . . .

Protect Your Vision: the Dilated Eye Exam

Overall Quality of DVD: ☐ **Poor** ☐ **Average** ☐ **Above Average** ☐ **Excellent**

Clarity of Information: ☐ **Poor** ☐ **Average** ☐ **Above Average** ☐ **Excellent**

Diabetic Retinopathy: A Potential Consequence of Uncontrolled Diabetes

Overall Quality of DVD: ☐ **Poor** ☐ **Average** ☐ **Above Average** ☐ **Excellent**

Clarity of Information: ☐ **Poor** ☐ **Average** ☐ **Above Average** ☐ **Excellent**

Contribute to the cause . . .

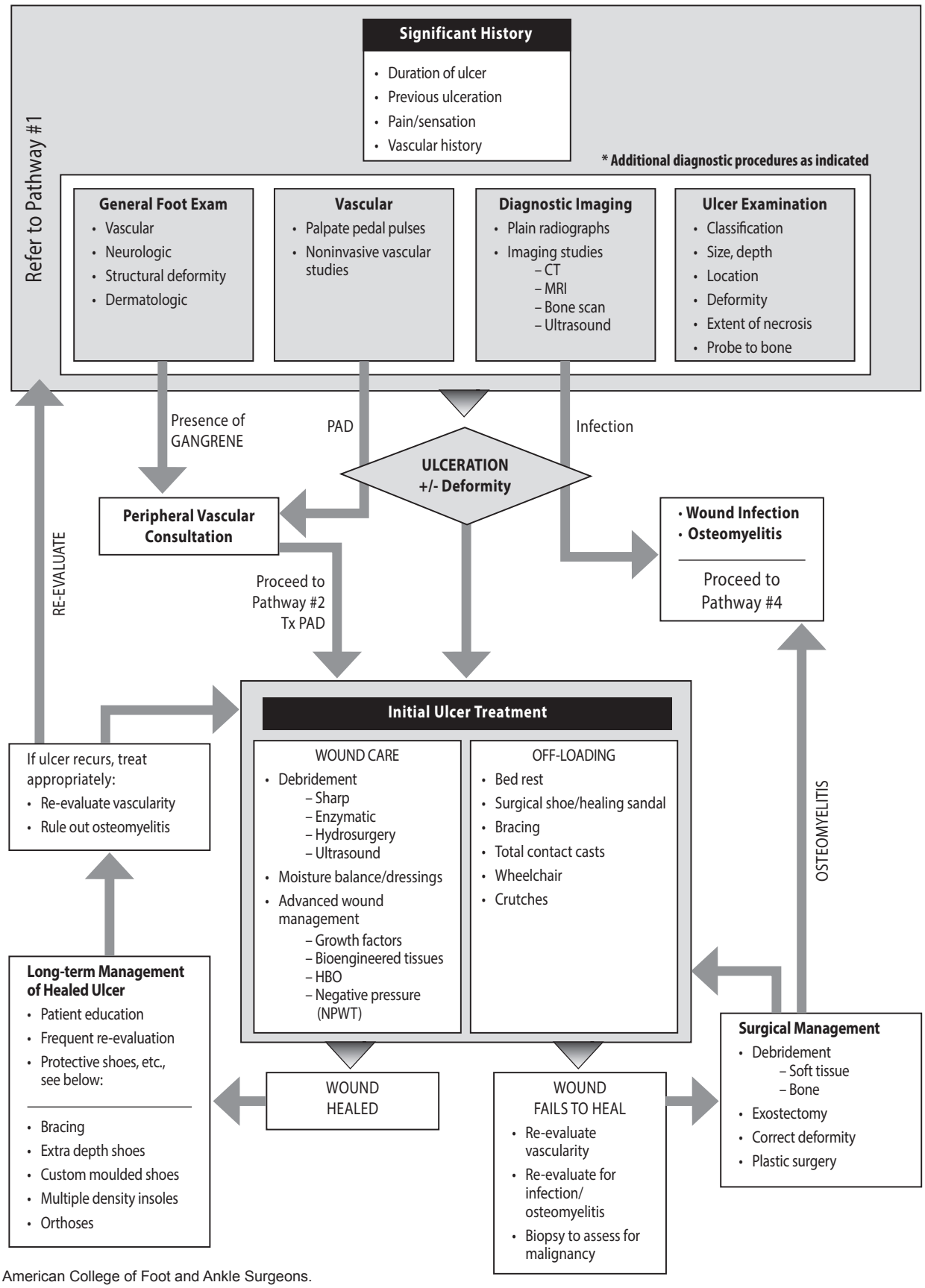
The cost for *each* DVD, including production, packaging, and shipping, is approximately $4. If your company/organization is able to offset even a portion of this cost, it would be greatly appreciated. This *voluntary donation* will be used in Lions' future community diabetes education projects. If you would like to make a voluntary donation, please make check payable to: ***Wisconsin Lions Foundation Diabetes Education Fund.***

Send this order form (and check if making a donation) to:

Wisconsin Lions Foundation
3834 County Road A
Rosholt, WI 54473

Email: wlf@wlf.info
Fax: (715) 677-4527
Phone: (877) 463-6953 (toll free)

DIABETIC FOOT ULCERATION



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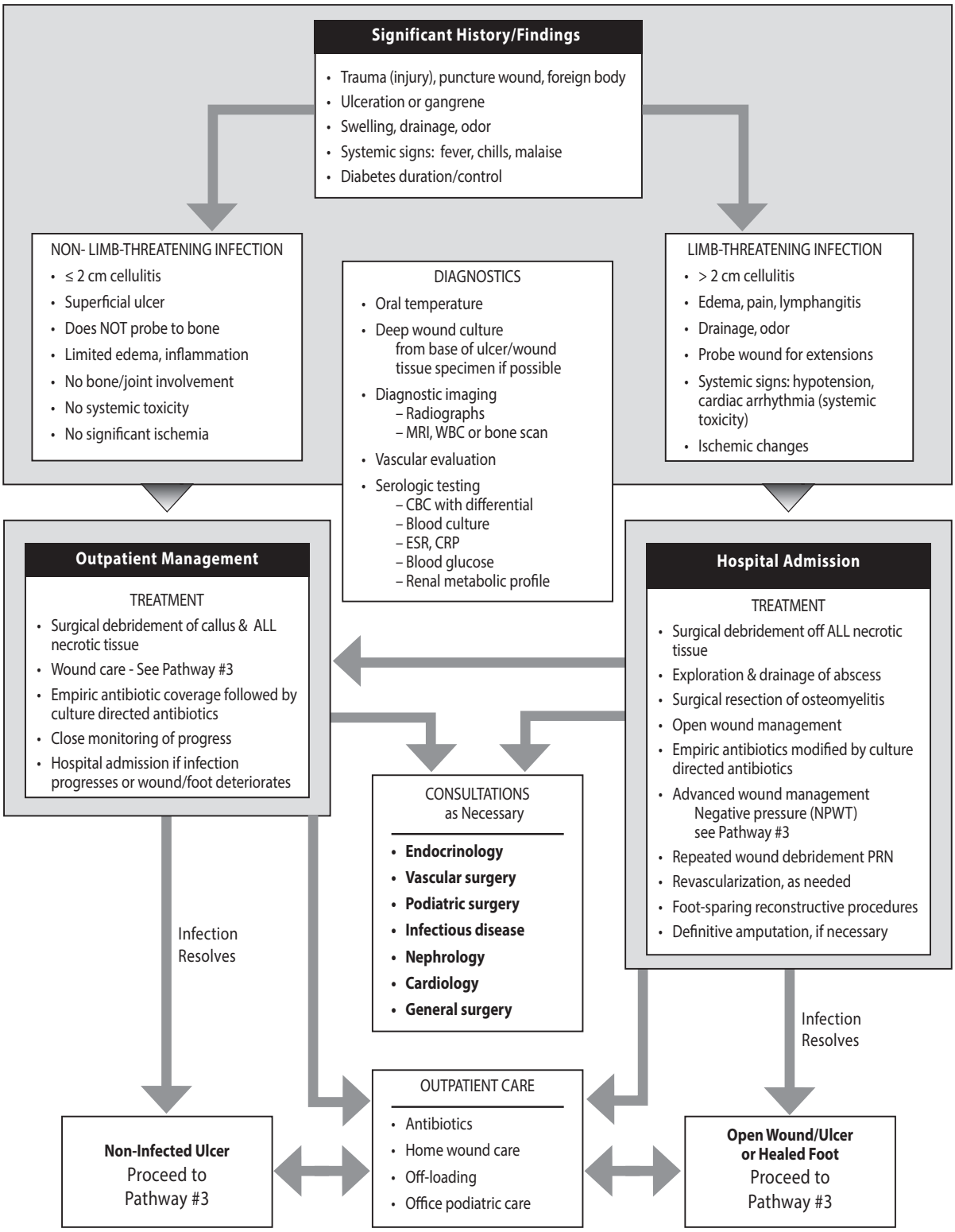
All rights reserved. The full guideline, including details regarding this pathway, is available at: acfas.org/cpg.

Pathway # 2 can be found at: http://www.acfas.org/uploadedFiles/Healthcare_Community/Education_and_Publications/Clinical_Practice_Guidelines/pway2--pad.pdf.

Pathway # 4 can be found at: http://www.acfas.org/uploadedFiles/Healthcare_Community/Education_and_Publications/Clinical_Practice_Guidelines/pway4--infection.pdf.

DIABETIC FOOT INFECTION



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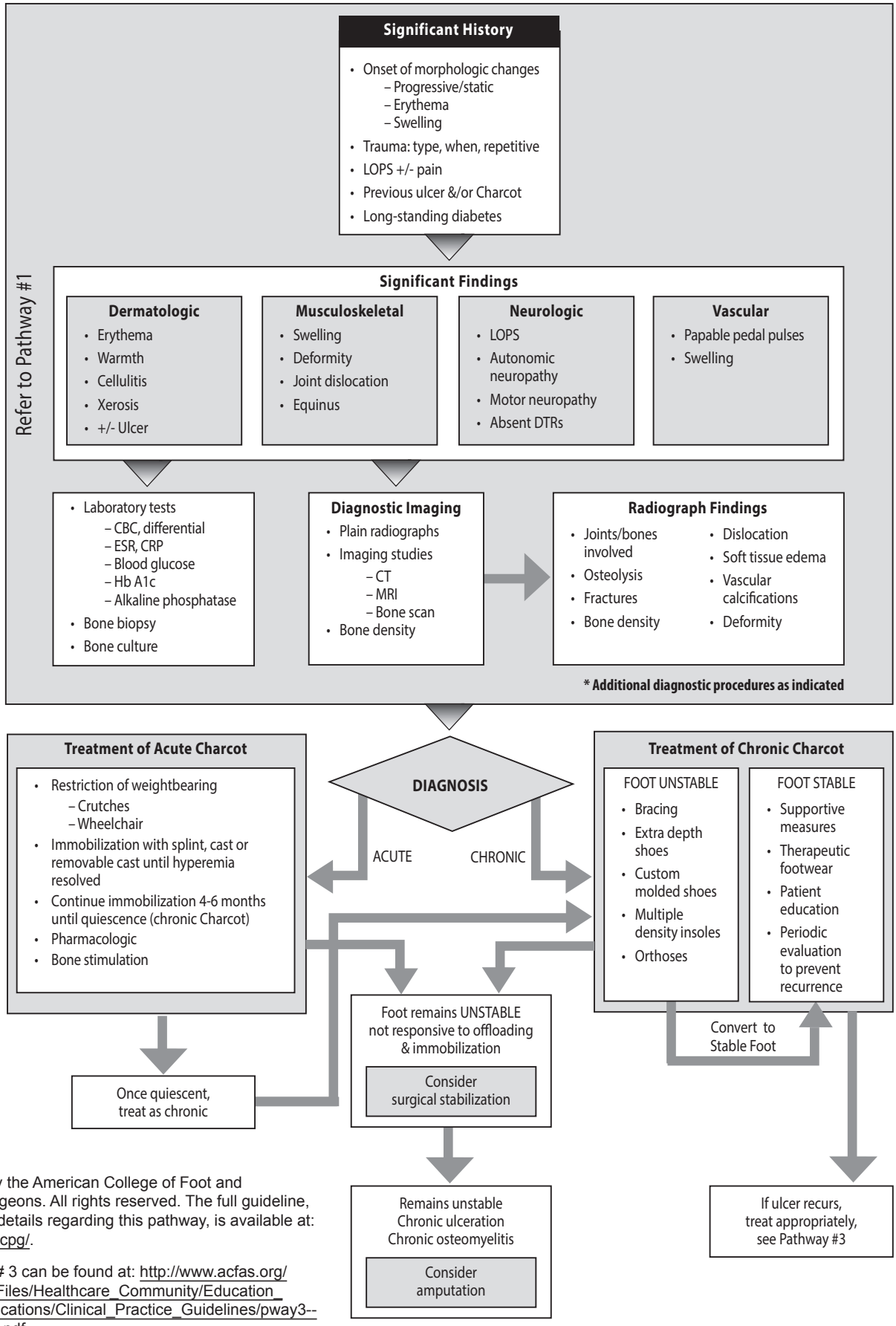
Pathway # 3 can be found at: http://www.acfas.org/uploadedFiles/Healthcare_Community/Education_and_Publications/Clinical_Practice_Guidelines/pway3--ulceration.pdf.

CHARCOT FOOT



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Pathway # 3 can be found at: http://www.acfas.org/uploadedFiles/Healthcare_Community/Education_and_Publications/Clinical_Practice_Guidelines/pway3--ulceration.pdf.

ANNUAL COMPREHENSIVE DIABETES FOOT EXAM FORM

Name: _____ Date: _____ ID#: _____

I. Presence of Diabetes Complications
1. Check all that apply.
❑ Peripheral Neuropathy
❑ Nephropathy
❑ Retinopathy
❑ Peripheral Vascular Disease
❑ Cardiovascular Disease
❑ Amputation *(Specify date, side, and level)*

_____

Current ulcer or history of a foot ulcer?
Y____ N____

For Sections II & III, fill in the blanks with "Y" or "N" or with an "R," "L," or "B" for positive findings on the right, left, or both feet.

II. Current History
1. Is there pain in the calf muscles when walking that is relieved by rest?
Y____ N____
2. Any change in the foot since the last evaluation? Y ____ N____
3. Any shoe problems? Y___ N____
4. Any blood or discharge on socks or hose? Y____ N____
5. Smoking history? Y___N___
6. Most recent hemoglobin A1c result _____% _____ *date*

III. Foot Exam
1. Skin, Hair, and Nail Condition
Is the skin thin, fragile, shiny and hairless? Y ___ N___

Are the nails thick, too long, ingrown, or infected with fungal disease? Y ___ N___

Measure, draw in, and label the patient's skin condition, using the key and the foot diagram below.
C=Callus U=Ulcer PU=Pre-Ulcer
F=Fissure M=Maceration R=Redness
S=Swelling W=Warmth D=Dryness

2. Note Musculoskeletal Deformities
❑ Toe deformities
❑ Bunions (Hallus Valgus)
❑ Charcot foot
❑ Foot drop
❑ Prominent Metatarsal Heads

3. Pedal Pulses Fill in the blanks with a "P" or an "A" to indicate present or absent.
Posterior tibial Left_____ Right_____
Dorsalis pedis Left_____ Right_____

4. Sensory Foot Exam *Label sensory level with a "+" in the five circled areas of the foot if the patient can feel the 5.07 (10-gram) Semme ament and "-" if the patient cannot feel the filament.*

Notes

Right Foot

Left Foot

5. Vibration Perception with 128-Hz tuning fork
Check appropriate box.
❑ Normal (+)
❑ Abnormal (-)

IV. Risk Categorization *Check appropriate box.*

❑ **Low Risk Patient**
All of the following:
❑ Intact protective sensation
❑ Pedal pulses present
❑ No deformity
❑ No prior foot ulcer
❑ No amputation

❑ **High Risk Patient**
One or more of the following:
❑ Loss of protective sensation
❑ Absent pedal pulses
❑ Foot deformity
❑ History of foot ulcer
❑ Prior amputation

V. Footwear Assessment *Indicate yes or no.*
1. Does the patient wear appropriate shoes? Y___ N ___
2. Does the patient need inserts? Y ___ N ___
3. Should corrective footwear be prescribed? Y ___ N ___

VI. Education *Indicate yes or no.*
1. Has the patient had prior foot care education? Y __N__
2. Can the patient demonstrate appropriate foot care? Y__N__
3. Does the patient need smoking cessation counseling? Y__N__
4. Does the patient need education about HbA1c or other diabetes self-care? Y__N__

VII. Management Plan *Check all that apply.*
1. Self-management education:
Provide patient education for preventive foot care. Date: _____
Provide or refer for smoking cessation counseling. Date: _____
Provide patient education about HbA1c or other aspect of self-care. Date: _____
2. Diagnostic studies:
❑ Vascular Laboratory
❑ Hemoglobin A1c (at least twice per year)
❑ Other: _____

3. Footwear recommendations:
❑ None
❑ Athletic shoes
❑ Accommodative inserts
❑ Custom shoes
❑ Depth shoes
❑ Socks

4. Refer to:
❑ Primary Care Provider
❑ Diabetes Educator
❑ Podiatrist
❑ RN Foot Specialist
❑ Pedorthist
❑ Orthotist
❑ Endocrinologist
❑ Vascular Surgeon
❑ Foot Surgeon
❑ Rehab. Specialist
❑ Other: _____

5. Follow-up Care:
Schedule follow-up visit. Date: _____

Provider Signature _____

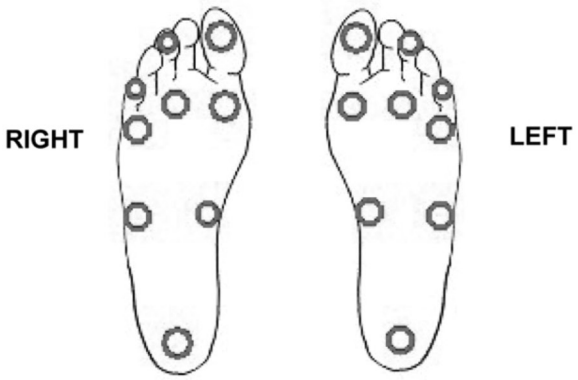
DIABETIC FOOT SCREEN FOR LOSS OF PROTECTIVE SENSATION

National Hansen's Disease Programs, LEAP Program, 1770 Physicians Park Dr., Baton Rouge, LA 70816

Filament Application Instructions:

1) Show the filament to the patient and touch it to his/her hand or arm so that he/she knows it does not hurt.

2) Use the 10 gram filament to test sensation at the indicated sites on each foot as shown. Apply the filament along the perimeter of and NOT on an ulcer, callous, scar, or necrotic tissue.



Note: While five sites on each foot are necessary for proper sensation testing, additional sites are preferred, as shown here.

3) Hold the filament perpendicular to the skin and use a smooth motion when testing. Use a 3 step sequence that includes (1) touch the skin, (2) bend the filament, and (3) lift from the skin *(See Figures 1-3)*. Do not use rapid movement. The approach, skin contact, and departure of the filament should be approximately 1½ seconds duration.

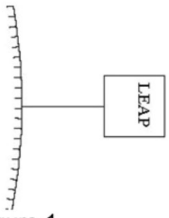


Figure 1

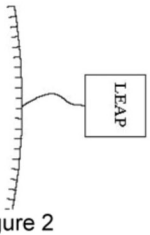


Figure 2

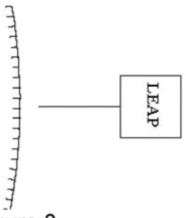


Figure 3

4) Ask the patient to respond "yes" when the filament is felt. If the patient does not respond when you touch a given point on the foot, continue on to another site. When you have completed the sequence, REPEAT the area(s) where the patient did not indicate feeling the filament.

5) Use the filament in a random sequence.

6) On the form, indicate with a minus sign, "—", the areas where the patient did not respond to the filament. LOSS OF PROTECTIVE SENSATION AT ANY ONE OF THE EIGHT SITES INDICATES A FOOT AT HIGH RISK.

7) If you wish to clean the filament, use sodium hypochlorite *(household bleach)* 1:10 solution or follow the infection control disinfecting guidelines in your facility.

JF/06/2005

SHOES *and* SOCKS

take 'em off!

IF YOU HAVE DIABETES

Have your doctor check your feet.

MEDIAS *y* ZAPATOS

¡Sáqueselos!

SI TIENE DIABETES

Pídale a su médico que le vea los pies.

MEDICAL-DENTAL: TEAM REFERRAL FORM

Client Name: _____ **Date of Birth:** _____

Medical Provider: Complete this section

1. Type of diabetes: ❑ Type 1 diabetes ❑ Type 2 diabetes ❑ Other Year diagnosed: _____
2. List medication(s)/insulin: _____
3. Result and date of most recent: A1C: _____ % Date: _____
4. Result and date of most recent blood pressure _____ History of cardiovascular disease: ❑ Yes ❑ No
5. Antibiotic pre-medication required? ❑ Yes ❑ No Drug allergies: _____
6. Inspection of gums and teeth: ❑ Loose, sensitive teeth, and/or separated teeth ❑ Accumulation of food debris and/or plaque around teeth
   ❑ History of abscess ❑ Red, sore, swollen, receding or bleeding gums ❑ Halitosis ❑ Missing teeth ❑ Other _____
7. Medical provider: _____

   Address: _____

   City/State: _____

   Telephone: _____ FAX: _____

Dental Provider: Complete this section

1. Date of dental visit: _____ Next dental appointment or F/U _____
2. Periodontal status (check): ❑ Gingivitis ❑ Early Periodontitis ❑ Moderate Periodontitis ❑ Advanced Periodontitis
3. Dental oral exam findings: _____
4. Treatment provided: _____
5. Dental office recommendations: ❑ F/U with healthcare provider ❑ Other _____
6. Dental provider: _____

   Address: _____

   City/State: _____

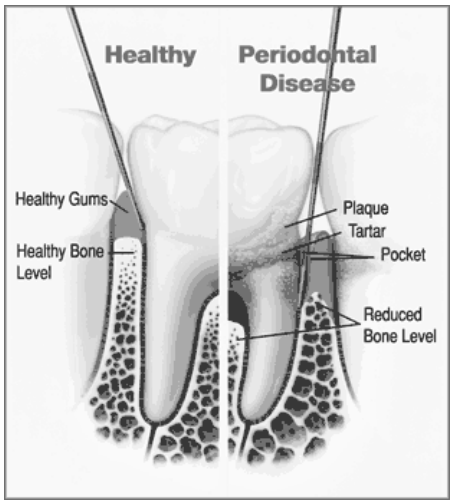
   Telephone: _____ FAX: _____

I, _____, consent to the release and exchange of medical/dental information pertinent to
Client name
my diabetes management and overall healthcare.

PLEASE FAX THIS FORM TO THE REFERRING DENTAL OR MEDICAL PROVIDER.

DIABETES: SCREENING TOOL FOR INSPECTION OF GUMS AND TEETH

Visual inspection of a person's gums and teeth for early signs of periodontal disease at diagnosis, and then at each focused visit can assist with early detection and treatment. The accompanying diagrams may be helpful for understanding the evaluation criteria and the presence of periodontal disease.



Periodontitis is a chronic infectious disease that causes loss of both supporting bone and can lead to tooth loss.

Healthy gums

Early periodontal disease
Gum recession

Severe periodontal disease
Exposed roots

Assign a score based on current findings. Refer to a dentist for further evaluation if score is 4 or more.

More than 6 months since last dental visit	4
Red, sore, swollen, or bleeding gums	4
Loose, sensitive teeth, and/or separated teeth	4
Visible debris or accumulation of hardened material around teeth	3
Exposed roots in the mouth	2
Strong odor in the mouth	1
Smoking or smokeless tobacco use	1
TOTAL SCORE	

PATIENT HEALTH QUESTIONNAIRE (PHQ-9)

NAME: _____ DATE: _____

Over the last two weeks, how often have you been bothered by any of the following problems? *(use "✓" to indicate your answer)*	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself – or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or the opposite – being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead, or of hurting yourself in some way	0	1	2	3
add columns:		+		+
(Health care professional: for interpretation of TOTAL, please refer to accompanying score card.) **TOTAL:**				

10. If you checked off *any* problems, how *difficult* have these problems made it for you to do your work, take care of things at home, or get along with other people?	
Not difficult at all	_____
Somewhat difficult	_____
Very difficult	_____
Extremely difficult	_____

Provided as a service by Pfizer Neuroscience

PHQ-9 is adapted from PRIME MD TODAY, developed by Drs Robert L. Spitzer, Janet B.W. Williams, Kurt Kroenke, and colleagues, with an educational grant from Pfizer Inc. For research information, contact Dr Spitzer at rls@columbia.edu. The names PRIME-MD® andPRIME MD TODAY™ are trademarks of Pfizer Inc.

PHQ-9 QUICK DEPRESSION ASSESSMENT – INSTRUCTIONS FOR USE

for doctor or health care professional use only

For initial diagnosis:

1. Person completes PHQ-9 Quick Depression Assessment.
2. If there are at least 4 ✓s in the gray highlighted section (including Questions #1 and #2), consider a depressive disorder. Add score to determine severity.
3. Consider Major Depressive Disorder.
   - ♦ if there are at least 5 ✓s in the gray highlighted section (one of which corresponds to Question #1 or #2)

   Consider Other Depressive Disorder
   - ♦ if there are 2-4 ✓s in the gray highlighted section (one of which corresponds to Question #1 or #2)

Note: Since the questionnaire relies on individuals self-reporting, the clinician should verify all responses and make a definitive diagnosis on clinical grounds, taking into account how well the individual understood the questionnaire, as well as other relevant information from the individual. Diagnoses of Major Depressive Disorder or Other Depressive Disorder also require impairment of social, occupational, or other important areas of functioning (Question #10) and ruling out normal bereavement, a history of a Manic Episode (Bipolar Disorder), and a physical disorder, medication, or other drug as the biological cause of the depressive symptoms.

To monitor severity over time for newly diagnosed individuals or individuals in current treatment for depression:

1. Individual may complete questionnaires at baseline and at regular intervals (e.g., every 2 weeks) at home and bring them in at their next appointment for scoring or they may complete the questionnaire during each scheduled appointment.
2. Add up ✓s by column. For every ✓: "Several days" = 1, "More than half the days" = 2, "Nearly every day" = 3.
3. Add together column scores to get a TOTAL score.
4. Refer to the accompanying PHQ-9 Scoring Card to interpret the TOTAL score.
5. Results may be included in individual's file to assist you in setting up a treatment goal, determining degree of response, as well as guiding treatment intervention.

PHQ-9 SCORING CARD FOR SEVERITY DETERMINATION

for health care professional use only

Scoring – add up all checked boxes on PHQ-9

For every ✓: Not at all = 0; Several days = 1; More than half the days = 2; Nearly every day = 3

Interpretation of Total Score

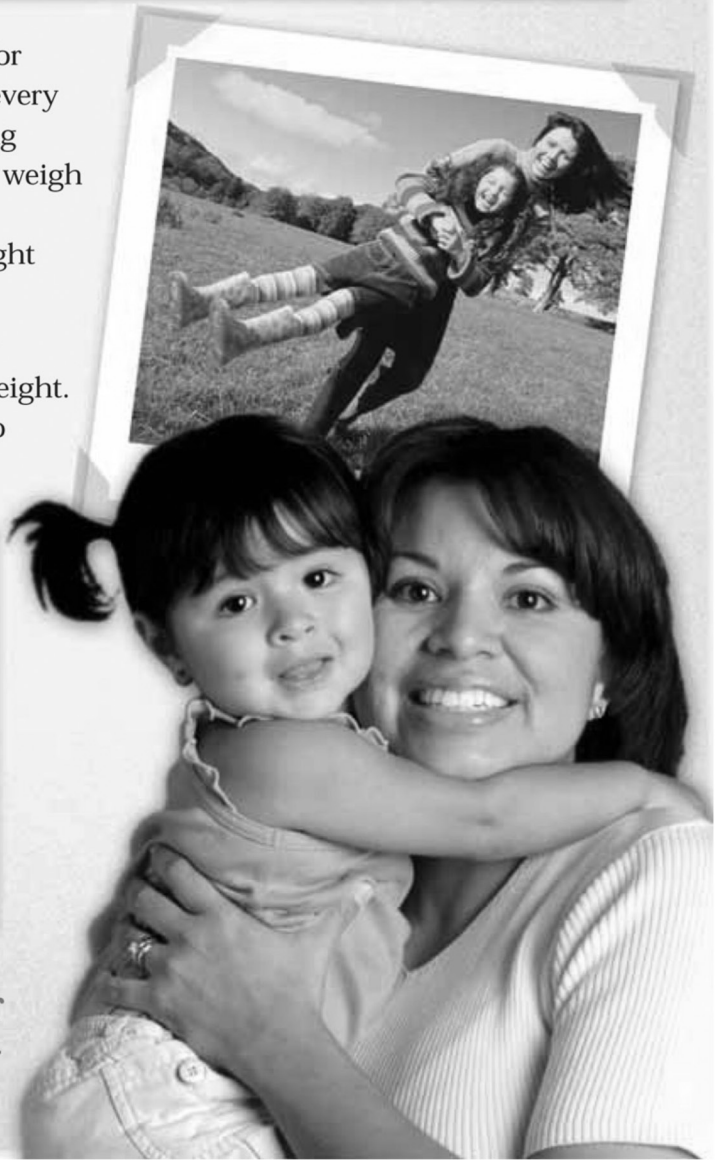
Total Score	Depression Severity
1 – 4	Minimal depression
5 – 9	Mild depression
10 – 14	Moderate depression
15 – 19	Moderately severe depression
20 – 27	Severe depression

It's never too early... to Prevent Diabetes

If you had gestational diabetes when you were pregnant, you and your child have a lifelong risk for getting diabetes.

Because of this risk, you need to be tested for diabetes **after your baby is born,** then every one to two years. Reduce your risk by taking small steps for you and your family. If you weigh too much, you can prevent or delay type 2 diabetes if you lose a small amount of weight and become more active.

Your children can lower their risk for type 2 diabetes if they don't become overweight. Serve them healthy foods and help them to be more active.



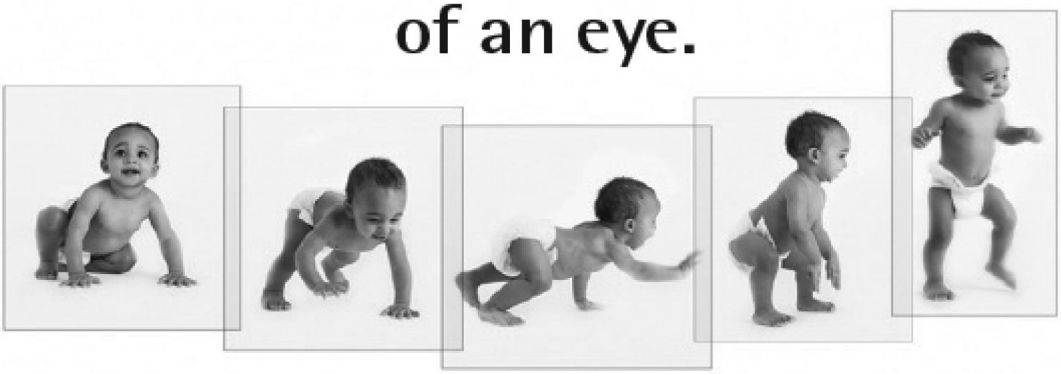
What is Gestational (jes-TAY-shon-al) Diabetes?

It is a type of diabetes that occurs when women are pregnant. Having it raises their risk for getting diabetes, mostly type 2, for the rest of their lives. African American, Hispanic/Latina, American Indian, and Alaska Native women have the highest risk.

A Lifetime of Small Steps for A Healthy Family

National Diabetes Education Program **www.ndep.nih.gov**

They grow up in the blink of an eye.



Don't miss a minute.

Don't let gestational diabetes become type 2 diabetes.

If you've had gestational diabetes, you're more than seven times as likely to develop type 2 diabetes as women who did not have diabetes during pregnancy. But you can lower your risk.

Be sure to tell your health care providers that you have had gestational diabetes. Working with your doctor, healthy eating, and exercising can help prevent type 2 diabetes. Follow these steps so you can enjoy a healthy, active life with your baby.

American Diabetes Association.
CheckUpAmerica®

The American College of Obstetricians and Gynecologists

For more information, visit CheckUpAmerica.org/GDM, or call 1-800-DIABETES.

ASSESSING RISK AND TESTING FOR TYPE 2 DIABETES PATHWAY

Test all persons ≥ age 45

Consider testing any adult with BMI ≥ 25 kg/m^2 and/or one or more risk factors listed below:

- ❑ Physical inactivity
- ❑ A1C ≥ 5.7%, history of impaired glucose tolerance (IGT), or impaired fasting glucose (IFG)
- ❑ Race/ethnicity (Hispanic/Latino, African American, Native American, Asian American, or Pacific Islander)
- ❑ Family history (first-degree relative with diabetes)
- ❑ History of hypertension (> 140/90 mmHg) or on therapy for hypertension
- ❑ History of cardiovascular disease
- ❑ History of dyslipidemia: HDL < 35 mg/dL and/or triglycerides ≥ 250 mg/dL
- ❑ Markers of insulin resistance: (e.g., Acanthosis nigricans and/or waist circumference > 40 inches in men and > 35 inches in women❖)
- ❑ Women with Polycystic Ovary Syndrome (PCOS)
- ❑ History of Gestational Diabetes Mellitus (GDM) in women or delivery of a baby weighing more than 9 pounds at birth♦
- ❑ Schizophrenia and/or severe bipolar disease, or long-term antipsychotic therapy

❖ Waist circumference > 35 inches in Asian men and > 31 inches in Asian women

♦ Very high risk of developing type 2 diabetes

Check Fasting Plasma Glucose (FPG), Oral Glucose Tolerance Test (OGTT), or A1C
Use code 790.29 (pre-diabetes not otherwise specified)

FPG < 100 mg/dL
OGTT < 140 mg/dL
A1C < 5.7%

Results Normal; No Pre-Diabetes Detected

Retest in 3 years if:

- ≥ 45 years old
- Prior normal FPG
- No risk factors

Retest in 1 year if:

- One or more risk factors
- History of GDM
- History of PCOS

People ≥ 45 years old and with any risk factors for type 2 Diabetes benefit from:

- Assessment, education, and support for lifestyle change:
  - Weight reduction (goal of > 7% of body weight or more)
  - Aerobic activity (goal of 150 min/wk or more)
- Strategies to assist with behavior change
- Positive support and guidance
- Annual screening test to assure early detection

FPG 100-125 mg/dL
OGTT 140-199 mg/dL
A1C 5.7-6.4%

FPG ≥ 126 mg/dL
OGTT > 200 mg/dL
A1C ≥ 6.5%

Confirm/Repeat Test (prefer using the same test)

FPG < 100 mg/dL
OGTT < 140 mg/dL
A1C < 5.7%

FPG 100-125 mg/dL
OGTT 140-199 mg/dL
A1C 5.7-6.4%

FPG ≥ 126 mg/dL
OGTT > 200 mg/dL
A1C ≥ 6.5%

Consider

Repeat test in 3-6 months

Especially for those with:

- **One prior abnormal FPG**
- History of GDM
- Women with PCOS
- Multiple risk factors

FPG, OGTT, A1C

FPG < 100 mg/dL
OGTT < 140 mg/dL
A1C < 5.7%

FPG 100-125 mg/dL
OGTT 140-199 mg/dL
A1C 5.7-6.4%

FPG ≥ 126 mg/dL
OGTT > 200 mg/dL
A1C ≥ 6.5%

Dx Pre-Diabetes

Use code 790.21 (IFG) or 790.22 (IGT)

Refer for or provide:

- Assessment, education and support lifestyle changes
- Assess Cardiovascular Disease (CVD) risk (see section 5)
- Consider Metformin in very high risk individuals
- Follow-up annually

Dx Type 2 Diabetes

Refer for:

- Self-Management Education and Medical Nutrition Therapy
- Start metformin
- Assess Cardiovascular Disease (CVD) risk (see section 5)
- Implement WI Essential Diabetes Care Guidelines

American Diabetes Association.

ALERT!DAY

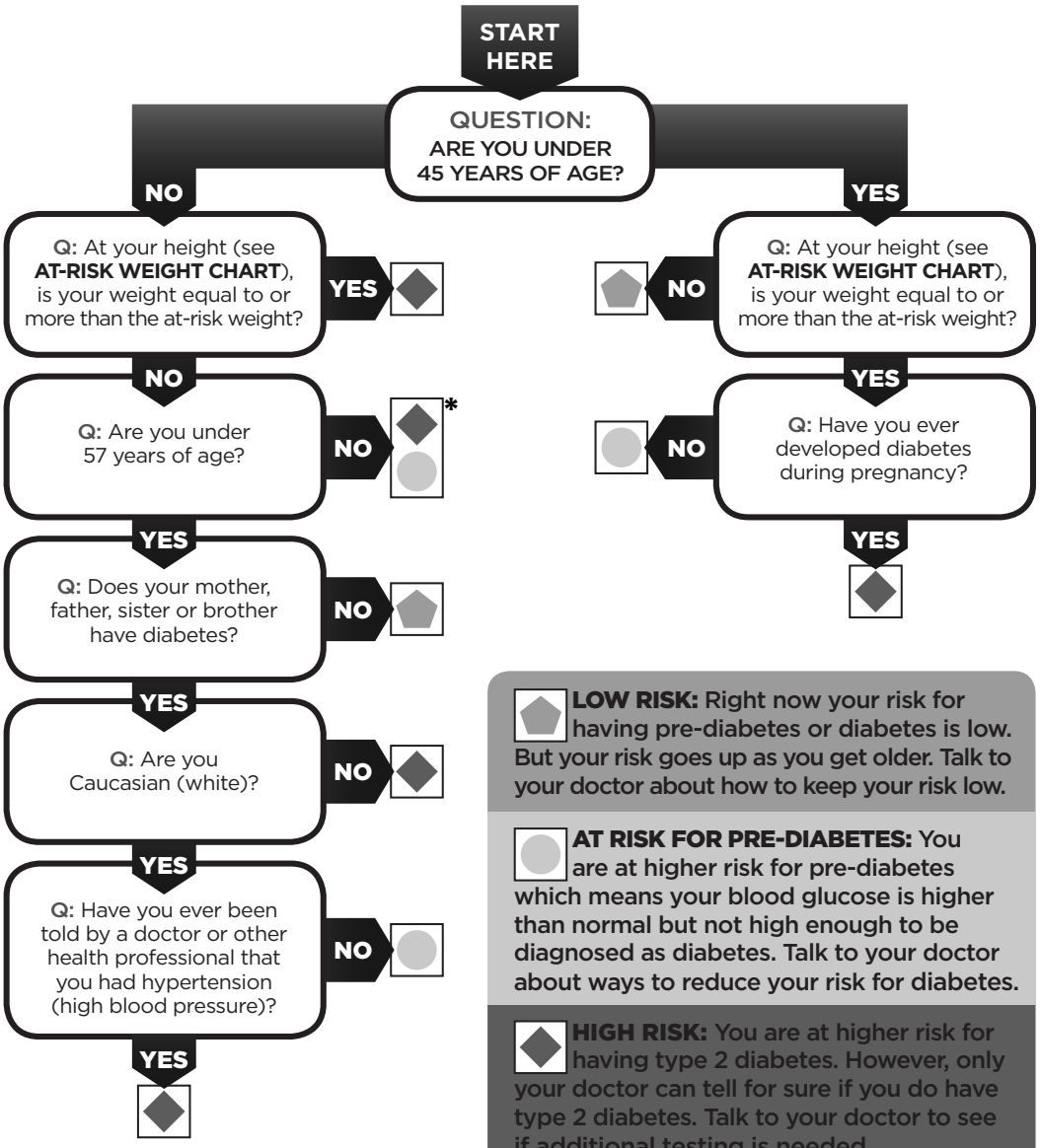
ARE YOU AT RISK?

DIABETES RISK TEST

Calculate Your Chances for Type 2 or Pre-Diabetes

The American Diabetes Association has revised its Diabetes Risk Test according to a new, more accurate statistical model. The updated test includes some new risk factors, and projects risk for pre-diabetes as well as diabetes.

This simple tool can help you determine your risk for having pre-diabetes or diabetes. Using the flow chart, answer the questions until you reach a colored shape. Match that with a risk message shown below.



LOW RISK: Right now your risk for having pre-diabetes or diabetes is low. But your risk goes up as you get older. Talk to your doctor about how to keep your risk low.

AT RISK FOR PRE-DIABETES: You are at higher risk for pre-diabetes which means your blood glucose is higher than normal but not high enough to be diagnosed as diabetes. Talk to your doctor about ways to reduce your risk for diabetes.

HIGH RISK: You are at higher risk for having type 2 diabetes. However, only your doctor can tell for sure if you do have type 2 diabetes. Talk to your doctor to see if additional testing is needed.

AT-RISK WEIGHT CHART

HEIGHT	WEIGHT
4'10"	148 LBS
4'11"	153 LBS
5'0"	158 LBS
5'1"	164 LBS
5'2"	169 LBS
5'3"	175 LBS
5'4"	180 LBS
5'5"	186 LBS
5'6"	192 LBS
5'7"	198 LBS
5'8"	203 LBS
5'9"	209 LBS
5'10"	216 LBS
5'11"	222 LBS
6'0"	228 LBS
6'1"	235 LBS
6'2"	241 LBS
6'3"	248 LBS
6'4"	254 LBS
6'5"	261 LBS

STOP DIABETES.

1-800-DIABETES

diabetes.org/risktest

*Your risk for diabetes or pre-diabetes depends on additional risk factors including weight, physical activity and blood pressure.

50+ Tips to Prevent Type 2 Diabetes

Reduce Portion Sizes

#1 Less on Your Plate, Nate.

#2 Keep meat, poultry and fish portions to about 3 ounces (about the size of a deck of cards).

#3 Try not to snack while cooking or cleaning the kitchen.

#4 Try to eat meals and snacks at regular times every day.

#5 Make sure you **eat breakfast** everyday.

#6 Use broth and cured meats (smoked turkey and turkey bacon) in small amounts. They are high in sodium. Low sodium broths are available in cans and in powdered form.

#7 **Share** a single dessert.

#8 When eating out, have a big vegetable salad, then split an entrée with a friend or have the other half wrapped to go.

#9 Stir fry, broil, or bake with non-stick spray or low-sodium broth and cook with less oil and butter.

#10 Drink a glass of water 10 minutes before your meal to take the edge off your hunger.

#11 Make **healthy choices** at fast food restaurants. Try grilled chicken (remove skin) instead of a cheeseburger. Skip the french fries and choose a salad.

#12 Listen to music while you eat instead of watching TV (people tend to eat more while watching TV).

#13 Eat slowly. It takes 20 minutes for your stomach to send a signal to your brain that you're full.

#14 Eat a small meal, Lucille.

#15 Teaspoons, salad forks, or child-size utensils may help you take smaller bites and eat less.

#16 You don't have to cut out the foods you love to eat. Just **cut down** on your portion size and eat it less often.

#17 Make less food look like more by serving your meal on a salad or breakfast plate.

Move More Each Day

#18 Dance It Away, Faye.

#19 Show your kids the dances you used to do when you were their age.

#20 Turn up the music and **jam** while doing household chores.

#21 Deliver a message in person to a co-worker instead of e-mailing.

#22 Take the stairs to your office. Or take the stairs as far as you can, and then take the elevator the rest of the way.

#23 Make fewer phone calls. Catch up with friends on a regular basis during a planned **walk**.

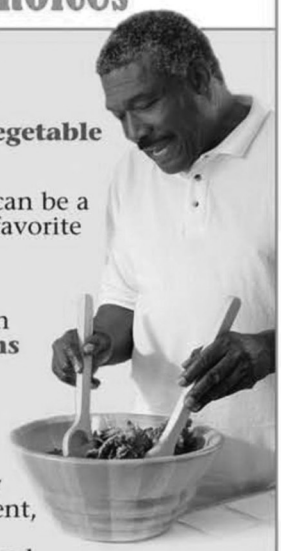
#24 March in place while you watch TV.

#25 Park as far away as possible from your favorite store at the mall.

#26 Select a physical activity video from the store or library.

#27 Get off of the bus one stop early and walk the rest of the way home or to work several times a week.

Make Healthy Food Choices



#28 Snack On a Veggie, Reggie

#29 Try getting one new fruit or **vegetable** every time you grocery shop.

#30 Low-fat macaroni and cheese can be a main dish. Serve it with your favorite vegetable and a salad.

#31 Try eating foods from other countries. Many dishes contain more vegetables, **whole grains** and beans and less meat.

#32 Cook with a mix of spices instead of salt.

#33 Find a **water** bottle you really like (from a church or club event, favorite sports team, etc.) and drink water from it wherever and whenever you can.

#34 Always keep a healthy snack with you, such as fresh fruit, handful of nuts, whole grain crackers.

#35 Choose veggie toppings like spinach, broccoli, and peppers for your pizza.

#36 Try different recipes for baking or **broiling** meat, chicken and fish.

#37 Try to choose foods with little or no added sugar.

#38 Gradually work your way down from whole milk to 2% milk until you're drinking and cooking with **fat-free** (skim) or low-fat milk and milk products.

#39 Eat foods made from whole-grains—such as whole wheat, brown rice, oats, and whole-grain corn—every day. Use whole-grain bread for toast and sandwiches; substitute brown rice for white rice for home-cooked meals and when dining out.

#40 Don't grocery shop on an empty stomach. Make a list before you go to the store.

#41 Read food labels. Choose foods low in saturated fats, *trans* fats, cholesterol, salt (sodium), and added sugars.

#42 **Fruits** are colorful and make a welcome centerpiece for any table. Enjoy the company of family and friends while sharing a bowl of fruit.

#43 Slow down at snack time. Eating a bag of low-fat **popcorn** takes longer than eating a slice of cake. Peel and eat an orange instead of drinking orange juice.

#44 Try keeping a written record of what you eat for a week. It can help you see when you tend to overeat or eat foods high in fat or calories.

Nurture Your Mind, Body and Soul

#45 You Can Exhale, Gail.

#46 Don't try to change your entire way of eating and increasing your **physical activity** all at once. Try one new activity or food a week.

#47 Find mellow ways to **relax**—try deep breathing, take an easy paced walk, or enjoy your favorite easy listening music.

#48 Give yourself daily "pampering time." Honor this time, whether it's **reading** a book, taking a long bath, or meditating.

#49 Try not to eat out of boredom or frustration. If you are not hungry, do something else, such as taking a long walk.

Be Creative

#50 Honor your health as your most precious gift.

#51 Make up your own

#52 _____

_____

#53 _____

_____

_____

There are many more ways to prevent or delay diabetes by making healthy food choices and moving more. Discover your own and share them with your family, friends, and neighbors.

Control your Diabetes. For Life.

Section 1: General Recommendations for Care

Concern	Care/Test	Frequency
General Recommendations for Care	▪ Perform diabetes-focused visit	Type 1: Every 3 months❖ Type 2: Every 3 – 6 months❖
	▪ Review management plan; assess barriers and goals	Each focused visit; revise as needed
	▪ Assess physical activity level	Each focused visit
	▪ Assess nutrition/weight/growth	Each focused visit

❖ Consider more often if A1C ≥ 7.0% and/or individual risk and/or complications exist or less often if at goal an individual risk and/or complication do not exist.

MAIN TOPICS INCLUDED IN THIS SECTION:

- Diabetes Health Care Team
- Diabetes-Focused Visit Frequency
- Medical Home
- Diabetes Across the Life Span
- Physical Activity
- Nutrition
- Weight and Growth
- Bariatric Surgery
- Sleep-Disordered Breathing and Diabetes
- Disaster Preparedness
- Sharps Disposal
- Additional Resource
- References

Diabetes Health Care Team

People with diabetes need to participate in a health care delivery system that provides high quality, patient-centered care on an ongoing basis. This approach assures that timely changes in their treatment are made to achieve optimal control of diabetes. Ongoing communication among all professionals involved in treating the person with diabetes is essential to ensure optimal diabetes management.

No single practitioner is expected to provide all of the care required by a person with diabetes. While the primary care provider is responsible for ongoing care, people with diabetes gain even greater benefit when they have access to a **multidisciplinary health care team.** This team consists of primary health care providers and specialists with particular skills and expertise and an interest in diabetes care. Team members with special knowledge in diabetes education, nutrition, pharmacy, podiatry, wound care, ophthalmology, dentistry, nephrology, neurology, cardiology, exercise physiology, social work, and counseling may be needed. Each member of the multidisciplinary health care team is in the unique position to deliver prevention messages, communicate the need for metabolic control, reinforce screening recommendations, and encourage a proactive approach to diabetes care. Collaboration and communication are essential components of a **team care** approach. A system for referrals can facilitate coordination of care. In areas where it is impractical to develop a team, it is beneficial to develop a system for ongoing consultation and referrals for these essential services.

The person who has diabetes, his/her family, the primary care provider, and other members of the health care team should develop the management plan together. Management goals should be negotiated with each person individually and should be realistic and achievable. In evaluating the person's management plan, make sure the goals are outcome-driven, with success measured through metabolic parameters, such as self-monitored blood glucose (SMBG) results, A1C and lipid levels, body weight, blood pressure, and quality of life. Health care providers with expertise in meeting the special medical, educational, nutritional, and behavioral needs of children and adolescents should provide diabetes management for children and adolescents.

Diabetes-Focused Visit Frequency

A diabetes-focused visit is a regularly scheduled appointment for the primary purpose of assessing diabetes care. During a diabetes-focused visit, it is important to address:

- Current self-care management skills, needs, and barriers
- Review individual goals
- SMBG data and most recent A1C level
- Nutrition needs and weight/body mass index/growth
- Physical activity status
- Medication and insulin use and related side effects.
- Frequency, severity, and treatment of hypoglycemia
- Preventive exams (e.g., dilated eye exam, comprehensive foot exam, oral/dental screening, kidney screening, and any other preventive exams for general health)
- Psychosocial concerns (e.g., screening for depression, anxiety, sexual disorders, eating disorders)
- Blood pressure control and lipid management
- Sleep apnea assessment
- Lifestyle modifications
- Potential referrals to other team members and scheduled follow-up with primary care provider

The recommended frequency of diabetes-focused visits is quarterly for people with type 1 diabetes and every three to six months for people with type 2 diabetes. However, frequency of visits may vary if blood glucose goals are not met, changes in the treatment plan are needed, and/or the presence of complications or other medical conditions exist.

All visits for people with diabetes are an opportunity to advance the treatment and management of diabetes. Diabetes-focused visits at the recommended frequency are needed in addition to routine physical examinations and general health care visits. An incidental, acute care visit for another health care need does not meet or fulfill the intent of a diabetes-focused visit but may provide an opportunity to review the impact of diabetes control on the current health concern. The availability of a diabetes checklist or flow sheet to provide ready access to essential components of diabetes care is especially useful in integrating diabetes care with other personal concerns during a non-diabetes related visit. For an example of a flow sheet, see the tool titled "Diabetes Flow Sheet/Chart Audit Tool" in the Tools Section.

Medical Home

All persons with diabetes should receive coordinated, ongoing, comprehensive care within a medical home. A medical home is an approach to providing comprehensive primary health care in a high quality and effective manner to children, adolescents, adults, and older adults. The ideal medical home includes a primary care provider or specialist and a diabetes team who work in partnership with the person who has diabetes.

Whether a person with diabetes is cared for within a medical home or not, coordination of care is essential to assure that appropriate consultation and co-management by specialty services occurs in a timely manner.

Diabetes Across the Life Span

Diabetes can occur at anytime across the lifespan and taking care of diabetes is a lifelong process. Experts have identified core messages for maintaining health at every stage of life. The diagram "Healthy People at Every Stage of Life Framework: Core Messages," found at http://www.dhs.wisconsin.gov/publications/P0/P00237.pdf provides an overview of one model that lists important health messages to provide to people at every stage of life. Diabetes care and management can be incorporated into this model for each of the various life stages as diabetes care needs and treatment change over time.

Physical Activity

To promote and preserve good health, all people should maintain a physically active lifestyle, including those who have diabetes. There is evidence that in older adults, physical activity reduces the risk of falls and injuries from falls (Nelson et al., 2007).

It is recommended that people with diabetes perform moderate-intensity aerobic (endurance) physical activity for a minimum of 150 minutes over at least 3 days each week or vigorous-intensity aerobic activity for a minimum of 75 minutes over at least three days each week. Moderate-intensity aerobic activity involves a moderate level of effort relative to an individual's aerobic fitness. On a 10-point scale, where sitting is 0 and all-out effort is 10, moderate-intensity activity is a 5 or 6 and produces noticeable increases in heart rate and breathing. On the same scale, vigorous-intensity activity is a 7 or 8 and produces large increases in heart rate and breathing.

In addition to aerobic exercise, it is recommended that adults also do muscle-strengthening (resistance type) activities that involve all major muscle groups at least two or more days per week. Clinical trials have shown strong evidence for the A1C lowering effect of resistance training in adults with type 2 diabetes as well as improvement in many abnormalities associated with metabolic syndrome. Therefore, people with all types of diabetes should include physical activity (aerobic + resistance type) as part of the treatment plan unless contraindicated.

Medical evaluation and individualized guidelines for managing a safe physical activity program are necessary before starting physical activity. Prior to initiation of any physical activity program, evaluate for any underlying or undetected complications affecting the eyes, heart and blood vessels, kidneys, or nervous system. For more on stress testing prior to physical activity, see *Section 5: Cardiovascular Care*.

The potential peripheral neuropathic complications of diabetes require attention to strategies that prevent trauma and/or prevent aggravation of existing foot problems. Discuss proper footwear, socks, and the potential use of shoe inserts when reviewing physical activity regimens. Vascular and structural changes can cause foot injury at any time, making regular re-evaluation of footwear necessary. People with peripheral neuropathy may need physical activity modifications. Hydration can affect blood glucose levels and heart function. Adequate hydration prior to and during physical activity is recommended.

People with type 1 diabetes who do not have complications and are in good glucose control can participate in all levels of physical activity. However, persons should check ketones if blood sugar is greater than 250 mg/dL. Tracking blood glucose data with physical activity records allows for adjustment of insulin and caloric intake to allow safe participation in activities. Referral to a personal trainer can reduce risk of injury and optimize goals for physical activity.

Providing specific instructions for physical activity in the form of a prescription can effectively motivate consistent and sustained physical activity. Such a prescription may direct the agreed type of activity, amount or duration, frequency, and rate of increase. For an example prescription that could be used for physical activity, see the tool titled "Practice Prevention Prescription Template" in the Tools Section.

It is important to individualize any physical activity plan for people with diabetes. The following are general guidelines for people with diabetes:

- Have a medical evaluation prior to beginning a physical activity program; the presence of specific long-term complications of diabetes may be contraindications to general physical activity recommendations.
- Avoid physical activity if fasting glucose levels are > 250 mg/dL and ketones are present (especially for people with type 1 diabetes).
- Use caution if glucose levels are > 300 mg/dL and ketones are not present.
- Consume carbohydrate if glucose levels are < 100 mg/dL before physical activity to prevent low glucose levels, especially if taking oral sulfonylureas and/or insulin.
- Have carbohydrate-based foods readily available during and after physical activity as glucose levels are known to drop for hours after physical activity has ended (for those with type 1 diabetes, the potential for low glucose levels can last up to 24 hours).
- Learn the glycemic response to different physical activity conditions and identify when changes in insulin and/or food intake are necessary. For the athlete with diabetes, factors to consider include: type of competition/sport, intensity and duration of the activity, time of day, and stress.

The following information regarding physical activity for children and adolescents, adults, and older adults are general recommendations. All people with diabetes, regardless of age, must consult with their primary care provider to reduce risk of injury or harm.

Physical Activity for Children and Adolescents

Physical activity is a fundamental part of a healthy lifestyle for all children and adolescents. Children and adolescents with diabetes can participate in gym class and after-school sports, just as any other student can. When participating in school-based activities, a Diabetes Medical Management Plan (DMMP) should outline specific instructions for physical activity. For additional information on diabetes care in children and adolescents in the school system (including specific information on physical activity), refer to the resource Students with Diabetes: A Resource Guide for Wisconsin Schools and Families, located at: http://www.dhs.wisconsin.gov/diabetes/srg.HTM.

Increases in metabolism/carbohydrate burning can cause a low blood sugar during or after a period of vigorous physical activity. A child may need to consume additional carbohydrate before, during, or after physical activity. It is recommended that a child check his/her blood glucose level before starting an activity to use as a guide for carbohydrate replacement. The general rule is to consume 15 grams of carbohydrate (1 carb serving) for every hour of activity to prevent a hypoglycemic episode.

Children and adolescents with type 1 diabetes are more likely to develop ketones if they participate in physical activity with high blood glucose levels. Participating in physical activity when urine ketones are present will result in accelerated production of ketones, which can quickly lead to diabetic ketoacidosis and dehydration.

If participating in organized sports, ensure that all coaches are aware of the child's diabetes and that a responsible person is present to provide any necessary help if the child has a low blood glucose reaction (including administration of Glucagon).

Physical Activity for Adults

All healthy adults aged 18 to 65 years need moderate-intensity aerobic (endurance) physical activity for a minimum of 150 minutes over at least three days each week or vigorous-intensity aerobic activity for a minimum of 75 minutes over at least three days each week. Performing bouts of moderate-intensity aerobic activity (generally equivalent to a brisk walk and noticeably accelerating the heart rate) each lasting 10 or more minutes can accumulate toward the 150 minute minimum. Vigorous-intensity activity causes rapid breathing and is exemplified by activities such as jogging, bicycling, and dancing. In addition, every adult should perform activities that maintain or increase muscle strength and endurance a minimum of two days each week.

Because of the dose-response relationship between physical activity and health, adults who wish to further improve their personal fitness, reduce their risk for chronic diseases and disabilities, or prevent unhealthy weight gain, will likely benefit by exceeding the minimum recommended amount of physical activity.

Physical Activity for Older Adults and Adults with Clinically Significant Functional Limitations*

*American College of Sports Medicine and American Heart Association recommendations for men and women age 65 and older and adults age 50 to 64 with clinically significant chronic conditions or functional limitations that affect movement ability, fitness, or physical activity. Adults age 50 to 64 with chronic conditions that do not affect their ability to be active should follow the adult recommendation.

It is recommended that older adults perform moderate-intensity aerobic (endurance) physical activity for a minimum of 150 minutes over at least three days each week or vigorous-intensity aerobic activity

for a minimum of 75 minutes on at least three days each week. However, it is important to take into consideration individual circumstances and limitations. **Cardiac stress testing may be appropriate for older adults who are planning to start a new physical activity program.** For more on stress testing prior to physical activity, see *Section 5: Cardiovascular Care*.

Given the variety of fitness levels in older adults, a moderate-intensity walk is a slow walk for some and a brisk walk for other older adults. Individuals can perform a combination of moderate- and vigorous-intensity activity to meet minimum recommendation. Older persons who wish to improve their personal fitness, reduce their risk for chronic diseases and disabilities, or prevent unhealthy weight gain, will likely benefit by exceeding the minimum recommended amount of physical activity. These moderate- or vigorous-intensity activities are in addition to the light-intensity activities frequently performed during daily life (e.g., self care, washing dishes) or moderate-intensity activities lasting 10 minutes or less (e.g., taking out trash, walking to parking lot from store or office).

In addition, at least twice each week, older adults should perform muscle strengthening activities using the major muscles of the body that maintain or increase muscular strength and endurance. It is recommended that individuals perform 8–10 exercises on at least two nonconsecutive days per week using the major muscle groups. To maximize strength development, it is recommended that individuals use a resistance (weight) that allows 10–15 repetitions for each exercise. The best level of effort for muscle-strengthening activities is moderate to high.

To maintain the flexibility necessary for regular physical activity and daily life, older adults should perform activities that maintain or increase flexibility on at least two days each week for at least 10 minutes each day. To reduce risk of injury from falls, community-dwelling older adults with substantial risk of falls should perform activities that maintain or improve balance. Older adults with one or more medical conditions for which physical activity is therapeutic should perform physical activity in a manner that effectively and safely treats the condition(s).

Older adults need to have a plan for obtaining sufficient physical activity that addresses each recommended type of activity. Those with chronic conditions for which activity is therapeutic need a single plan that integrates prevention and treatment. For older adults who are not active at recommended levels, plans can include a gradual (or stepwise) approach to increase physical activity over time. Many months of activity at less than recommended levels is appropriate for some older adults (e.g., those with low fitness) as they increase activity in a stepwise manner. Encourage older adults to self-monitor their physical activity on a regular basis and to reevaluate plans as their abilities improve or as their health status changes.

Nutrition

Nutritional intake or "healthful eating" is at the foundation of optimal blood sugar control and is essential to an overall healthy lifestyle. However, it is important to note that eating plans for people with diabetes have changed over time from strict "diabetic diets" to food choices recommended today based on the same dietary guidelines recommended for all Americans which include:

- Eat a variety of foods including vegetables, fruits, whole grains, non-fat dairy foods, healthy fats, and lean meats or meat substitutes.
- Eat balanced meals throughout the day to meet individual calories needs while controlling portion sizes
- Limit foods with excess fat, cholesterol, salt (sodium), and sugar
- Keep food safe to eat with proper food handling and storage

A meal plan developed with a registered dietitian who knows about diabetes can help in making the best food choices for each individual's health needs. The meal plan should take into account food preferences including cultural foods, eating habits (including snacking), and medical nutrition therapy (MNT) needed for other conditions such as hypertension, hyperlipidemia, and weight control. A registered dietician has expertise in creating meal plans that balance the nutritional content of foods to meet energy needs and medical needs. Refer to *Section 3: Medical Nutrition Therapy* for more information on meal planning.

Weight and Growth

Weigh adults at every visit and periodically assess body mass index (BMI) as the measurement of choice to determine health risks due to overweight or obesity.

BMI is a mathematical formula (ratio between height and weight) that correlates with body fat and is a better predictor of disease risk than body weight alone. BMI is body weight (in kg) divided by height (in m^2). Calculate BMI by using an automatic BMI calculator such as the example located at: http://www.cdc.gov/healthyweight/assessing/bmi/index.html or by using one of the following equations:

BMI = [weight in pounds / (height in inches)^2] x 703
BMI = [weight in kilograms / (height in meters)^2]

For adults, a BMI ≥ 25.0 kg/m^2 but < 30 kg/m^2 denotes overweight and a BMI ≥ 30 kg/m^2 denotes obesity. Table 1-1 provides categories of weights related to BMI in adults.

Approximately 88% of adults with diabetes are either overweight or obese. For a sample adult BMI chart, see the tool titled "Body Mass Index (BMI) Table for Adults" in the Tools Section. This chart is not appropriate for frail or sedentary elderly individuals, women who are pregnant or lactating, or competitive athletes or body builders.

Table 1-1: Weight Status Categories Associated with Body Mass Index Ranges for Adults

BMI (in kg/m^2)	Weight Status
Below 18.5	Underweight
18.5 – 24.9	Normal
25.0 – 29.9	Overweight
30.0 and Above	Obese

In addition to measuring body mass index (BMI), tracking changes in waist circumference over time may be beneficial. The waist circumference measurement can provide an estimate of increased abdominal fat even in the absence of a change in BMI. In obese patients with metabolic complications, changes in waist circumference are useful predictors of changes in cardiovascular risk factors. Table 1-2 provides obesity classification related to BMI and waist circumference measurements.

Waist circumference can also be a better indicator of obesity-related diseases compared to BMI, especially among different populations. The elderly and individuals with less muscle mass tend to have underestimated BMI values. Certain ethnic groups are genetically predisposed to storing more fat in the abdomen, even at healthy weights; these include non-Hispanic blacks, Mexican Americans, non-Hispanic whites, and people of Asian descent.

The waist circumference measurement is taken by placing a measuring tape snugly around the natural waist (just above the navel). The risk for health problems and complications increases with a waist measurement equal to or greater than 40 inches in men and equal to or greater than 35 inches in women. Lower thresholds for waist circumference have been recommended for Asian populations by the World Health Organization due to recent research findings. For Asian men, a waist circumference equal to or greater than 35 inches is considered high risk and for Asian women, a waist circumference equal to or greater than 31 inches is considered high risk. For more information, see the tool titled "Waste Circumference Measurement and Risk Assessment" in the Tools Section.

Table 1-2: Classification of Overweight and Obesity by BMI, Waist Circumference, and Associated Disease Risk

	BMI (kg/m^2)	Obesity Class	Men ≤ 102 cm (≤ 40 in)# Women ≤ 89 cm (≤ 35 in)#	Men > 102 cm (> 40 in)❖ Women > 89 cm (> 35 in)❖
Underweight	<18.5		—	—
Normal	18.5 - 24.9		—	—
Overweight	25.0 - 29.9		Increased	High
Obesity	30.0 - 34.9	I	High	Very High
	35.0 - 39.9	II	Very High	Very High
Extreme Obesity	≥ 40	III	Extremely High	Extremely High

Asian men ≤ 89 cm (≤ 35 in); Asian women ≤ 79 cm (≤ 31 in)

❖ Asian men > 89 cm (> 35 in); Asian women > 79 cm (> 31 in)

Wisconsin data from the 2008 Pediatric Nutrition Surveillance System (PedNSS) show that 16% of children aged 2 to 4 are overweight and 4% are obese. (Note that these values are population values for children participating in the Special Supplemental Nutrition Program for Women, Infants, and Children; the values do not represent values for all Wisconsin children or even for all low-income Wisconsin children.) Data from the 2009 Youth Behavioral Risk Factor Survey (YRBS) showed that 14% of Wisconsin high school students are overweight and 9% are obese. Therefore, nearly 25% of adolescents (1 in every 4) are either overweight or obese.

Children and adolescents need adequate calories and nutrients to facilitate normal growth and development. Assess height and weight at every visit. Calculate BMI identically to an adult BMI calculation (see above) and regularly plot on gender- and age-specific growth charts. Growth charts for children and adolescents ages 2-20 published by the Centers for Disease Control and Prevention (CDC) are included in the Tools Section. For infants less than 2 years of age, growth charts for children, developed by the World Health Organization (WHO), are recommended for the assessment of growth, regardless of type of feeding; these charts are included in the Tools Section.

The terminology used to describe weight categories in children and adolescents has previously differed from that used for adults. However, an expert panel on pediatric overweight and obesity recently recommended consistent use of these terms across the lifespan. Table 1-3 provides categories of weights related to BMI in children. Children and adolescents (ages 2 through 20) who are at or above the 95th percentile on growth charts are now termed “obese,” while those between the 85th and 95th percentiles are considered “overweight.” In addition, because BMI for some older adolescents may fall below the 95th percentile on growth charts but still exceed the adult obesity BMI cutoff value of 30 kg/m^2, the panel recommended that such individuals also be considered obese.

Table 1-3: BMI-for-age Weight Status Categories and Corresponding Percentiles for Children and Adolescents (ages 2-20)*

Weight Status Category	Percentile Range
Underweight	Less than the 5th percentile
Healthy weight	5th percentile to less than the 85th percentile
Overweight	85th percentile to less than the 95th percentile
Obese	Equal to or greater than the 95th percentile

* When using the WHO growth charts for children < 24 months of age, values of two standard deviations above and below the median, or the 2.3rd and 97.7th percentiles (labeled as the 2nd and 98th percentiles on the growth charts), are recommended for identification of children whose growth might be indicative of adverse health conditions.

Weight loss in overweight or obese people with diabetes can improve both hypertension and blood glucose control. Studies show that even modest reductions in weight (5-10%) are beneficial. Modest calorie restriction and modification in eating habits, increasing physical activity, as well as ongoing support, can help people with diabetes achieve weight loss. Place emphasis on attaining reasonable body weight, defined as the weight that an individual and provider feel is achievable and maintainable. Referrals to dietitians, diabetes educators, physical therapists, and exercise physiologists are beneficial for problem solving and ongoing support to achieve physical activity, dietary, and weight goals.

Special health conditions disproportionately impact youth, such as eating disorders which commonly result in excessive weight loss and altered insulin needs. This type of health condition requires intensive intervention from a diabetes team of professionals.

Bariatric Surgery

Bariatric surgery, including laparoscopic gastric bypass, biliopancreatic diversion, sleeve gastrectomy and adjustable gastric banding, when part of a comprehensive team approach, has been shown to be effective in treating obesity and eliminating or reducing the need for diabetes pharmacologic therapy for people with type 2 diabetes (Schauer et. al., 2012).

Bariatric surgery should be considered in adults with a BMI >35 kg/m2 and who have type 2 diabetes especially when the diabetes or associated comorbidities remain difficult to control with lifestyle and pharmacologic therapy. There is substantial evidence that procedures which bypass certain portions of the small intestine can reduce or eliminate the need for diabetes medication. This effect is independent of weight changes occurring after surgery (Mingrone et. al., 2012).

The benefits of bariatric surgery are best realized, and risks are best minimized when surgery is performed in a multidisciplinary center specializing in bariatric surgery. Lifelong support and monitoring are essential to optimize long-term outcomes. An unanticipated problem which is now becoming more common years after gastric bypass is hypoglycemia. Bariatric surgery is a reasonable tool for whom it's appropriate. A thorough evaluation and discussion of the risks and benefits of this teatment is citical. Life long followup and counseling is needed to monitor blood sugar levels overtime, lipids, blood pressure and to monitor for other complications.

Sleep-Disordered Breathing and Diabetes

Sleep-disordered breathing (SDB) refers to a variety of sleep dysfunctions that involve the respiratory system. The most common form of SDB is obstructive sleep apnea (OSA). An apnea is a temporary absence or cessation of breathing, lasting ten or more seconds. With OSA, the upper airway collapses, obstructing air flow, even as the person makes an effort to breathe.

OSA is a prevalent condition associated with comorbidities such as hypertension, obesity or overweight, memory problems, headaches, erectile dysfunction, and cardiovascular disease. OSA has been associated with poor glycemic control, specifically for people with type 2 diabetes. Also, because of altered glucose metabolism (e.g., glucose intolerance, insulin resistance), OSA may be related to metabolic syndrome, but more evidence is needed. A consensus statement written by the International Diabetes Foundation recommends that all people with type 2 diabetes should be screened for OSA. For additional information, go to: http://www.sleepapnea.org/.

Signs and symptoms of OSA are:

- Snoring
- Irregular breathing
- Daytime sleepiness
- Awaken gasping for breath
- Frequent nocturnal urination
- Morning headache
- Large neck size
- Hypertension

A few simple questions to consider for early assessment of OSA include:

1. Do you snore at night?
2. Do you wake up tired after a “good” night of sleep?
3. Do you have daytime sleepiness?
4. Has anyone told you that you quit breathing while sleeping at night?
5. Have you gained weight or has your shirt collar size increased?

Table 1:4 Multiple sleep assessment tools are provided in the chart and may be used to screen for sleep disorders.

The Epworth Sleepiness Scale (ESS) Related Recommended Readings	The ESS presents various daily situations and asks the responder to rate the degree of sleepiness in each circumstance.
The Stanford Sleepiness Scale (SSS) Related Recommended Readings	The SSS is used to assess sleepiness or alertness at a specific moment in time.
Pittsburgh Sleep Quality Index (PSQI) Related Recommended Readings	The PSQI is designed to provide a reliable, valid, and standardized measure of sleep quality. It is comprised of 19 self-rated questions and 5 questions rated by a bed partner or roommate. All items are brief and easy for most adolescents and adults to understand.
STOP Questionnaire Related Recommended Readings	The STOP questionnaire is a self-administered, 4-question survey that is designed to help identify obstructive sleep apnea (OSA) in advance of surgery and thus prevent complications. The 4 STOP questions are related to snoring, tiredness during daytime, observed apnea, and high blood pressure.
Berlin Questionnaire Related Recommended Readings	The Berlin questionnaire consists of 3 categories related to the risk of having sleep apnea. Patients are classified as high risk or low risk based on their responses to the individual items and their overall scores in the symptom categories.
Apnea Risk Evaluation System Questionnaire (ARES Q) (see Fig 1) Related Recommended Readings	ARES is one page in length and can be filled out by the patient in less than 5 minutes without assistance. Data obtained include age, gender, height, weight and neck size; diagnosis of diseases associated with risk for OSA, or prior diagnosis of OSA; the Epworth Sleepiness Scale score; and a 5-scale response to the frequency rating for snoring, waking up choking, and having been told that he/she stopped breathing during sleep. The questionnaire is available in several languages.

Adopted with permission from John Hopkins Sleep University CME
This online tool is available at: www.sleepuniversitycme.com/screening_tools.asp

Refer a person with signs and symptoms of OSA to a specialist in sleep disorders for further evaluation, diagnosis, and treatment. Effective treatment of OSA improves morbidity, mortality, and quality of life.

Disaster Preparedness

It is essential for people with diabetes to plan ahead for potential disaster situations. Some helpful resources include:

- The American Diabetes Association's *Tips for Emergency Preparedness:* http://www.diabetes.org/living-with-diabetes/treatment-and-care/medication/tips-for-emergency-preparedness.html.
- American College of Endocrinology and Lilly USA, LLC *Power of Prevention Diabetes Disaster Plan:* http://www.powerofprevention.com/diabetes-emergency-plan.
- The Centers for Disease Control and Prevention, Diabetes Public Health Resource information on "Diabetes Care During Natural Disasters, Emergencies, and Hazards:" http://www.cdc.gov/diabetes/news/docs/disasters.htm.

Health care providers can obtain information from the State of Wisconsin, Division of Public Health's Public Health Preparedness Program at: http://www.dhs.wisconsin.gov/preparedness/index.htm or their own professional organization such as the following examples for physician providers.

- The American Medical Association offers courses through its National Disaster Life Support™ Program: http://www.ama-assn.org/ama/pub/physician-resources/public-health/center-public-health-preparedness-disaster-response/national-disaster-life-support.shtml.
- The American Medical Association's Center for Public Health Preparedness and Disaster Response offers extensive resources and policies for physicians and people with diabetes on medical preparedness: http://www.ama-assn.org/ama/pub/physician-resources/public-health/center-public-health-preparedness-disaster-response.shtml.

Sharps Disposal/Unused Medication Disposal

Do not dispose of sharps in the trash. Individuals must take syringes, lancets, and other sharp medical items to a sharps collection station. To find the location of the nearest sharps collection station or for more information about sharps disposal in Wisconsin: http://dnr.wi.gov/topic/HealthWaste/CollectSharps.html and search for the term "sharps disposal" in the "Search" box in the upper right hand corner of the webpage. For questions, refer to the Department of Natural Resources website about medical/infectious waste located at: http://dnr.wi.gov/files/PDF/pubs/wa/wa1239.pdf or refer to the Department of Natural Resources "Medical Waste: Disposing of Household Sharps" publication at: http://dnr.wi.gov/topic/HealthWaste/CollectSharps.html.

The Pharmacy Society of Wisconsin (PSW) and the Wisconsin Department of Natural Resources (DNR) have developed a flier that outlines options for the disposal of unused prescription medications. The safe disposal of unused medications protects the environment and ensures these medications will not get into the wrong hands. For more information on safe disposal of unused medication see: http://library.constantcontact.com/download/get/file/1011293851033-1162/DNR+2012.pdf.

Web-Based Repository

The Wisconsin Diabetes Prevention and Control Program collaborated with the Diabetes Research and Wellness Foundation to design a web-based repository of resources in Wisconsin to support healthy behaviors for living with diabetes. People can search by zip code, town, or state to find resources in their area. Wisconsin's resources will begin to appear in spring of 2012. New resources will be added on a regular basis. To access this resource, go to: www.DiabetesLocal.org.

References

American Diabetes Association. (2012).Standards of Medical Care in Diabetes - 012.*Diabetes Care*, 2012 35 (supp 1), S11-S63.

Aronne, L. J. (2002). Classification of Obesity and Assessment of Obesity-Related Health Risks. *Obesity Res*, 10, 105S-115S.

Barlow, S. E., and the Expert Committee. (2007). Expert Committee Recommendations Regarding the Prevention, Assessment, and Treatment of Child and Adolescent Overweight and Obesity: Summary Report. *Pediatrics*, 120(supp 4), S164-92.

Buchwald, H., Estok, R., Fahrbach, K., Banel, D., Jensen, M. D., Pories, W. J., Bantle, J. P., & Sledge, I. (2009). Weight and Type 2 Diabetes After Bariatric Surgery: Systematic Review and Meta-Analysis. *Am J Med*, 122, 248–256.

Centers for Disease Control and Prevention. (2008). *National Diabetes Fact Sheet: General Information and National Estimates on Diabetes in the United States, 2007.* Atlanta, GA: U. S. Department of Health and Human Services, Centers for Disease Control and Prevention.

Centers for Disease Control and Prevention. (2010). Use of World Health Organization and CDC Growth Charts for Children Age 0-59 Months in the United States. *MMWR*, 59(rr09), 1-15.

Colberg, S. (2009). *Diabetic Athlete's Handbook: Your Guide to Peak Performance*. Champaign, IL: Human Kinetics.

Colby, S. E., & Johnson, L. (2006). Total and Saturated Fat Intake are Associated with Increased Waist Circumference. *J Am Diet Assoc*, 106(Supp), A44.

Haskell, W. L., Lee, I. M., Pate, R. P., Powell, K. E., Blair, S. N., Franklin, B. A., et al. (2007). Physical Activity and Public Health: Updated Recommendation for Adults from the American College of Sports Medicine and the American Heart Association. *Circulation*, 116, 1081-1093.

Heart Outcomes Prevention Evaluation Study Investigators. (2000). Effects of Ramipril on Cardiovascular and Microvascular Outcomes in People with Diabetes Mellitus: Results of the HOPE and MICRO-HOPE Substudy. *The Lancet*, 355, 253-259.

Mealeg, B. (2000). Position Paper: Diabetes and Periodontal Diseases, American Academy of Periodontology. *J Periodontology*, 71, 664-678.

Mingrone, G., Panunzi, S., De Gaetano, A., Guidone, C., Iaconelli, A., Leccesi, L., Nanni, G., Pomp, A., Castagneto, M., Ghirlanda, G., et al. (Epub ahead of print 2012 Mar 26 at NEJM.org). Bariatric Surgery versus Conventional Medical Therapy for Type 2 Diabetes. N Engl J Med. doi: 10.1056/*NEJMoa*1200111

National Athletic Trainers' Association. (2007). Position Statement: Management of the Athlete with Type 1 Diabetes Mellitus. *Journal of Athletic Training*, 42(4), 536-545.

National Center for Health Statistics. 2000 CDC *Growth Charts: United States* [BMI & growth charts for children]. Retrieved from http://www.cdc.gov/growthcharts.

National Heart Lung and Blood Institute. *Body Mass Index Table* [BMI chart for adults]. Retrieved from http://www.nhlbi.nih gov/guidelines/obesity/bmi_tbl.htm.

Nelson, M. E., Rejeski, W. J., Blair, S. N., Duncan, P. W., Judge, J. O., King, A. C., et al. (2007). Physical Activity and Public Health in Older Adults: Recommendation from the American College of Sports Medicine and the American Heart Association. *Circulation*, 116, 1094-1105.

Schauer, P. R., Kashyap, S. R., Wolski, K., Brethauer, S. A., Kirwan, J. P., Pothier, C. E., Thomas, S., Abood, B., Nissen, S. E., and Bhatt, D. L. (Epub ahead of print 2012 Mar 26 at NEJM.org). Bariatric Surgery versus Intensive Medical Therapy in Obese Patients with Diabetes. *N Engl J Med.* doi: 10.1056/NEJMoa1200225

Shankuan, Z., Steven, B., et al. (2005). Race-Ethnicity-Specific Waist Circumference Cutoffs for Identifying Cardiovascular Disease Risk Factors. *Am J Clin Nutr*, 81, 409-415.

Shaw, J. E., Punjabi, N. M., Wilding, J. P., Alberti, K. G., & Zimmet, P. Z. (2008). Sleep-Disordered Breathing and Type 2 Diabetes: A Report from the International Diabetes Federation Taskforce on Epidemiology and Prevention. *Diabetes Research and Clinical Practice*, 81, 2-12.

Wahrenberg H, Hertel K, et al. (2005) Use of Waist Circumference to Predict Insulin Resistance: Retrospective Study. *BMJ*, 11(330), 1363-1364.

Wisconsin Department of Health Services, Division of Public Health, Diabetes Prevention and Control Program (2011). *The 2011 Burden of Diabetes in Wisconsin*. Madison, WI: Wisconsin Department of Health Services.

Wisconsin Department of Health Services, Division of Public Health, Nutrition, Physical Activity, and Obesity Program and Wisconsin Partnership for Activity and Nutrition. (2008). *Obesity, Nutrition, and Physical Activity in Wisconsin* (DHS Publication No. P-00008). Madison, WI: Wisconsin Department of Health Services.

Section 2: Self-Management Education

Concern	Care/Test	Frequency
Self-Management Education	▪ Refer to diabetes educator, preferably a CDE in an ADA Recognized or AADE Accredited Program	At diagnosis, then every 6 – 12 months, or more as needed

MAIN TOPICS INCLUDED IN THIS SECTION:

- Providing Individualized Care
- Role of Diabetes Educators
- Referral to a Certified Diabetes Educator (CDE)
- National Standards for Diabetes Self-Management Education Programs
- Outcome Measures of Diabetes Self-Management Education
- Referral to a Diabetes Education Program
- The Changing Face of Diabetes Education
- Health Literacy
- Patient-Centered Teaching Approaches
- Medicare Coverage for Diabetes Screening, Education, and Supplies
- Insurance Coverage
- Additional Resources
- References

Diabetes self-management education (DSME) is a formal process through which persons at risk for or with diabetes develop and use the knowledge and skill required to reach their self-defined diabetes goals. Providers of self-management education facilitate short- and long-term goal setting. **Emphasis is placed on individualized, realistic, and obtainable goals. Family members, significant others, the primary care provider, the diabetes team, and a variety of others may influence goals, but the person at risk for or with diabetes must ultimately determine self-care goals.** Goals and related interventions should be evaluated regularly and revised to achieve desired health outcomes.

In Healthy People 2020, experts have increased the objective for the percentage of individuals in the United States who receive formal diabetes education to 62.5%. It is estimated that 50-80% of people with diabetes lack the knowledge and skills needed to adequately self-manage their diabetes. Data from the National Health and Nutrition Examination Survey (NHANES) from 2005-2008 show that only 53.5% of adults with diabetes achieved an A1C of less than 7.0% and 16.2% have A1C levels above 9%. Self-management education can help people lower their A1C levels, and could reduce the need for medication. Given this powerful and effective reduction in A1C, it is evident why self-management education must be included in the medical treatment plan.

Providing Individualized Care

According to the American Association of Diabetes Educators (AADE), DSME should not only be accessible, planned, documented, and evaluated, but it must also be individualized. Tailoring the educational process to match individual learner characteristics can assist in achieving positive outcomes. When self-management education is individualized, a number of key outcomes are achieved:

- Consideration is given to each person's educational concerns and priorities
- Recognition is offered for each person's expertise and unique perspectives toward the process of DSME
- Psychological and behavioral aspects of care are incorporated
- Collaborative relationships are formed between learners and educators

A crucial aspect of providing individualized care is assessing for specific learning barriers such as those related to language, culture, learning preferences, cognition, and memory. A learning assessment should be done on a regular basis to ensure that any changes are acknowledged and reflected in the teaching approach used. Specific attributes should also be assessed to better understand each person's ability to engage in self-care behaviors. These attributes include:

- Health status
- Attitudes, beliefs, experiences, and desire to participate in diabetes education
- Psychosocial status
- Literacy and learning style
- Cultural and life span issues
- Personal metabolic and other goals
- Self-care skills and access to resources

In order to more fully individualize care, attempts should be made to better understand a person's readiness-to-change behavior. One evidence-based model of behavior change is the Transtheoretical Model of Change or Stages of Change Model by Prochaska, et al. (see Table 2-1). The Stages of Change Model shows that, for most people, a change in behavior occurs over time. People may initially be uninterested, unaware or unwilling to make a change (pre-contemplation). They may then begin to consider a change (contemplation) and eventually decide and prepare to make a change. Action is then taken over time to maintain the new behavior. Relapses are almost inevitable and become part of the process of working toward life-long change. Understanding readiness and barriers to change, and anticipating "relapses" can lead to realistic goal setting, improved confidence, and can help support people throughout the change process.

Table 2-1: Stages of Change Model

Stage of change	Patient stage	Incorporating other explanatory/treatment models
Pre-contemplation	Not thinking about change May be resigned Feeling of no control Denial: does not believe it applies to self Believes consequences are not serious	Locus of Control Health Belief Model Motivational Interviewing
Contemplation	Weighing benefits and costs of behavior, proposed change	Health Belief Model Motivational Interviewing
Preparation	Experimenting with small changes	Cognitive-Behavioral Therapy
Action	Taking a definitive action to change	Cognitive-Behavioral Therapy 12-Step program
Maintenance	Maintaining new behavior over time	Cognitive-Behavioral Therapy 12-Step program
Relapse	Experiencing normal part of process of change Usually feels demoralized	Motivational Interviewing 12-Step program

Source: Prochaska et al. and Miller, et al.

Role of Diabetes Educators

Diabetes educators represent a variety of health care disciplines. Although each is responsible for upholding discipline-specific standards of professional practice, diabetes educators have a number of shared expectations.

Diabetes educators:

- Use established principles of teaching and learning theory and lifestyle counseling to help clients
- Confidently and effectively work with the person to manage their diabetes
- Provide instruction that is individualized for persons of all ages, incorporating cultural preferences, health beliefs, and preferred learning styles
- Promote behavior change directed at successful diabetes self-management

Referral to a Certified Diabetes Educator (CDE)

Persons newly diagnosed with diabetes, or needing assistance in managing their diabetes care, should be referred to a diabetes educator, preferably a certified diabetes educator (CDE) in an ADA or AADE accredited program.

CDEs are health care professionals with knowledge, expertise, and at least 1000 hours of practical experience in diabetes education and management. CDEs include, but are not limited to, nurse practitioners, pharmacists, physicians, physician assistants, podiatrists, registered dietitians, registered nurses, and social workers. The CDE has the expertise to identify factors influencing the outcomes of successful self-management and the skills to help people with diabetes, their family members, and primary care providers collaborate to develop achievable goals.

Certified diabetes educators must meet specific requirements including licensure as a health care professional as well as experience in diabetes management and counseling. These educators must pass a qualifying exam to become certified. For more information on CDE requirements, see the National Certification Board for Diabetes Educators website: http://www.ncbde.org. CDE professionals may be members of the American Association of Diabetes Educators (AADE). A listing of CDEs who are AADE members may be found at: http://www.diabeteseducator.org/DiabetesEducation/Find.html.

Health care providers without access to designated certified diabetes educators in their clinic or health care organization may find it beneficial to coordinate care with other diabetes educators and health education programs found in their communities.

National Standards for Diabetes Self-Management Education Programs

The American Diabetes Association (ADA) and the American Association of Diabetes Educators (AADE) have established specific standards for diabetes self-management education (DSME). DSME programs have been implemented in diverse settings and facilitate improvement in health care outcomes for people with diabetes. There are ten evidence-based standards applied to the structure, process, and outcomes of quality DSME programs. These are available on the AADE website: http://www.diabeteseducator.org/export/sites/aade/_resources/pdf/2007national_standards_for_dsme.pdf.

Each recognized diabetes program must have a written curriculum that includes criteria for successful learning outcomes. It must also include an individual educational needs assessment, a formal educational plan, a goal setting process, and documentation of education provided and goals identified and achieved.

The individualized educational needs assessment should include:

- Health history and physical limitations
- Medical history
- Cultural influences
- Previous and current use of medication(s)
- Nutrition history and eating practice
- Current mental health status

- Family and social supports
- Previous diabetes education, actual knowledge, and skills
- Current self-management practices
- Access to and utilization of health care delivery systems
- Lifestyle practices including health beliefs and attitudes
- Psychosocial factors (socioeconomic, housing, employment, financial status [including the person's ability to afford DSME and proposed diabetes regimens])
- Readiness to learn
- Barriers to learning, including health literacy level

The formal DSME educational plan begins with basic information, typically referred to as "diabetes survival skills." This introductory education should ideally be followed by a more comprehensive training program. For those interested in or needing additional knowledge and skills development, intensive management programs within specialty clinic settings may be available.

Basic Diabetes Survival Skills Education

Comprehensive diabetes education is often not possible at the time of diagnosis. Survival skills education or basic diabetes education provides the information essential for the safety of the person with diabetes in the immediate weeks following diagnosis. People with diabetes need basic survival skills education, including:

- Understanding of diabetes as a disease process and the dosing and expected effects (including side effects) of medication/insulin
- Self-monitoring of blood glucose and explanation of home blood glucose goals (additional information on self-monitoring of blood glucose is located in *Section 4: Glycemic Control)*
- Definition, recognition, treatment, and prevention of hypoglycemia and hyperglycemia
- Identification of health care provider who will provide diabetes care after discharge
- Information on consistent eating patterns
- Planning when and how to take blood glucose-lowering medications including insulin administration (if prescribed)
- Planning for and responding to diabetes emergencies and sick days
- Resources for proper use and disposal of needles and syringes

Comprehensive Self-Management

A comprehensive self-management program is an interactive educational process most often completed in ambulatory care settings, either individually or in a group format. Comprehensive self-management education incorporates the components of basic diabetes education and builds on that education with the addition of the National Standards for Diabetes Self-Management Education's ten core educational content areas, which include:

1. Disease process and treatment options
2. Nutrition (incorporating into lifestyle)
3. Physical activity (incorporating into lifestyle)
4. Medication(s) (safe usage and maximum therapeutic effectiveness)

5. Blood glucose monitoring (interpreting and using results for self-management decision making)
6. Acute complications (preventing, detecting, and treating)
7. Chronic complications (preventing, detecting, and treating)
8. Goal setting and problem solving (personal strategies to promote health and behavior change)
9. Psychosocial aspects (personal strategies to address issues and concerns)
10. Preconception care/pregnancy/gestational diabetes

It is important for a comprehensive self-management program to include a multidisciplinary, instructional team which may include but is not limited to nurses, dietitians, physicians, social workers, psychologists, and exercise physiologists to assure all ten of the core educational areas are taught by qualified professionals.

Intensive Self-Management

Intensive self-management diabetes education builds upon comprehensive education. Intensive self-management should be sought for all highly motivated people. Providers can assist people to individualize and intensify self-management skills to achieve normal or near-normal blood glucose levels using all available resources. Persons choosing intensive self-management may incorporate any or all of the following into their individualized plan:

- Intensive insulin therapy (multiple daily injections or continuous subcutaneous insulin infusion by pump)
- Carbohydrate counting using insulin-to-carbohydrate ratios which may be fixed or individualized for each meal and snack
- Correction insulin doses which may be fixed, or individualized by time of day
- Temporary or adjusted insulin rates for physical activity, fasting, or sick days
- A variety of insulin regimens (patterns) based on varying days of the week (weekday vs. weekend, highly active day vs. sedentary day, high stress day vs. normal work day, travel day vs. office day)

At all levels of DSME, the person with diabetes and the diabetes team must work together to balance achievement of optimal glucose levels without increased risk for hypoglycemia.

Regardless of the teaching methods or interventions used, goal setting is an integral component of DSME. The role of the diabetes educator is to assist the person with diabetes in making sure that his or her individualized goals are specific and measurable within a specified time frame. Documentation of all aspects of the diabetes program is essential for follow up as well as for measuring effectiveness of the DSME. Examples of self-management tools can be found in the Tools Section of this document.

Outcome Measures of Diabetes Self-Management Education

In an environment of evidence-based practice, diabetes educators must gather data to support their practices and modify their educational approaches in response to outcomes achieved. Educators must evaluate both the process and the outcomes of their diabetes educational program.

The AADE identifies seven diabetes self-care behaviors (see Table 2-2) that are integral to optimal self-management. Educators can use outcomes of these behavioral goals to:

- Determine the efficacy of education with both individuals and populations
- Compare performance with established benchmarks
- Measure or quantify the unique contribution that DSME plays in the overall context of diabetes care

Table 2-2: AADE7™ Self-Care Behaviors

1. Healthy eating
2. Being active (physical activity)
3. Monitoring (blood glucose and A1C for long-term complications)
4. Taking medication and/or insulin
5. Problem solving (especially for blood glucose, high and low levels, and sick days)
6. Reducing risks (of diabetes complications)
7. Healthy coping

AADE7™ Self-Care Behaviors Goal Sheets and other materials can be purchased from the AADE at: http://www.diabeteseducator.org/ProfessionalResources/AADE7/

Adapted from the AADE7™ Self-Care Behaviors

The AADE further defines standards for outcomes measurement for DSME programs that are practical, informative, applicable, and achievable (see Table 2-3).

Table 2-3: American Association of Diabetes Educators Standards for Outcomes Measurement

1. Behavior change is the unique outcome measurement of diabetes self-management education.
2. Seven diabetes self-care behavior measures determine the effectiveness of diabetes self-management education at individual, participant, and population levels (see Table 2-2).
3. Diabetes self-care behaviors should be evaluated at baseline and then at regular intervals after the education program.
4. The continuum of outcomes, including learning, behavioral, clinical, and health status, should be assessed to demonstrate the interrelationship between DSME and behavior change in the care of individuals with diabetes.
5. Individual outcomes are used to guide the intervention and improve care for that person with diabetes. Aggregate population outcomes are used to guide programmatic services and for continuous quality improvement activities for the DSME and the population it serves.

Source: American Association of Diabetes Educators

Referral to a Diabetes Education Program

Referral to a recognized or accredited program is optimal. Educators who lead self-management programs identify their program as a quality service by earning recognition status in the ADA Education Recognition Program or accreditation status in the AADE Accredited Diabetes Education Program. Both programs meet the Centers for Medicare & Medicaid Services' criteria for reimbursement for Diabetes Self-Management Training (DSMT). To earn recognition/accreditation status, staff must develop a diabetes education curriculum using the National Standards for Diabetes Self-Management Education, collect data to demonstrate Continuous Quality Improvement (CQI) measures, and pay an application fee. Recognition/accreditation is granted for a four-year cycle, at which time the organization must reapply.

To learn more about achieving ADA Recognition:
http://professional.diabetes.org/Recognition.aspx?cid=57941&typ=15.

To learn more about achieving AADE Accreditation:
http://www.diabeteseducator.org/ProfessionalResources/accred/.

To locate Wisconsin locations for ADA Recognized Programs go to:
http://professional.diabetes.org/ERP_List.aspx.

To locate AADE accredited programs in Wisconsin, go to:
http://www.diabeteseducator.org/ProfessionalResources/accred/Programs.html.

The Changing Face of Diabetes Education

In today's health care environment, information about diabetes is available from a variety of sources. Many persons with diabetes have access through the internet to reliable diabetes resources, specifically national organizations such as the ADA, the AADE, the Centers for Disease Control and Prevention (CDC), the National Diabetes Education Program (NDEP), and multiple other sites. Information is provided through the written word, podcasts, game playing, and interactive learning modules.

Conversation Maps

Conversation Maps are a learning tool using a board game format with small groups of people. Produced in collaboration between the ADA and Healthy Interactions Inc. (Healthyi), Conversation Maps are used to engage people in learning about diabetes self-management. Users of the maps have access to a curriculum which meets the requirements needed for ADA recognition or AADE accreditation. The underlying philosophy of conversation maps is empowerment. Six components of the Conversation Maps include:

1. Large visual map
2. Facts about diabetes, medications, food choices, long-term complications
3. Conversation questions
4. Group interaction (as opposed to lecture content)
5. Facilitation by a health care provider, often a diabetes educator
6. Action plans (exercises to stimulate goal setting and taking the "next step")

Information on Diabetes Conversation Maps can be found at: http://www.healthyinteractions.com/

Disease Case Management

Diabetes education and self-management are also available in the form of Disease Case Management. Disease Case Management is a multi-disciplinary, continuum-based approach to health care delivery that proactively identifies populations with, or at risk for, chronic medical conditions. Typically, a Disease Case Manager is a nurse who supports the practitioner-patient relationship and plan of care and emphasizes prevention of exacerbations and complications using cost-effective, evidence-based practice guidelines and patient empowerment strategies. Disease Case Managers continuously evaluate clinical, humanistic, and economic outcomes in their clinic population with the goal of improving overall health. Some insurance companies offer this type of support to people with diabetes.

Stanford Chronic Disease Self-Management Program (Living Well with Chronic Conditions)

People with diabetes need continued support to reach self-management and lifestyle goals as they strive for optimal diabetes control. The Chronic Disease Self-Management Program (CDSMP) is an evidence-based prevention program that is an option for extending self-management support to people with diabetes and/or other chronic diseases. In Wisconsin, the statewide CDSMP program is known as *Living Well with Chronic Conditions* (http://www.dhs.wisconsin.gov/aging/CDSMP/LivingWellwithChronicConditions/index.htm). CDSMP has been shown to have a beneficial effect on physical and emotional health outcomes, as well as health-related quality of life. Program participants consistently experience greater energy, less fatigue, improved physical activity, fewer social role limitations, improved psychological well-being, enhanced partnerships with physicians, improved health status, and greater self-esteem. CDSMP is a program that does not replace DSME, but complements it and provides an opportunity for continued support for people with diabetes. Providers will find it useful to refer people to CDSMP after completion of DSME. More information about how CDSMP and DSME differ can be found in the Tools section.

Health Literacy

Health literacy refers to one's ability to obtain, process, and understand basic health information and services needed to make appropriate health decisions. It includes writing, listening, speaking, arithmetic, and conceptual knowledge. **The Institute of Medicine (IOM) reports that nearly half of the American adult population, or approximately 90 million people, have limited health literacy. Literacy Services of Wisconsin estimates that there are more than 300,000 adults with literacy needs in Wisconsin.**

The extent of one's literacy and numeracy skills affects his/her ability to understand the material presented in DSME programs. Additionally, literacy skills can affect a person's ability to communicate needs to health care providers. The evidence suggests that diabetes patients who have low literacy and numeracy skills are more likely to have poorer glycemic control due to difficulties interpreting glucose readings, calculating carbohydrates, adjusting medications, and performing other daily self-management tasks. While there are many variations and degrees of literacy, health literacy affects all groups of people. Even those who have finished high school or college may have difficulties navigating the health care system. Those with low educational levels, linguistic or cultural barriers, and low socioeconomic status may have even more difficulty. Therefore, it is important to carefully assess health literacy levels and to tailor self-management education accordingly.

There are a number of health literacy assessment tools that can be used to assess reading comprehension. Some tools also assess abstract reasoning and numeracy. The majority of tools are geared toward the assessment of people 18 years of age or older. A small number of them are available in Spanish. One valid and reliable screening tool, Newest Vital Sign (NVS), is available in English and Spanish and includes just 6 questions about a food label. Testing has demonstrated that it can be self-administered in approximately three minutes and allows for the applications of scenario information to assess reading, comprehension, abstract reasoning, and numeracy. See http://www.pfizerhealthliteracy.com for more information and to access to the tool.

There are specific interventions that can help to address health literacy. First, use straightforward or "plain" language and provide explanations of new or unfamiliar words. This can be accomplished when using print materials that are written at a fifth grade reading level or lower. Readability calculators are now available on the internet to assess reading levels, such as the SMOG (Simple Measure of Gobbeldygook) calculator (http://www.harrymclaughlin.com/SMOG.htm). Health information should also be provided in a culturally-sensitive manner. Lastly, information should be provided and reinforced using both oral and written communication. Whenever possible, the educator should also use kinesthetic learning opportunities such as having the learner complete hands-on tasks, write out ideas, complete goal pages, or engage in role-playing or simulations.

Studies show that 40-80% of the medical information people receive is forgotten immediately (Kutner et. al., 2006) and nearly half of the information retained is incorrect (DeWalt et al., 2004). It is the provider's responsibility to assure that people understand the information exchanged during encounters. One way to accomplish this is by using the "teach-back" method, also know as the "show-me" method. A person's understanding is confirmed when they can explain it back to you or demonstrate a skill. If a person is not able to verbalize the new knowledge or demonstrate the new skill, then a new teaching approach should be used as this is a reflection of how well the new concept or skill was explained or demonstrated.

Here are a few examples of using the teach-back method:

- "I want to be sure that I explained your medication correctly. Can you tell me how you are going to take this medicine?"
- "We covered a lot today about your diabetes, and I want to make sure that I explained things clearly. So let's review what we discussed. What are three strategies that will help you control your diabetes?"
- "What are you going to do when you get home?"

Use of emerging technologies such as interactive tutorials, touch screen computers, and various visual formats can assist people in learning and absorbing new information. For more information and resources, refer to the list of health literacy organizations and programs in Table 2-4.

Table 2-4: Health Literacy Organizations and Programs

Agency for Healthcare Research and Quality http://www.ahrq.gov/qual/literacy Ask Me 3 http://www.npsf.org/askme3/ Center for Plain Language http://www.centerforplainlanguage.org National Institute for Literacy http://www.caliteracy.org/nil/ Health Literacy, American Medical Association Foundation http://www.ama-assn.org/ama/pub/about-ama/ama-foundation/our-programs/public-health/health-literacy-program.shtml Health Literacy Institute http://www.healthliteracyinstitute.net/	Health Literacy Studies http://www.hsph.harvard.edu/healthliteracy/index.html Health Literacy Month http://www.healthliteracymonth.com/ Health Resources and Services Administration (HRSA) http://www.hrsa.gov/healthliteracy/ Medical Library Association http://www.mlanet.org/resources/healthlit/ Literacy Information and Communication System: http://lincs.ed.gov/ World Education, Health and Literacy Initiative http://www.worlded.org/

Patient-Centered Teaching Approaches

Traditionally, the focus of diabetes education has been to increase a person's adherence to a treatment plan developed by a health care provider. Techniques used included teaching, persuasion, direct questioning and advice-giving, with the provider contributing most to the conversation. This approach has been shown to frustrate a person and provide limited effectiveness in managing chronic conditions. Multiple factors influence adherence to treatment including patient knowledge of the disease and treatments, psychological factors, socioeconomic factors, and beliefs about diabetes and its treatment. The Diabetes Attitudes Wishes and Beliefs (DAWN) Study was conducted to identify barriers to achieving optimal diabetes care and included over 5000 people with diabetes and over 3500 providers. The study results showed that poor psychological well-being is common in people with diabetes, affecting about 40% of people with diabetes, and may influence treatment adherence, especially for diet and physical activity.

Successful strategies to support behavior change and improve treatment adherence have been developed to replace more traditional approaches. Two of these strategies are patient empowerment and motivational interviewing.

The patient empowerment model is based on the assumption that most people do not want to adhere to lifestyle changes dictated by others. Instead, the assumption is that people will choose to bring about changes in their personal behavior, in their social situations, and in the environment. The empowerment model provides people with information (knowledge) and skills and places the responsibility for change in their hands.

There are three main principles underpinning the empowerment approach to diabetes self-management education. These include the following:

1. Day-to-day decision making about self-care is the responsibility of the person with diabetes.
2. The health care team is responsible for providing diabetes expertise, education, and support so people are able to make informed decisions.
3. Adults who recognize benefits of behavior change and make decisions about their own self-care behaviors are more likely to maintain chosen behavior changes.

Motivational Interviewing is an evidence-based approach to behavior change counseling which has its origins in the field of substance abuse and is gaining more attention as a useful strategy for DSME. It has been shown to be effective in brief (15-20 minute) interventions which makes it practical and useful in the diabetes setting. It is based on models of behavior change theory and psychotherapy. Motivational interviewing by definition is "a client-centered, directive method for enhancing intrinsic motivation to change by exploring and resolving ambivalence."

Practitioners of motivational interviewing use interaction techniques such as:

1. Asking open-ended questions to elicit a person's ambivalence about making change in health behaviors
2. Providing affirmations for steps taken in the direction of the person's goals
3. Using reflective listening to determine the person's reasons for, willingness to, and readiness for change
4. Summarizing regularly throughout the conversation to emphasize key concepts elicited from the person

Practitioners prompt the person with diabetes to identify the importance of achieving health outcomes and evaluate his or her self-confidence in making that behavior change, ultimately leading the person to take responsibility for his or her behavior change. Motivational Interviewing is used most appropriately in the precontemplation and contemplation stages when forming a commitment to change and believing change is possible are the principle barriers.

For more information about Motivational Interviewing, refer to: http://www.motivationalinterview.org.

Medicare Coverage for Diabetes Screening, Education, and Supplies

Since 1997, Medicare Part B has reimbursed for diabetes self-management training (DSMT) services when these services are provided by a nationally recognized/accredited provider and are prescribed by the treating physician or qualified non-physician practitioner as part of the diabetes care plan. DSMT services are available to the newly diagnosed, people at risk for complications from diabetes (e.g., poor blood glucose control, vision problems, nerve damage, or kidney disease), or people who have diabetes and recently became eligible for Medicare. DSMT includes ten hours of initial DSMT in the 12-month period following referral, as well as two hours of follow-up DSMT annually. MNT has been covered under the Medicare Part B DSMT benefit since 2002.

Medicare coverage for DSMT is contingent upon specific documentation in the provider's order, as well as documentation of diabetes as a diagnosis:

1. Fasting blood glucose greater than or equal to 126 mg/dL
2. Two-hour post-glucose challenge (75 grams) greater than or equal to 200 mg/dL
3. Random glucose test over 200 mg/dL for a person with symptoms of uncontrolled diabetes

The first two criteria should be confirmed with repeat testing to substantiate diagnosis. Diagnosis of diabetes, according to ADA standards, includes A1C of greater than or equal to 6.5%; however, this criteria is not included as a Medicare diagnostic criteria by the Centers for Medicare & Medicaid Services (CMS).

The 2009 CMS document "The Guide to Medicare Preventive Services for Physicians, Providers, Suppliers, and Other Health Care Professionals, Third Edition" has detailed guidelines for Medicare coverage: https://www.cms.gov/MLNProducts/downloads/mps_guide_web-061305.pdf.

A "Diabetes Services Order Form (DSMT and MNT Services)" developed by the American Dietetic Association and the American Association of Diabetes Educators is available at: http://www.diabeteseducator.org/ProfessionalResources/Library/ServicesForm.html.

Persons with diabetes, family members, significant others, and caregivers can find more information about Medicare coverage for diabetes screening, education, and supplies on the following websites: https://www.cms.gov/Medicare/Prevention/PrevntionGenInfo/index.html?redirect=/PrevntionGenInfo/. For information on the Diabetes Medicare Screening Project: http://www.screenfordiabetes.org/.

Insurance Coverage

Diabetes self-management education must be available to everyone with diabetes. Organizations that purchase health care benefits for their members or employees should insist that self-management education be included in the services provided. Managed care organizations should include these services and supplies in the basic plan available to all participants. Diabetes self-management education can result in cost-savings as well as assist with improving outcomes. DSME programs that have met accepted standards should be adequately reimbursed by third-party payers.

Additional Resources

1. "Life with Diabetes: A Series of Teaching Outlines, 4th Edition" 2009; developed by the Michigan Diabetes Research and Training Center and published by the American Diabetes Association. Available for purchase at: http://store.diabetes.org.
2. The National Diabetes Education Program (NDEP) provides many and varied materials. For more information, call 1-800-438-5383 or visit the NDEP website at: http://ndep.nih.gov/. Materials are not copyrighted.
3. Wisconsin Diabetes Prevention and Control Program (DPCP) Materials Order Form. Order DPCP resources for free through this order form, including the Diabetes Self-Care Information and Record Booklet. The order form can be accessed at: http://www.dhs.wisconsin.gov/diabetes/PDFs/OrderForm.pdf.
4. Diabetes HealthSense: www.YourDiabetesInfo.org/healthsense. Diabetes HealthSense provides people with diabetes, people at risk for the disease and those who care for them with easy access to useful tools and programs that exist within the public domain and facilitate the behavior change process.

References

American Association of Diabetes Educators. (2003). *A CORE Curriculum for Diabetes Education, Diabetes Management Therapies* (5th ed.). Chicago, IL: American Association of Diabetes Educators.

American Diabetes Association. (2004). Third-Party Reimbursement for Diabetes Care, Self-Management Education, and Supplies. *Diabetes Care*, 27, S136-137.

American Diabetes Association. (2012). Standards of Medical Care in Diabetes - 2012. *Diabetes Care*, 2012 35 (supp 1), S11-S63.

Betz, C., Ruccione, K., Meeske, K., Smith, K., & Chang, N. (2008). Health Literacy: A Pediatric Nursing Concern. *Pediatr Nurs*, 34(3), 231-239.

Bodenheimer, T., Lorig, K., Holman, H., & Grumbach, K. (2002). Patient Self-Management of Chronic Disease in Primary Care. *JAMA*, 288, 2469-2475.

Bohlman, L., Panzer, A. M., & Kindig, D. A. (Eds.). (2004). *Health Literacy: A Prescription to End Confusion.* Washington, DC: The National Academies Press.

Centers for Medicare and Medicaid Services. (2007). *Diabetes-Related Services* [pamphlet].

Centers for Medicare and Medicaid Services. (2008). *Medicare Claims Processing Manual* [internet-only manual]. Retrieved from http://cms.hhs.gov/Manuals/IOM/list.asp.

DeWalt, D. A., Berkman, N. D., Sheridan, S., et al. (2004). Literacy and Health Outcomes: A Systematic Review of the Literature. *J Gen Intern Med*, 19(12), 1228-1239.

DeWalt, D. A., Callahan, L. F., Hawk, V. H., Broucksou, K. A., Hink, A., Rudd, R., & Brach, C. (2010). *Health Literacy Universal Precautions Toolkit.* (AHRQ Publication No. 10-0046-EF). Rockville, MD: Agency for Healthcare Research and Quality.

Funnell, M. M., et al. (2007). National Standards for Diabetes Self-Management Education. *Diabetes Care,* 30, 1630-1637.

Funnell, M. M., Arnold, M. S., Barr, P. A., & Lasichak, A. J.(2000). *Life with Diabetes: A Series of Teaching Outlines by the Michigan Diabetes Research and Training Center* (2nd ed.). Alexandria, VA: American Diabetes Association.

Gazmararian. J. A., Williams, M. V., Peel, J., Baker, D. W. (2003). Health Literacy and Knowledge of Chronic Disease. *Patient Educ Couns*, 51:267-275.

Goldstein, D. E., Little, R. R., Lorenz, R. A., Malone, J. I., Nathan, D. M., & Peterson, C. M. for the American Diabetes Association. (2004). Tests of Glycemia in Diabetes. *Diabetes Care*, 27, S91-S93.

Joint Commission, The. (2007). *"What Did the Doctor Say?:" Improving Health Literacy to Protect Patient Safety*. Oak Terrace, IL: The Joint Commission.

Koenigsberg, M. R., Bartlett, D., & Cramer, J. S. (2004). Facilitating Treatment Adherence with Lifestyle Changes in Diabetes. *American Family Physician*, 69, 309-316.

Kuritzky, L. (2010). *Closing the Gaps in Type 2 Diabetes Mellitus: A Focus on Improving Key Performance Measures.* Retrieved from http://www.medscape.org/viewarticle/734424.

Kutner, M., Greenbert, E., Jin, Y., & Paulsen, C. (2006). *The Health Literacy of America's Adults: Results from the 2003 National Assessment of Adult Literacy* (NCES 2006-483). Washington, DC: National Center for Education Statistics, US Department of Education.

Mensing, C., Boucher, J., Cypress, M., et al. (2004). National Standards for Diabetes Self-Management Education. *Diabetes Care*, 27, S143-S150.

Mulcahy, K., Maryniuk, M., Peeples, M., et al. (2003). Technical Review: Diabetes Self-Management Education Core Outcomes Measures. *The Diabetes Educator,* 29(5), 768-803.

Norris, S. L., Lau, J., Smith, S. J., Schmid, C. H., & Engelgau, M. M. (2002). Self-Management Education for Adults with Type 2 Diabetes: A Meta-Analysis of the Effect on Glycemic Control. *Diabetes Care*, 25, 1159-1171.

Peyrot, M., Rubin, R. R., Lauritzen, T., et al. (2005). Resistance to Insulin Therapy Among Patients and Providers: Results of the Cross-national Diabetes Attitudes, Wishes, and Needs (DAWN) Study. *Diabetes Care*, 28, 2673-2679.

Rothman, R. L., Malone, R., Bryant, B., et al. (2005). The Spoken Knowledge in Low Literacy in Diabetes Scale: A Diabetes Knowledge Scale for Vulnerable Patients. *Diabetes Educ*, 31, 215-224.

Schillinger, D., Grumbach, K., Piette, J., et al. (2002). Association of Health Literacy with Diabetes Outcomes. *JAMA*, 288, 475-482.

U. S. Department of Health and Human Services. (2020). *Healthy People 2020*. Washington, DC: U. S. Government Printing Office.

U. S. Department of Health and Human Services, Centers for Medicare and Medicaid Services. (2011). *Medicare & You* [CMS Publication Number 10050]. Washington, DC: U. S. Government Printing Office.

Warshaw, H. S. (2004). Referral to Diabetes Self-Management Training and Medical Nutrition Therapy: Why Now and How? *Practical Diabetology*, 12-19.

Weiss, B. D., Mays, M. Z., Martz, W., Castro, K. M., DeWalt, D. A., Pignone, M. P., Mockbee, J., & Hale, F.A. (2005). Quick Assessment of Literacy in Primary Care: The Newest Vital Sign. *Ann Fam Med*. 3(6), 514-522.

Welch, G., Rose, G., & Ernst, D. (2010). Motivational Interviewing and Diabetes: What is it, How is it Used, and Does it Work?. *Diabetes Spectrum*, 19(1), 5-11.

Wolff, K., Cavanaugh, K., Malone, R., Hawk, V., Pratt Gregory, B., Davis, D., Wallston, K., & Rothman, L. (2009). The Diabetes Literacy and Numeracy Education Toolkit (DLNET): Materials to Facilitate Diabetes Education and Management in Patients with Low Literacy and Numeracy Skills. *The Diabetes Educator*, 35(2), 233-245.

Section 3: Medical Nutrition Therapy

Concern	Care/Test	Frequency
Medical Nutrition Therapy	▪ Refer for medical nutrition therapy (MNT) provided by a registered dietitian (RD), preferably a CDE	At diagnosis or first referral to RD: 3 to 4 visits, completed in 3 to 6 months; then, 1-2 hours of routine RD visits annually. RD determines additional visits based on needs/goals.

MAIN TOPICS INCLUDED IN THIS SECTION:

- Nutrition Care Process
- Medical Nutrition Therapy Goals
- Frequency of Visits
- Recommended Amount of Daily Carbohydrates
- Dietary Fats and Cholesterol
- Dietary Fiber
- Dietary Choices for Individuals with Pre-Diabetes
- Nutritional Guidance for Non-Dietitian Health Professionals
- Referral to a Registered Dietitian and Coordination of Care
- Additional Resources
- References

Medical nutrition therapy (MNT) is a cornerstone of diabetes self- management training. It is strongly recommended that a person with diabetes be referred to a registered dietitian (RD), preferably one who is also a certified diabetes educator (CDE), to provide MNT. MNT includes a nutrition assessment, goal setting for clinical and behavioral outcomes, and a self-management training plan for reassessment and communication to other members of the health care team.

Intervening early with MNT is essential. MNT is an integral component of diabetes self-management education. Even small consistent nutrition changes can be critical in achieving and maintaining glycemic control, reduce the risk of cardiovascular disease and other complications associated with poor blood glucose control. MNT can assist with the prevention of type 2 diabetes, and prevent (or at least slow) the development of costly diabetes-related complications and hospitalizations. MNT can assist people at risk for or with diabetes in making informed and beneficial nutrition changes, ultimately reducing the amount of oral medication(s)/insulin needed to optimize glycemic control. Strategies used by the RD in providing MNT take into consideration educational or cultural needs, literacy level/skill, and learning barriers while respecting the individual's willingness to change behavior.

An RD has specific expertise and resources to carry out the entire process from nutrition diagnosis to intervention, monitoring, and evaluation. It is important to note that Medicare Part B and most insurance plans only reimburse MNT for persons with confirmed diagnosis of diabetes when it is provided by a RD.

Nutrition Care Process

The nutrition recommendations for MNT must incorporate the evidence-based guidelines developed by the Academy of Nutrition and Dietetics (formerly the American Dietetic Association) and be based on a comprehensive assessment of medical history, nutrition, lifestyle factors, and learning ability. Interventions must include strategies that encourage responsibility for self-management. Several meal-planning approaches are available to help people develop realistic and achievable goals. Standardized calorie-level meal plans are no longer recommended. Nutrition recommendations may be as simple as three regularly scheduled meals without sweetened beverages, or as complex as the use of carbohydrate-insulin ratios for people using insulin pumps.

The RD monitors and evaluates food intake, medication(s), metabolic control (glycemia, lipids, and blood pressure), anthropometric measurements, physical activity, and goal progress. To evaluate the effectiveness of MNT, the RD uses blood glucose results, changes in lipids and blood pressure, goal achievement, and reported measures of self confidence management. Self-monitoring of blood glucose (SMBG) results can serve as a basis for making adjustments in amounts and types of foods eaten at meals to achieve blood glucose goals. The RD can suggest medication(s)/insulin adjustments if he/she determines that sufficient nutrients and calories are achieved yet blood glucose values are not at goal. The RD bases MNT goals on the specific situation (e.g., age, type of diabetes). For more on situation-specific goals, see Table 3-1.

Medical Nutrition Therapy Goals

Medical nutrition therapy goals for diabetes include:

1. Attain and maintain optimal metabolic outcomes
   - Blood glucose levels in the normal range (or as close to normal as is safely possible) to prevent or reduce the risk of diabetes complications

- Lipid and lipoprotein profile that reduces the risk for vascular disease
- Blood pressure level that reduces the risk for vascular disease

2. Prevent, or at least slow, the rate of development of chronic complications by modifying nutritional intake and lifestyle
3. Maintain the pleasure of eating while making food choices indicated by scientific evidence
4. Assess individual nutritional needs taking into consideration lifestyle, personal and cultural preferences, and food security, while respecting the individual's wishes and willingness to change behavior
5. Assess literacy and other special educational needs

Table 3-1: Situation-Specific Medical Nutrition Therapy Goals

Situation	Medical Nutrition Therapy Goals
Type 1 – Youth	Provide adequate energy to ensure normal growth and development. Integrate insulin regimens into normal eating and physical activity habits.
Type 2 – Youth	Facilitate changes in eating and physical activity habits to reduce insulin resistance, improve metabolic status, and promote a healthy weight.
Pregnancy and Lactation	Provide adequate energy and nutrients needed for optimal outcomes for mother and baby.
Older Adults	Provide for the nutritional and psychosocial needs of an aging individual.
Individuals who take insulin	Provide self-management education for treatment and prevention of hypoglycemia, acute illnesses, and physical activity-related blood glucose fluctuations.
Pre-diabetes	Encourage physical activity and promote healthier food choices to facilitate moderate weight loss or at least prevent weight gain. (For additional information, see *Section 13: Assessing Risk and Prevention of Type 2 Diabetes*.)
Metabolic Syndrome	Encourage physical activity and promote healthier food choices to facilitate moderate weight loss (or at least prevent weight gain) and help achieve optimal blood pressure, lipid, and glucose goals. (For additional information, see *Section 13: Assessing Risk and Prevention of Type 2 Diabetes*.)

Frequency of Visits

An initial series of three to four MNT encounters, each lasting 45 to 90 minutes, is recommended. Completing this series within three to six months, beginning at diagnosis of diabetes or at first referral to an RD for MNT for diabetes, is optimal. The RD should determine if additional MNT encounters are needed after the initial series, based on nutrition assessment of learning needs and progress toward desired outcomes.

After completing the initial series of MNT visits, a person with diabetes should see an RD for a minimum of one visit annually. More frequent appointments may become necessary during major changes in therapy, at times of uncontrolled diabetes, in the event of hospitalization for diabetic ketoacidosis or hypoglycemia, at the onset of complications, during preconception counseling, and during pregnancy. Family members or other caregivers are encouraged to attend MNT visits to assist and support healthy eating for the person with diabetes as well as the entire family.

Recommended Amount of Daily Carbohydrates

Nutrition interventions to regulate pre- and post-meal blood glucose levels are key to improving glycemic control. Both the quantity and type/source of carbohydrates found in foods influence post-meal blood glucose levels. An RD can assist the person with diabetes to evenly distribute his or her carbohydrate intake to keep blood glucose in the goal range; this may include matching doses of insulin to the carbohydrate content in each meal. There are a variety of methods that an RD can use to estimate the nutrient content of meals, including carbohydrate counting.

Carbohydrate counting is the most common meal planning method. When using carbohydrate counting, the amount of carbohydrates per meal is individualized to each person, based on their nutrition goals, weight goal, present eating habits, and physical activity level. Choosing carbohydrates from whole grains, fruits, vegetables, beans, and low-fat dairy is encouraged. A helpful tool entitled "Ready, Set, Start Counting: Carbohydrate Counting – A Tool to Help Manage Your Blood Glucose," is available at: http://www.dce.org/pub_publications/education.asp.

Keeping carbohydrates around 45 to 50 percent of daily calories has been shown to improve blood sugars and lipids. Depending on age and other factors, this is between 150 and 300 grams per day for most people. Keeping meal and snack carbohydrate intake consistent on a day-to-day basis supports glycemic control. Children and adults need a minimum of 130 grams of carbohydrates per day for proper brain and body functions. There is no evidence to recommend carbohydrate restriction to less than 130 grams per day. Pregnant women need a minimum of 175 grams of carbohydrates per day to prevent ketosis.

There are calculations people with diabetes can use to adjust for fiber and sugar alcohols:

1. Check total grams of carbohydrates listed on nutrition facts label
2. Look for grams of dietary fiber:
   - If the total grams of dietary fiber per serving consumed is **greater** than 5g, then **subtract** half of the grams of dietary fiber from the total grams of carbohydrates
   - If the total grams of dietary fiber per serving consumed is **less** than 5g, then there are insignificant effects on blood glucose levels; therefore, you should not subtract the grams of dietary fiber from the total grams of carbohydrates
3. Look at total grams of sugar alcohols
   - Subtract **half** of the total grams of sugar alcohols from total carbohydrates.

For information on how to read a food label, see the tool titled "How to Use a Food Label to Select Foods" in the Tools Section.

However, the same is not true for sugar alcohols. Sugar alcohols affect blood sugar levels less than the same amount of other sugar or starch, but individuals with diabetes need to take them into account when counting carbohydrates. Some manufacturers include a "net carbs" calculation by subtracting all of the sugar alcohols from total carbohydrates. Even so, sugar alcohols are still partially absorbed in the small intestine and people who are counting carbohydrates should pay attention to these ingredients. Examples of sugar alcohols include sorbitol, mannitol, and xylitol. Sugar alcohols are only partially absorbed and may cause intestinal discomfort. Some individuals may experience varying degrees of a laxative side effect following ingestion of foods containing these sugar derivatives. For information about sugar alcohol, see the tool titled "Understanding Sugar Alcohols" in the Tools Section.

Dietary Fats and Cholesterol

The recommended nutrition changes for reducing lipids (cholesterol and triglycerides) is the same for those with diabetes. The amount of saturated fat and trans fat should be limited in order to help reduce lipids and therefore reduce CVD risk. **Saturated fat should be limited to < 7% of caloric intake, or not greater than 15-20 grams per day.** A Registered Dietitian (RD) can help determine individual goals. Saturated fat is commonly found in meats, full-fat dairy products (milk, cheese, and ice cream), butter, sausage, lard, poultry skin, tropical oils, and coconut. Lean meats, such as skinless chicken and fish, and low-fat dairy products, such as fat-free or 1% milk are preferred.

Trans fatty acids are commonly found in fried foods from restaurants, stick margarines, shortening, and processed foods. **The recommendation is to limit the intake of trans fatty acids to as few as possible.** The federal government now requires that trans fat be listed on all food labels. For information on how to read a food label, see the tool titled "How to Use a Food Label to Select Foods" in the Tools Section.

Despite the listing of trans fat on food labels, it should be noted that according to the United States Food and Drug Administration rules, a product claiming to have zero trans fat can actually contain up to a half gram. If "partially hydrogenated" is found anywhere in the ingredient list, the product does contain a small amount of trans fat, even if the label states that 0 grams of trans fat are in the product.

Monounsaturated fats can lower LDL and total cholesterol levels, as well as raise HDL cholesterol. Good sources of monounsaturated fats include olive oil, canola oil, avocados, sesame seeds, peanut oil, peanut butter, almonds, macadamia nuts, pecans, peanuts, and pistachios. Suggested daily amounts may be 1-2 tablespoons of olive oil, 2 tablespoons of peanut butter, or 1/4 to 1/3 cup of nuts per day, while keeping within total calorie goals.

Polyunsaturated fats in place of saturated fats can reduce blood cholesterol and help lower the risk of cardiovascular disease. Omega-3 fatty acids are a type of polyunsaturated fat that can help reduce the risk of cardiovascular disease. Omega-3 fatty acids are found in certain fish such as salmon, tuna, mackerel, rainbow trout, herring, and sardines. Two or more 3-ounce servings of non-fried fish per week are recommended. The Food and Drug Administration and the Environmental Protection Agency has issued consumer advisory information about mercury in fish and shellfish. Women who might become pregnant, women who are pregnant or nursing and young children should limit fish and shellfish consumption to no more than 12 ounces per week. More information is available at http://www.fda.gov/Food/ResourcesForYou/Consumers/ucm110591.htm. Plant sources of omegas-3s include flaxseed, walnuts, tofu, soybean products, and canola oil.

Soluble Fiber

Soluble fiber can help reduce LDL cholesterol. Food sources of soluble fiber are fruits, vegetables, oats, and legumes. Oat bran is higher in soluble fiber per serving than oatmeal. Soluble fiber can also be increased by using ground psyllium or Metamucil (also psyllium). When using these products follow directions for proper mixing with water.

Plant sterol and stanol esters block the intestinal absorption of dietary and biliary cholesterol. This lowers LDL cholesterol without lowering HDL cholesterol. Plant sterols and stanols do not interfere with cholesterol-lowering medications. The National Cholesterol Education Program Adult Treatment Panel III program guidelines recommend plant sterols/stanols as part of a heart-healthy eating plan. Studies

show effectiveness with dosages of 2 to 3 grams plant sterols/stanols per day. Plant sterol and stanol esters occur naturally in some foods; they are present in small quantities in many fruits, vegetables, vegetable oils, nuts, seeds, cereals, and legumes. However, the average intake of these foods does not provide a great enough amount to lower cholesterol. In recent years, manufacturers have introduced items fortified with plant sterol and stanol esters to address reduction of cholesterol. These products are specifically-labeled, indicting cholesterol-lowering effects. Examples include some brands of margarines, juices, vitamins, snack bars, and yogurts.

Other Important Nutritional Factors

Sodium: A low sodium diet can assist in lowering blood pressure. The U.S. Department of Agriculture and the U.S. Department of Health and Human Services revised the sodium recommendations in the Dietary Guidelines for Americans in 2010. **Sodium recommendations are less than 1500 mg among persons who are 51 years and older and those of any age who are African American or have hypertension, diabetes, or chronic kidney disease (CDC, 2012).** Foods highest in sodium are lunch meats, canned goods, and frozen entrees. Seasonings such as Mrs. Dash®, garlic powder, onion powder, and other herbs or spices can be used to flavor foods without additional sodium.

Artificial Sweeteners: Artificial sweeteners, also called sugar substitutes, are substances that are used instead of sucrose (table sugar) to sweeten foods and beverages. Artificial sweeteners are regulated by the U.S. Food and Drug Administration. Questions arose about the impact of artificial sweeteners on cancer risk when early studies showed that cyclamate in combination with saccharin caused bladder cancer in laboratory animals. Studies have been conducted on the safety of several artificial sweeteners, including saccharin, aspartame, acesulfame potassium, sucralose, neotame, and cyclamate and there is no clear evidence that the artificial sweeteners available commercially in the United States are associated with cancer risk in humans.

Vegetarian diet option: Plant-based diets are "healthful, nutritionally adequate, and may provide health benefits in the prevention and treatment of certain diseases"(American Dietetic Association, 2009, p.1266) including type 2 diabetes. Great variability exists in the vegetarian diet and a registered dietitian should be consulted to determine the adequacy of the diet of the person with diabetes. Managing carbohydrate intake may be more challenging since many protein sources also contain carbohydrates.

Modified carbohydrate diets (Atkins, South Beach, or Zone): There are no known health risks with modifying carbohydrates to promote weight loss. After one year, the total weight loss between low-carbohydrate and low-fat diets was similar. Safety of the Atkins diet in individuals with diabetes has not been established, since it is a very low carbohydrate diet. The body needs a minimum of 130 grams of carbohydrates daily to fuel the brain and central nervous system.

Nutritional supplements: Some supplements claim to assist with diabetes control. Examples of supplements include alpha-lipoic acid, chromium, garlic, magnesium, cinnamon, polyphenols, prickly pear cactus, gurmar, and others. There is not enough scientific evidence to prove that dietary supplements benefit people with diabetes. The U.S. Food and Drug Administration (FDA) review and approval of supplement ingredients and products is not required before marketing. Persons with diabetes must know that labels on supplement bottles may not accurately reflect the actual amount of supplement that is present. All persons with diabetes who are interested in taking supplements should discuss with their health care provider(s).

Weight loss: The National Weight Control Registry (NWCR) is a longitudinal, prospective study of individuals 18 years and older who have successfully maintained a 30-pound weight loss for a minimum of one year. Findings of the NWCR show that of those individuals who successfully maintain weight loss:

- 78% eat breakfast every day
- 75% weigh themselves at least once a week
- 62% watch less than 10 hours of television per week
- 90% are physically active, on average, about one hour per day

Weight loss and physical activity can also significantly improve lipid levels. Weight loss and regular physical activity can lower LDL cholesterol and triglycerides, while raising HDL cholesterol.

For more information on the NWCR, go to: http://www.nwcr.ws/.

Dietary Fiber and Whole Grains

People with diabetes are advised to choose a variety of high fiber foods and whole grains. Whole grains provide a wide variety of vitamins, minerals, and other nutrients important to good health. Potential barriers to achieving a whole grain diet are palatability, limited food choices, and gastrointestinal side effects. Introduce high-fiber foods gradually to minimize the risk of gastrointestinal side effects. Sources of dietary fiber include beans, legumes, fruits, vegetables, and whole grain products. Whole grains consist of the intact, ground, cracked, or flaked kernel which includes the bran, the germ, and the innermost part of the kernel (the endosperm). To ensure that a product is whole grain, look in the ingredient list for the words "whole grain" or "whole wheat." It is best if these words are the first ingredient listed.

The recommended amount of dietary fiber is 14 grams of fiber per 1000 calories or between 21 to 38 grams each day for most adults. Based on limited clinical data, the recommendation for children older than 2 years of age is to increase dietary fiber to an amount equal to or greater than their age plus 5 grams per day, gradually increasing to 25 to 35 grams per day after age 20.

Dietary Choices for Individuals with Pre-Diabetes

The Finnish Diabetes Prevention study and the Diabetes Prevention Program (DPP) found that reduced intake of calories and reduced intake of dietary fat can reduce the risk for developing type 2 diabetes by reducing insulin resistance and promoting weight loss. Several other studies provide evidence that increased intake of whole grains and dietary fiber can also reduce risk for developing type 2 diabetes. People at risk for type 2 diabetes benefit from intensive lifestyle programs, including MNT, for the prevention or delay of type 2 diabetes. For additional information on assessing those at risk for type 2 diabetes, see *Section 13: Assessing Risk and Prevention of Type 2 Diabetes.*

Nutritional Guidance for Non-Dietitian Health Professionals

Non-dietitian health professionals can provide nutrition education when access to MNT is delayed or not accessible. Often times, a non-dietitian health professional will be asked nutrition questions about weight loss or diabetes. When answering questions, it is important to remember that both the health professional and the individual asking the questions may have received nutrition information from various sources and have differing levels of knowledge and beliefs. In addition, people with diabetes or pre-diabetes often have other health complications that require diet intervention (e.g., hypertension, dyslipidiemia). For these reasons, it is best to provide general information until the person is able to meet with a registered dietitian.

Table 3-2 provides simple initial nutrition education strategies for non-dietitian health care professionals to use with people newly diagnosed with diabetes until they are able to see a registered dietitian for MNT. The majority of people will see improvements in their blood sugar levels as they implement the simple strategies suggested below.

Table 3-2: Simple Nutrition Education Strategies Non-Dietitian Health Care Professionals Can Share with People Newly Diagnosed with Diabetes

1. Set an eating schedule: ▪ Eat three small- to medium-sized meals at the same time every day ▪ Choose small amounts of healthy foods (e.g., fruit, vegetables) for a snack ▪ Do not eat a large evening meal or late-night snack ▪ Do not skip meals, especially breakfast
2. Control portion sizes: ▪ Eat about the same amount of food every day ▪ Eat smaller portion sizes of all foods (carbohydrate, fat, and protein) if weight loss is needed ▪ Use a salad plate at meals to help decrease portions ▪ Fill ½ plate at lunch and dinner with vegetables, ¼ with lean protein, and ¼ with whole grains ▪ Eat a second helping of vegetables only
3. Reduce or eliminate sweetened beverages: ▪ Limit regular soda/pop, regular kool-aid, energy drinks, and sports drinks ▪ Limit juice to less than ½ cup (4 ounces) per day and no more than 3 cups (24 ounces total) of low-fat milk per day ▪ Drink more water, flavored water, sugar-free drinks, diet soda/pop, or other calorie-free beverages

People often ask very specific questions, such as, "Can I eat corn?" or "How many carbs should I eat in a day?" or "Is sugar-free ice cream okay?" Remember the standard of care for diabetes is creating an individualized meal plan that can include a variety of foods when portion control and planning are implemented. A registered dietitian can answer more specific questions during the MNT appointment.

Meal planning using the plate method is a simple approach to healthy eating and can be used by anyone. A Meal Planning with the Plate Method Tool is available in English and Spanish and can be found in the tools section of these guidelines. The MyPlate is another option available to assist people in adopting healthy eating habits. The Department of Agriculture introduced the new MyPlate icon that looks like a dinner plate. MyPlate replaced the MyPyrimid. More information about MyPlate can be found at: http://www.foodchannel.com/articles/article/replacement-food-pyramid-unveiled.

Referral to a Registered Dietitian and Coordination of Care

Due to the complexity of diabetes nutrition issues, referral to a registered dietitian (RD) skilled in the current recommendations of diabetes care (preferably who is also a certified diabetes educator) is strongly recommended. Although other health professionals can contribute to and support MNT, the registered dietitian is the member of the diabetes treatment team responsible for coordinating overall MNT in order to ensure assessment, planning, intervention, evaluation, and follow-up for a person with diabetes. The registered dietitian is the only health professional allowed to bill for MNT. Many insurance providers cover MNT by a registered dietitian when referred by a physician, but coverage varies greatly among insurers. It is important for people with diabetes to check with their insurance provider for coverage of MNT and diabetes self-management education (DSME). Medicare Part B covers MNT for diabetes and kidney disease. Wisconsin-based insurance policies that include "mandated benefits" and cover the treatment of diabetes are required to cover DSME, including nutrition counseling.

Additional Resources

1. A variety of consumer and professional publications are available at the American Dietetic Association: http://www.eatright.org.
2. American Dietetic Association Evidence Analysis Library website: http://adaevidencelibrary.com. The library is only accessible to ADA members and subscribers.
3. A variety of patient and professional publications are available at the American Diabetes Association: http://www.diabetes.org.
4. Diabetes Prevention Program Lifestyle Manuals of Operations: http://www.bsc.gwu.edu/dpp/manuals.htmlvdoc. Slide set also available for download: http://www.bsc.gwu.edu/dpp/slides.htmlvdoc.
5. Dietary Guidelines for Americans, 2010. Current edition available at: http://health.gov/dietaryguidelines/2010.asp.
6. Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults. National Heart, Lung, and Blood Institute: http://www.nhlbi.nih.gov/guidelines/obesity/ob_home.htm.
7. National Diabetes Education Program: http://www.ndep.nih.gov/.
8. The Dietary Approaches to Stop Hypertension (DASH) Eating Plan. National Heart, Lung, and Blood Institute: http://www.nhlbi.nih.gov/health/public/heart/hbp/dash/index.htm.
9. Third Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) Full Report: http://www.nhlbi.nih.gov/guidelines/cholesterol/atp3_rpt.htm.
10. National Institute of Diabetes and Digestive and Kidney Diseases. Health Information – Nutrition: www.niddk.nih.gov/health/nutrition.htm.
11. American Association of Diabetes Educators – Industry Allies Advisory Council. This is a listing of pharmaceutical and diabetes supply companies that provide a variety of materials including blood glucose logs, food and physical activity record forms, flow sheets, and patient and professional educational materials: http://www.diabeteseducator.org/About/iac/.

12. The Portion Doctor. Plates, bowls, and glasses with guidance for food choices and portion sizes: http://www.portiondoctor.com.
13. Joslin Diabetes Center. Website contains extensive diabetes library separated into topics that are outlined and addressed in a question-and-answer format. Website also contains a "Beginner's Guide to Diabetes" and an online class that provides information on the pathophysiology and treatment of diabetes: www.joslin.harvard.edu.
14. Diabetes Monitor. Website contains extensive index of links to a wide variety of reliable sources. Links are monitored and updated on a regular basis. Also included is a list of links for websites in other languages like Spanish, Russian, Korean, and many more: www.diabetesmonitor.com.
15. Patient Education Slicks from the Diabetes Care and Education; a dietetic practice group of the American Dietetic Association. Reproducible patient education slicks available in PDF format: http://www.dce.org/pub_publications/education.asp.

References

American Association of Diabetes Educators. (2009). *Diabetes Education Curriculum: Guiding Patients to Successful Self-Management* (1st ed.). Chicago, IL: American Association of Diabetes Educators.

American Diabetes Association. (2008). *Nutrition* Recommendations and Interventions for Diabetes. Diabetes Care, 31, S61-78.

American Diabetes Association. (2012).Standards of Medical Care in Diabetes - 012.*Diabetes Care*, 2012 35 (supp 1), S11-S63.

American Dietetic Association. (2002). *Nutrition Practice Guidelines for Gestational Diabetes Mellitus* [CD-ROM]. Chicago, IL: American Dietetic Association.

American Dietetic Association. (2008). Health Implications of Dietary Fiber. *Journal of the American Dietetic Association*, 108(10), 1716-1731.

American Dietetic Association (2009). Position of the American Dietetic Association: Vegetarian Diets, *Journal of the American Dietetic Association*, 109,1266-1282.

American Dietetic Association Evidence Analysis Library. (2008). *Diabetes 1 and 2* [library accessible to American Dietetic Association members and subscribers only]. Retrieved from http://adaevidencelibrary.com.

Centers for Disease Control and Prevention(2012) CDC grand rounds: detary sodium reduction-time for choice. Morbidity and Mortality Weekly Report, 61(10), 89-91.

Franz, M. J., Bantle, J. P., Beebe, C. A., et al. (2002). Evidence-Based Nutrition Principles and Recommendations for the Treatment and Prevention of Diabetes and Related Complications. *Diabetes Care*, 25, 148-198.

Franz, M. J., Boucher, J. L., et al. (2008). Evidence-Based Nutrition Practice Guidelines for Diabetes and Scope and Standards of Practice. *J Am Diet Assoc*, 108, S52-S58.

Knowler, W. C., Barrett-Connor, E., Fowler, S. E., et al. for the Diabetes Prevention Program Research Group. (2002). Reduction in the Incidence of Type 2 Diabetes with Lifestyle Intervention or Metformin. *NEJM*, 346, 393-403.

Trumbo, P., Schlicker, S., Yates, A., & Poos, M. (2002). Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids. *Journal of the American Dietetic Association*, 102(11), 1621-1630.

U. S. Department of Agriculture and U. S. Department of Health and Human Services. (2010). Dietary Guidelines for Americans, 2010 (7th ed.) Washington, DC: U. S. Government Printing Office.

Wheeler, M.L., & Pi-Sunyer, F.X. (2008). Carbohydrate Issues: Type and Amount. *J Am Diet Assoc*, 108, S34-S39.

Section 4: Glycemic Control

Concern	Care/Test	Frequency
Glycemic Control	▪ Check A1C; general goal: < 7.0% (individualize, see Table 4-2)	Every 3 months if not at goal; every 6 months at goal
	▪ Review goals, medications, side effects, and frequency of hypoglycemia	Each focused visit
	▪ Assess self-blood glucose monitoring schedule	Each focused visit, 2 – 4 times/day, or as recommended

MAIN TOPICS INCLUDED IN THIS SECTION:

- General Glycemic Control Goals
- Individual and Specific Considerations for Glycemic Control Goals
- Assessment of Diabetes Control
- Hypoglycemic Agents
- Insulin Pump Therapy
- Acute Complications
- Sick Day Management
- Referral to a Diabetes Specialist
- References

General Glycemic Control Goals

The Wisconsin Diabetes Advisory Group and a panel of experts recommend a general A1C goal of < 7.0%. Table 4-1 lists general goals for glycemic control for non-pregnant adults with diabetes.

Table 4-1: Glycemic Control Goals for Non-Pregnant Adults with Diabetes

General A1C (%) goal	< 7.0%◆
Pre-prandial or pre-meal goal	70 – 130 mg/dL
Peak post-prandial❖ or post-meal (2 hour) goal❖	< 180 mg/dL

◆A1C is the primary target for glycemic control and referenced to a nondiabetic range of 4.0-6.0% using a DCCT-based assay.
❖ Post-prandial glucose measurements should be made 1- 2 hours after the beginning of the meal.

Randomized controlled studies demonstrate reduced microvascular complications in both type 1 and type 2 diabetes with this level of control (ACCORD, 2008) (ADVANCE, 2008) (Writing Team for the Diabetes Control and Complications Trial/Epidemiology of Diabetes Interventions and Complications Research Group, 2002). It is estimated that for every one percent decrease in A1C, there is a 14-20% decrease in hospitalizations, resulting in a $4-5 billion savings in direct health care costs alone (Centers for Disease Control and Prevention Diabetes Cost-Effectiveness Group, 2002).

Although the benefits of good glycemic control on microvascular complications are well established, the benefits for macrovascular disease are less clear. The recently published Action to Control Cardiovascular Risk in Diabetes (ACCORD, 2008), Action in Diabetes and Vascular Disease: Preterax and Diamicron Modified Release Controlled Evaluation (ADVANCE, 2008), and Veterans Affairs Diabetes Trial (VADT) studies did not demonstrate benefits of tight glucose control for macrovascular disease; for some people with diabetes, tight blood glucose control resulted in worse cardiovascular outcomes. Conversely, some people with short duration of diabetes and few comorbidities did show cardiovascular benefit from tight glycemic control.

Individual and Specific Considerations for Glycemic Control Goals

Although the general A1C goal of < 7.0% is applicable to most people with diabetes, experts agree that the A1C goal should be individualized. Less stringent A1C goals may be appropriate for some people with diabetes (Ismael-Beigi, Moghissi, Tiktin, Hirsch, Inzuchhi & Genuth, 2011). Goals must be achievable, realistic, and safe. Health care providers should work with each person to negotiate and set glycemic goals as low as feasible to prevent microvascular complications of diabetes, while avoiding undue risk for adverse events (e.g., hypoglycemia, increased cardiovascular disease). Table 4-2 provides a list of factors that health care professionals and people with diabetes may want to consider when collaboratively setting A1C goals.

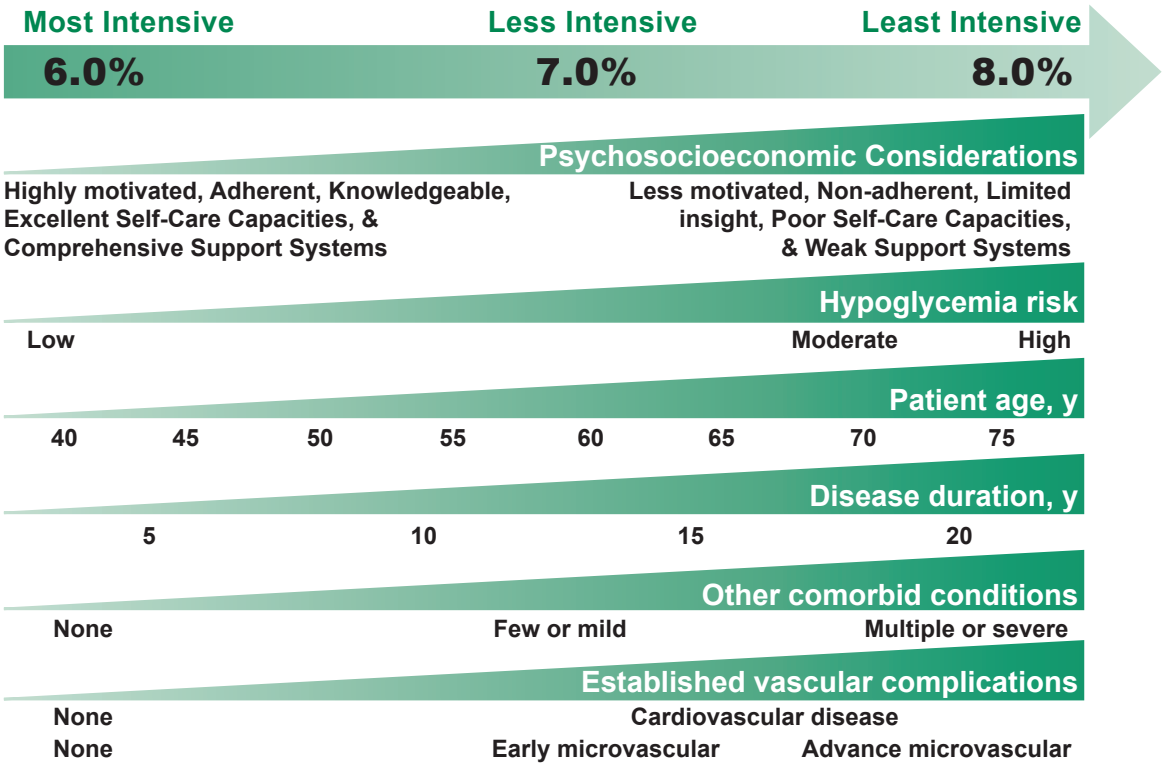
Table 4-2: Important Considerations in Individualizing Glycemic Goals

Factors to consider when individualizing glycemic goals include:

- Duration of diabetes
- Comorbidities
- Complication status (e.g., gastroparesis, chronic kidney disease)
- Known severe cardiovascular disease
- Age (e.g., children and the elderly)
- Life style, life expectancy, living status, financial status (e.g., safety, living alone or with someone)
- History of severe and/or frequent hypoglycemia
- Increased risk for hypoglycemia or has hypoglycemia unawareness
- Planning pregnancy or during pregnancy
- Physchological/cognitive status (e.g., self-management skill, ability, and motivation)

Health care professionals must balance the potential benefits of intensive blood glucose control against the risks for each individual with diabetes. A proposed approach for considering an appropriate and safe A1C goal for each person is to use a 2-step process, which includes clinical characteristics and psychosocioeconomic conditions. The proposed framework outlined in Figure 1 offers one simple approach in determining glucose goals for people with type 2 diabetes.

Figure 1: Framework to Assist in Determining Glycemic Treatment Targets in Patients with Type 2 Diabetes



Glycemic goals and treatment intensities are shown in terms of increasing severity or magnitude of clinical variables, as well as with limitations set by the psychosocioeconomic context. Greater height of a triangle indicates increased clinical concern about the considered variable. If a patient's position on the various triangles is widely disparate, the treatment target should be determined by the farthest-right position. As always, sound clinical judgment should prevail in these circumstances. The location of the triangles in the figure is not meant to represent their relative importance in setting glycemic targets. The depicted targets assume stable outpatient treatment protocols. Depending on the set glycemic target range for any given patient, the target range may have to be decreased (for example, for a patient in the intensive care unit with an acute infection) or increased (for example, for a patient admitted for acute renal injury) for various periods. Note that although hemoglobin A1C and mean blood glucose levels have a strong positive correlation in populations, this relationship varies substantially at an individual level and across certain populations (for various medical, nonmedical, and unknown reasons) among both glucose levels at a given hemoglobin A1C value and hemoglobin A1C values at a given average blood glucose level (30). A hemoglobin A1C value represents the mean effect of glycation reaction on hemoglobin over 2 to 3 months, whereas blood glucose levels obtained by fingersticks give a more accurate picture of glycemic control on a day-to-day basis.

Table included with permission from the authors: Ismail-Beigi, F., Moghissi, E., Tiktin, M., Hirsch, I. B., Inzucchi, S. E., & Genuth, S. (2011). *Ann Intern Med*, 154(8), 554-559.

Type 1 Diabetes

The Diabetes Control and Complications Trial (DCCT) showed the significant benefits of intensive glycemic control (ADA, 2012); however, these benefits were at the expense of a three-fold increase in severe hypoglycemia. People with type 1 diabetes who are at increased risk of severe hypoglycemia (i.e., have hypoglycemia unawareness or history of severe hypoglycemia) will need to have glycemic goals moderated. An A1C goal from 7.0-8.0% may be appropriate for these people.

Type 2 Diabetes

Type 2 diabetes is a progressive disease. Beta cell loss begins almost a decade before the actual diagnosis of type 2 diabetes. (UKPDS). Beta cell function continues to decline in the years following diagnosis due to the natural progression of disease. Therefore, achieving optimal glycemic control in people with type 2 diabetes requires an understanding of the disease's natural course. Treatment needs change over time due to one or more of the following reasons:

- Progression of type 2 diabetes
- Underlying infection, disease, or condition (including dental disease)
- The person's dietary management and physical activity regimens
- Medication issues (discontinuation, missed doses, interference, or side effects from other medications)
- Weight change

Monotherapy alone is rarely effective over time and intensification of medications is necessary for optimal glycemic control for most people with type 2 diabetes (ADA, 2012). In the United Kingdom Prospective Diabetes Study (UKPDS) trial, monotherapy with insulin, a sulfonylurea, or metformin failed to maintain an A1C of < 7.0% after three years in approximately 50% of participants. After nine years, 75% of participants required additional therapy. The health care team should optimize glycemic control by adding medications as needed to effectively reach A1C goals in a timely manner. A recent retrospective cohort study showed all-cause mortality was greater in patients who had A1C < 7.0% or > 8.0%. For more information regarding medications to lower blood glucose, see the tool titled "Diabetes Mellitus Medications 2012" in the Tools Section.

Children and Adolescents

Special consideration must be given when identifying A1C and plasma glucose goals for toddlers, preschoolers, school-aged children, adolescents, and young adults with diabetes. The A1C goals identified for each age group serve as a guide for health care professionals as they individualize the diabetes management plan. Plasma blood glucose and A1C goals for type 1 diabetes by age group are presented in Table 4-3. For additional information about diabetes in school-aged children, see the resource *Students with Diabetes: A Resource Guide for Wisconsin Schools and Families* at: http://www.dhs.wisconsin.gov/diabetes/srg.HTM.

Table 4-3: Plasma Blood Glucose and A1C Goals for Type 1 Diabetes by Age for Children and Adolescents❖

Age (years)	Plasma blood glucose goal range (mg/dL)		A1C	Rationale for A1C Level
	Before meals	Bedtime/ overnight		
Toddlers and preschoolers (0-6)	100-180	110-200	< 8.5% (but > 7.5%)	▪ High risk ▪ Vulnerability to low blood glucose
School age (6-12)	90-180	100-180	< 8.0%	▪ Risks of low blood glucose ▪ Relatively low risk of complications prior to puberty
Adolescents and young adults (13-19)	90-130	90-150	< 7.5%	▪ Risk of severe low blood glucose ▪ May have developmental and psychological issues ▪ A lower goal (< 7.0%) is reasonable if achieved without excessive low blood glucose

Adapted from: *Diabetes Care* (2012). 33(1), S40.
❖A plasma blood glucose level is obtained by a finger stick and a home blood glucose monitor. Although there are no national recommendations for children with type 2 diabetes, using the values in this table as a guide is reasonable.

Key concepts in setting glycemic goals:

- Goals should be individualized and lower goals may be reasonable based on benefit-risk assessment.
- Blood glucose goals should be higher than those listed above in students with frequent low blood glucose or hypoglycemia unawareness (inability to sense that blood glucose is low or going low).
- Post-prandial blood glucose values should be measured when there is a discrepancy between pre-prandial blood glucose values and A1C levels and to help assess glycemia in those on basal/bolus regimens.
- During adolescence, the need for insulin will dramatically increase due to hormone changes and growth.

Pregnancy

For information specific to preconception, and pregnancy, and postpartum care, see *Section 12: Preconception, Pregnancy, and Postpartum Care*.

Assessment of Diabetes Control

A1C

The A1C test is the gold standard for assessing and monitoring long-term glycemic control in people with diabetes (ADA, 2012). A1C values correlate with average blood glucose levels for approximately the previous three months. A1C should be tested a minimum of two times per year for those meeting treatment goals with stable glycemic control and four times per year for those whose therapy is changing or those not meeting treatment goals.

Point-of-care A1C testing is available and provides a viable option for monitoring of A1C when the person is in the provider's office (ADA, 2012). The immediate results allow the provider and the person with diabetes to evaluate and modify the diabetes plan of care as needed. Point-of-care A1C testing should not be used for diagnosing diabetes or monitoring during pregnancy. Point-of-care A1C testing requires proper instruction on use and adherence to strick quality control of the device.

Accuracy of A1C

Conditions or illness that shorten erythrocyte survival or decrease mean erythrocyte age (e.g., acute blood loss, anemia, blood transfusions, hypersplenism, cirrhosis, chronic kidney disease) may affect the accuracy of the A1C. Additionally, a variety of hemoglobin disorders such as sickle cell disease can interfere with A1C assay methods, independent of shortened erythrocyte survival. Most of these conditions will give a falsely low A1C. A1C results should be continuously compared to a person's home glucose readings. This comparison can assist in detecting discrepancies in persons with conditions known to affect the A1C but also for those whose A1C appears at goal (e.g., 7.0%) yet blood glucose readings document extreme fluctuations (e.g., 30 to 300 mg/dL).

Estimated Average Glucose

Estimated average glucose (eAG) is an alternative method of describing the results of the A1C. Health care providers can translate A1C results into an estimated average glucose (eAG), thereby using the same unit of measurement as used by an individual with their home blood glucose monitors. Table 4-4 provides a comparison of A1C and eAG levels.

The formula is: (28.7 x A1C) – 46.7 = eAG. A calculator is available to calculate eAG from A1C or A1C from eAG: http://professional.diabetes.org/GlucoseCalculator.aspx.

Table 4-4: Comparison of A1C and eAG Levels

A1C (%)	eAG (mg/dL)
5.0%	97
5.5%	111
6.0%	126
6.5%	140
7.0%	154
7.5%	169
8.0%	183
8.5%	197
9.0%	212
9.5%	226
10.0%	240
10.5%	255
11.0%	269
11.5%	283
12.0%	298

Adapted from: *Diabetes Care* (2008). 31(8), 1473-1478.

Fructosamine

Non-hemoglobin-based methods for assessing glycemic control may be useful when the A1C is known to be unreliable (ADA, 2004). The fructosamine test, or glycated serum albumin test, reflects changes in glycemic control over a period of one to two weeks. It may also be useful in situations where information on recent glycemic control is required. **Measurement of a fructosamine level, however, has not been demonstrated to correlate with the risk of development of complications, and thus should not be considered equivalent to an A1C test.**

Self-Monitoring of Blood Glucose

Self-monitoring of blood glucose (SMBG) is a powerful tool that gives people with diabetes a way to check their blood glucose level at any time of day (American Association of Diabetes Educators, 2010). Studies have consistently demonstrated the benefits of SMBG in type 1 diabetes. However, similar studies in people with type 2 diabetes have not always produced consistent results. Nonetheless, SMBG is still considered the best way for people and health care providers to assess efficacy of all ongoing diabetes management regimen. Providers should review blood glucose logs and/or downloaded meter results during each diabetes-focused visit and use the results to enhance self-management skills, reinforce lifestyle modifications, and guide medical treatment changes. Many different meters are available and meter choice should match individual needs. Accuracy of the meter should be checked annually. This is most often done by comparing a meter test result to a lab test result. A lab test will be about 10-15% higher than the value given by a meter that measures whole blood. Many meters now measure plasma blood values, which means the result can be compared more directly to lab test value. More information on meters can be found at: http://www.forecast.diabetes.org/files/images/v63n01_p44v2.pdf.

Self-monitoring of blood glucose is quick and easy but can be expensive (ADA, 2012). Frequency and timing of SMBG testing depends on individual circumstances. Some common self-monitoring suggestions are listed in Table 4-5. The following factors are considerations when recommending frequency of testing:

- Type of diabetes
- Blood sugar fluctuation (i.e., degree of and number of fluctuations through the day)
- Blood glucose control
- Type of treatment (i.e., oral medication, insulin, food choices, and physical activity)
- Adjustments of medications/insulin
- Frequency of hypoglycemia
- Individual ability and willingness to test
- Insurance coverage and limits

Table 4-5: Self-Monitoring of Blood Glucose Suggestions◆

Condition	Testing Amount	Recommended Testing Time
Type 1 or Type 2: Using insulin (intensive regimen, multiple injections, or pump) or during illness	4 or more times/day (during illness, check urine or blood ketones with each blood glucose > 250 mg/dL)	▪ Fasting, pre-meal, and bedtime ▪ 1-2-hour post-meal is beneficial especially when trying to achieve tighter control by adjusting treatment for the specific grams of carbohydrates consumed before a meal and for teaching about how lifestyle choices affect glucose levels ▪ If not eating, the person with diabetes should check every 4-6 hours
Type 2: Not on insulin; adding or adjusting treatment	2 or more times/day	▪ Fasting, pre-meal, bedtime, and/or 1-2-hour post-meal (alternate days with varied times) ▪ Adjust the doses of medications to attain the goal fasting glucose level ▪ 1-2-hour post-meal is beneficial especially when trying to achieve tighter control by adjusting treatment when fasting glucose is at goal and for teaching about how lifestyle choices affect glucose levels
Type 2: Stable treatment regimen; not on insulin	1 or more times/day	▪ Alternate fasting and 1-2-hour post-meal ▪ Adjust the doses of medications to attain the goal fasting glucose level ▪ 1-2-hour post-meal is beneficial for teaching about how lifestyle choices affect glucose levels
Pre-conception	4 or more times/day	▪ Fasting, pre-meal, and bedtime ▪ 1-2-hour❖ post-meal is beneficial especially when trying to achieve tighter control by adjusting treatment for the specific grams of carbohydrates consumed before a meal and for teaching about how lifestyle choices affect glucose levels
Pregnancy°	4 or more times/day	▪ Fasting, pre-meal, 1-hour or 2-hour❖ post-meal, and bedtime

◆All people with diabetes must be instructed to test their glucose when experiencing symptoms of hypoglycemia or when at risk of hypoglycemia. These testing schedules and recommendations are intended to serve as a guide for health care providers. They are not intended to replace or preclude clinical judgment.

❖1-hour or 2-hour recommendation will be determined by provider

°ACOG and ADA have different reccomendations for testing freq and targets during pregnancy. Providers caring for pregnant women with diabetes should be familiar with recommendations and treat accordingly. Pregnant women with diabetes should be cared for by an experienced provider in diabetes management.

Alternate Site Testing

Many blood glucose meters provide the ability to measure blood glucose using blood from a location other than a finger, such as the forearm, upper arm, base of the thumb, or thigh (Johnson & Hinnen (2001). Typically, alternate site testing utilizes a specific lancet device (or device tip) to obtain an adequate blood specimen. Alternate site blood glucose results differ from finger stick results when blood glucose levels are changing rapidly, such as after a meal, after taking insulin, during physical activity, or during illness/stress. A finger stick test is advised:

- If alternative site test results are not consistent with how the person is feeling
- When hypoglycemia is suspected and symptoms are present
- Within two hours after a meal
- During/after physical activity
- During illness or stress

When possible, fingerstick testing is preferred. Providers caring for people asking to do alternate site testing may consider referring to a diabetes educator in order to troubleshoot testing technique. In most cases people can modify fingerstick testing technique to minimize pain and monitor effectively without use of alternate site testing.

Continuous Glucose Monitors

Continuous Glucose Monitors (CGM), sometimes called sensors, are devices that continuously measure glucose levels in the interstitial fluid of the skin (National Diabetes Information Clearinghouse, 2008). CGMs provide an additional method of evaluating glucose control as the CGM tracks glucose levels and trends throughout the day for 3 or 7 days depending on the monitor. CGM is not intended to be a replacement for finger stick testing. CGM may be used for a variety of reasons:

- To augment insulin therapy with the goal of optimizing glycemic control
- To identify erratic blood glucose fluctuations
- To serve as a warning tool for those with frequent, severe hypoglycemia or hypoglycemia unawareness
- To identify previously undetected hyperglycemia and hypoglycemia
- For optimal glucose control during pregnancy

CGM systems are programmed to alert for hyperglycemia and hypoglycemia, as well as rapidly changing glucose levels (either rising or falling). CGM systems may not alert for **all** high or low blood glucose levels. **A CGM reading should never be used to determine treatment.** In the presence of CGM, blood glucose monitoring by finger stick is still essential with any symptoms of hyperglycemia or hypoglycemia and high or low alerts.

Calibration of a CGM is essential and is best done when glucose levels are stable. Various types of continuous glucose monitors are available as shown in Table 4-6. More information on CGMs can be found at: http://www.forecast.diabetes.org/files/images/v63n01_p44v2.pdf.

An office-based continuous glucose monitor (Medtronics iPRO) is also available for professional use. This device is inserted in the office, worn for 3 days, then removed and downloaded. People may need prior authorization for use of this device. It can be helpful to determine:

- Daily glucose patterns
- Otherwise unidentified hyperglycemia and hypoglycemia
- Discordance between A1C and SMBG monitoring

Table 4-6: Continuous Glucose Monitors for Individuals

Product Name	Manufacturer	Phone and Website
Seven Plus ✪	DexCom	(888) 738-3646 www.dexcom.com
Guardian Real-Time❖	Medtronic Diabetes	(866) 948-6633 www.medtronic-diabetes.com
MiniMed Paradigm Real-Time ❖	Medtronic Diabetes	(866) 948-6633 www.medtronic-diabetes.com

Adapted from: American Diabetes Association (January 2012). Diabetes Forecast Resource Guide, 44-46.
✪ FDA approved for adults 18 years and older
❖ FDA approved for children 7 years and older

Hypoglycemic Agents

Oral Glucose-Lowering Medications

Many oral medications are available for treatment of type 2 diabetes. These can effectively reduce fasting plasma glucose (FPG) or post-prandial glucose to achieve optimal glycemic control. For a comprehensive list of oral glucose-lowering medications see the tool titled "Diabetes Mellitus Medications 2012" in the Tools Section.

Injectable Glucose-Lowering Agents

Incretin mimetics are glucagon-like peptide 1 (GLP-1) agonists. These agents can effectively reduce post-prandial, and to a lesser extent, fasting glucose levels. For a comprehensive list of injectable non-insulin glucose-lowering agents see the tool titled "Diabetes Mellitus Medications 2012" in the Tools Section.

Insulin

Insulin is essential for the treatment of type 1 diabetes and is frequently necessary for people with type 2 diabetes to achieve optimal blood glucose levels. Insulin provides benefit for lowering both fasting and post-prandial glucose. For detailed information on the types of insulin, insulin regimens, and tips for using insulin, see the tool titled "Insulin Therapy 2012" in the Tools Section.

U-500

For persons whose insulin needs exceed 200 IU to 300 IU daily due to insulin resistance, U-500 insulin may be an option. Advantages are a lower quantity of fluid injected into the subcutaneous tissue, resulting in less discomfort, potentially increased medication adherence and improved glycemic control (Garg et al 2007, Dailey 2010). **Disadvantages of U-500 insulin are due to safety concerns.** There is no increase in hypoglycemia as compared to U-100 insulin when appropriate safety precautions are present for U-500 use (Garg et al 2007, Quinn 2011), however, three publications have reported clinically significant hypoglycemia during U-500 use (Dailey 2010, Boldo 2012, Ziesmer 2012). **No dedicated insulin syringes exist for U-500**, so careful instruction is needed for either a U-100 insulin or tuberculin syringes for U-500 insulin administration (Garg 2007). The Institute for Safe Medication Practices (ISMP) recommends use of a tuberculin syringe with doses expressed both in units and volume (Pena et al, Cochran et al, Lane, et al). For more information on ISMP go to: **http://www.ismp.org/Newsletters/ambulatory/archives/200708_2.asp**. U-500 insulin must be stored away from U-100 insulin to avoid an error in giving the wrong strength of insulin. A referral to an endocrinologist is recommended for those considering use and or using U-500 insulin.

Insulin Pump Therapy

Insulin pump therapy is also known as continuous subcutaneous insulin infusion (CSII) (Grunberger, G. et al., 2010) (Cummins, E. et al., 2010). The use of an insulin pump is one way to deliver insulin with more flexibility and convenience than multiple daily injections. Candidates for CSII are people with type 1 diabetes, type 2 diabetes, and gestational diabetes. It is estimated that in 2010, approximately 20-30% of people with type 1 diabetes and less than 1% of people with type 2 diabetes are currently managing their diabetes with CSII (ACCORD, 2008). The National Institute for Health and Clinical Excellence (NICE) issued guidelines in 2002 on appropriate initiation of CSII in patients with diabetes (ADVANCE, 2008). The guideline recommended CSII in people with type 1 diabetes whose diabetes is not sufficiently controlled including, but not limited to, people who have large fluctuations in blood glucose levels despite multiple adjustments of multiple daily insulin regimens. A systematic review conducted by NICE in 2010 revealed potential benefits of CSII in children and adult people with type 1 diabetes such as improved control of hemoglobin A1C, less hypoglycemic episodes, and increased quality of life with greater lifestyle flexibility. Few studies were conducted in people with type 2 diabetes and gestational diabetes to recommend CSII in such populations (ACCORD, 2008). In one study in the United States, CSII did not significantly improve hemoglobin A1C compared to the multiple daily insulin injections; however, CSII demonstrated a non-statistically significant trend in decreasing the amount of insulin demand in persons with type 2 diabetes.

Currently in the United States, there is no official requirement for medical supervision for persons with diabetes using CSII for glycemic control (ACCORD, 2008). As a result, adverse events can occur often with CSII due to inappropriate candidates, inadequate training on self-management, and limited expert guidance. Therefore, people wishing to use CSII must be willing to invest time and energy into learning a new insulin delivery approach and be able to fulfill follow-up responsibilities to ensure positive outcomes. Manufacturer resources exist for pump therapy. All the insulin pump companies have various resources and educational tools that are available free of charge. A compressive listing of insulin pumps and infusion sets can be found in the American Diabetes Association: January 2012 Diabetes Forecast Consumer Guide at: http://forecast.diabetes.org/magazine/features/2012-insulin-pumps. More information on CGMs can be found at: http://forecast.diabetes.org/magazine/features/2012-continuous-glucose-monitors.

Acute Complications

Hypoglycemia

Hypoglycemia is defined as a blood glucose less than 70 mg/dL (Briscoe, V., & Davis, S. 2006). People with diabetes on glucose-lowering agents with the exceptions of metformin, thiazolidinediones and DPP-4 Inhibitors are at risk of hypoglycemia. The risk of hypoglycemia increases as the blood glucose levels approach euglycemia. Some of the most common causes of hypoglycemia in people taking certain glucose-lowering agents are:

- Skipping or delaying meals or snacks, or eating less than usual
- More than the usual amount of physical activity without carbohydrate compensation
- Taking glucose lowering agents incorrectly (wrong dose, wrong medication, or wrong time)
- Ingesting alcohol
- Renal insufficiency
- Taking oral medications or injecting insulin too far in advance of eating
- Taking the wrong dose of rapid- or short-acting insulin (regular, aspart, lispro, or glulisine) before a meal (either calculating too much for the amount eaten or failing to correct for a low blood sugar first)
- Overcorrecting for high blood glucose by taking too much medication

The symptoms of hypoglycemia vary in characteristics, pattern, and intensity between individuals (McAulay, V., Deary, I, & Frier, B., 2001). It is important for people receiving glucose lowering agents with the potential of causing hypoglycemia to be familiar with their own individualized hypoglycemic symptoms. Although no single symptom is universally applicable to all people, some symptoms are more common than others, such as:

- Sweating, shaking, trembling
- Overall body weakness
- Visual disturbances and difficulty speaking
- Hunger
- Dizziness and headache
- Difficulty concentrating and confusion
- Anxiety
- Tingling in the mouth

Common symptoms can differ greatly in people from different age groups (McAulay et al., 2001). Children are more likely to have asymptomatic hypoglycemic episodes. Some common symptoms of hypoglycemia in children include weakness, sleepiness, tremor, hunger, and behavioral changes. The warning symptoms of hypoglycemia are less apparent in elderly people. People from this age group are more prone to severe hypoglycemic attacks. Children and the elderly may require modification of their glycemic goals to less intensified diabetes control due to safety concerns. Refer to the tool titled "Signs and Symptoms of Low Blood Glucose (Hypoglycemia)" in the Tools Section.

To prevent an accident because of hypoglycemia, blood glucose testing is recommended before and during any potentially dangerous activity (Briscoe & Davis, 2006). For example, blood glucose levels should be tested at least every two hours during prolonged use of motorized or moving vehicles or heavy machinery. Hypoglycemia can impair a person's ability to:

- Operate motorized or moving vehicles (e.g., car, motorcycle, lawn mower, scooter, bike)
- Operate equipment or machinery (e.g., power tools, firearms)
- Be aware of potential dangers during physical activities (e.g., swimming, diving, skiing)

Glucagon kits should be prescribed for any person taking glucose lowering agents with potential of causing hypoglycemia (Briscoe & Davis, 2006). Glucagon is used when the hypoglycemic person is unconscious or unable to take oral carbohydrates. Oral carbohydrates should be avoided in anyone that is unconscious as this practice is neither safe nor effective in treating severe hypoglycemia. It is important that the glucagon injection is available for use and that the person's family member(s) or caregivers are knowledgeable in its use. While glucagon is given to a person Emergency Medical Services (e.g., 9-1-1) should be called.

Glucagon injections should be given to a hypoglycemic person under the following conditions:

- Unable to safely take liquids or solids by mouth
- Confused or unable to follow commands or directions
- Unresponsive or unconscious
- Having a seizure or convulsion

Glucagon will not be effective if glycogen stores are depleted in the liver. Other instances that can reduce the effectiveness of glucagon are: a prolonged fasting state, low levels of adrenaline, chronic hypoglycemia,or hypoglycemia caused by drinking too much alcohol.

Emergency identification in the form of a bracelet or necklace noting that the person has diabetes is also recommended for anyone taking oral hypoglycemic agents and/or insulin (Briscoe & Davis, 2006) (McAulay, 2001).

The health care provider/educator should evaluate people's hypoglycemic episodes and develop a specific plan for treating hypoglycemia in a variety of settings (Briscoe & Davis, 2006). Table 4-7 presents the "Rule of 15" with a list of some common treatment options that are safe and effective for treating hypoglycemia. Over treatment of hypoglycemia with an inappropriate carbohydrate source (e.g., candy bar) is common and may cause significant rebound hyperglycemia. For additional information, go to: http://www.diabetesnet.com/diabetes-control/low-blood-sugars/treatment.

Table 4-7: Treatment of Hypoglycemia – Rule of 15

If awake and able to swallow:

1. Give 15 grams carbohydrate such as:
   - 3-4 glucose tablets
   - 1 tube of glucose gel (one tube may not always be 15 grams)
   - 8-12 oz of milk
   - 4 oz of any juice without sugar added
   - 4-6 oz of regular soda pop
   - 3 sugar packets
2. Wait 15 minutes. Recheck blood glucose; if still less than 70 mg/dL, repeat 15 gram carbohydrate oral feeding.
3. Recheck blood glucose every 15 minutes, repeat "Rule of 15" as necessary until no longer hyoglycemic. If the blood glucose is still low after two attempts to treat, one should consider obtaining assistance from a health care professional.
4. Rule of thumb: approximately 15 grams of carbohydrate will raise blood glucose about 50-60 mg/dL.
5. Always troubleshoot for the cause of the hypoglycemic episode. Common reasons for hypoglycemic episodes include too much medication, extra activity, medication taken/given at wrong time, or delaying a meal.

NEVER GIVE GLUCOSE GEL TO A PERSON THAT IS UNCONSCIOUS

- ➔ If initial blood glucose is < 50 mg/dL, consider using 30 grams of carbohydrate initially.
- ➔ If, after a hypoglycemic episode, blood glucose is > 70 mg/dL, and risk for low blood sugar remains (e.g., person will be physically active, next meal is more than one hour away, person is going to drive or operate a motorized vehicle or machinery, or is otherwise at higher risk for inability to detect or treat low blood sugar), consider an additional snack with 15 grams of carbohydrate and a protein (e.g., cheese, meat).
- ➔ Many over-the-counter products exist for treating low blood glucose such as glucose tablets and gels. The grams of carbohydrates vary for these products, so read labels carefully.

Hyperglycemia

Severe, uncontrolled hyperglycemia can lead to the short-term complications of diabetic ketoacidosis (DKA) in type 1 diabetes or Hyperosmolar Hyperglycemia State (HHS) in type 2 diabetes (Kitabchi & Nyenwe, 2006). Prolonged hyperglycemia increases the risks of both short-term and long-term diabetes complications. People with diabetes need to be instructed on proper management of severe hyperglycemia. Persistent high blood glucoses should be shared with the health care provider so adjustments to the treatment regimen can be made. For more information, refer to the tool titled "Signs and Symptoms of High Blood Glucose (Hyperglycemia)" in the Tools Section.

Diabetic Ketoacidosis

Diabetic ketoacidosis (DKA) is a dangerous life-threatening condition that may occur when **blood glucose levels are high (usually ≥ 250 mg/dL) and ketones are present (Kitabchi & Nyenwe, 2006)**. A single high blood glucose reading of ≥ 250 mg/dL without the presence of ketones should be monitored, but is not considered an emergency. **DKA is a medical emergency**. DKA is caused by lack of enough insulin to meet the body's requirements. It is often seen during another illness that increases insulin needs in the body. DKA primarily occurs in type 1 diabetes, but can occur in type 2 diabetes. Common symptoms/signs associated with DKA include:

- Nausea and/or vomiting
- Stomach cramps/pain
- Sweet/fruity odor to breath

- Sleepiness and/or lethargy, weakness
- Confusion, inattentiveness, or other behavior change
- Thirst/dry mouth
- Deep, fast, labored breathing

Hyperosmolar Hyperglycemic State

Hyperosmolar Hyperglycemic State (HHS) is an acute, life-threatening condition seen in type 2 diabetes (Kitabchi & Nyenwe, 2006). Previously termed Hyperosmolar Hyperglycemic Nonketotic Coma (HHNC), this condition occurs less frequently than DKA and typically occurs in people with type 2 diabetes over age 50. Features of HHS include hyperglycemia (often above 600 mg/dL), elevated serum osmolality, profound dehydration, and alterations in consciousness. Coma occurs in less than 20% of cases. Mortality rates can be as high as 10-40% for people with HHS.

Sick Day Management

During illness, the body releases stress hormones that contribute to hyperglycemia (by opposing the action of insulin) and to the formation of ketones (Kitabchi & Nyenwe, 2006). Any person with diabetes who is ill is at higher risk of dehydration, ketosis, DKA, or HHS, any of which can lead to hospitalization. Managing diabetes during illness often requires special care to achieve and maintain euglycemia, maintain fluid and electrolyte balance, provide adequate nutrition, and prevent further complications. Testing for urine ketones is recommended during periods of illness, infections, injury, or when blood glucose levels are ≥ 250 mg/dL to assist with early detection of DKA. Sick day management is a survival skill and all people with diabetes require detailed sick day instructions. For additional information, refer to the tool titled "Diabetes Sick Days Plan" in the Tools Section.

Referral to a Diabetes Specialist

Referral to a diabetologist, endocrinologist, or other health care provider with diabetes certification or who specializes in diabetes is valuable in the following circumstances:

- For clinical expertise in diabetes management
- For intensive insulin management
- For insulin pump or continuous glucose monitor initiation or adjustment
- For clients with hypoglycemia unawareness
- For clients with advanced diabetes complications
- For clients with complex diabetes regimens
- For clients requiring use of U500 insulin
- For clients with uncontrolled blood glucose despite multiple medication adjustments and/or who require the addition of insulin and/or experience frequent hypoglycemia

References

Action to Control Cardiovascular Risk in Diabetes Study Group. (2008). Effects of Intensive Glucose Lowering in Type 2 Diabetes. *NEJM*, 358, 2545-2559.

ADVANCE Collaborative Group. (2008). Intensive Blood Glucose Control and Vascular Outcomes in Patients with Type 2 Diabetes. *NEJM*, 358, 2560-2572.

Albright, E. S., Desmond, R., & Bell, D. S. H. (2004). Efficacy of Conversion From Bedtime NPH Insulin Injection to Once- or Twice-Daily Injections of Insulin Glargine in Type 1 Diabetic Patients Using Basal/Bolus Therapy [Letter to the Editor]. *Diabetes Care*, 27(2), 632-633.

American Association of Diabetes Educators (2010). AADE position statement: self-monitoring of Blood Glucose. http://www.diabeteseducator.org/export/sites/aade/_resources/pdf/research/Self-Monitoring_of_Blood_Glucose.pdf.

American Diabetes Association. (2012). Standards of Medical Care in Diabetes - 2012.*Diabetes Care*, 2012 35 (supp 1), S11-S63.

American Diabetes Association (2010). Tight Diabetes Control. http://www.diabetes.org/living-with-diabetes/treatment-and-care/blood-glucose -control/tight

American Diabetes Association (2004). Tests of glycemia in diabetes. *Diabetes Care*. 27(1), S91-S93.

American Diabetes Association, European Association for the Study of Diabetes, International Federation of Clinical Chemistry and Laboratory Medicine, International Diabetes Federation. (2007). Consensus Statement on the Worldwide Standardization of the HbA1c Measurement. *Diabetologia*, 50, 2042-2043.

Bloomgarden, Z. T. (2002). Treatment of Type 2 Diabetes: The American Association of Clinical Endocrinologists Meeting. *Diabetes Care*, 25, 1644-1649.

Boldo, A. & Comi, R. J. (2012 Jan-Feb). Clinical experience with U500 insulin: risks and benefits. *Endocr Pract*, 18(1):56-61.

Braunstein, S. N., Combs, P., & Campbell, R. K. (2003). Proceedings from 30th Annual Meeting and Exhibition of the American Association of Diabetes Educators: Optimal Glycemic Control with Insulin Therapy: Lowering A1c and Raising Standards. *The Diabetes Educator* (supp 1-15).

Briscoe, V., & Davis, S.(2006). Hypoglycemia in type 1 and type 2 diabetes: physiology, pathophysiology, and management. *Clinical Diabetes*, 24(3), 115-121.

Centers for Disease Control and Prevention. (2007). Self-Monitoring of Blood Glucose Among Adults with Diabetes – United States, 1997-2006. MMWR Morb Mortal Wkly Rep, 56, 1133-1137.

Centers for Disease Control and Prevention Diabetes Cost-Effectiveness Group. (2002). Cost-Effectiveness of Intensive Glycemic Control, Intensified Hypertension Control, and Serum Cholesterol Level Reduction for Type 2 Diabetes. *JAMA*, 287, 2542-2551.

Chitre, M. M., & Burke, S. (2006). Treatment Algorithms and the Pharmacological Management of Type 2 Diabetes. *Diabetes Spectrum*, 19, 249-254.

Cochrane, E. & Gorden, P. (2008). Use of U-500 insulin in the treatment of severe insulin resistance. *Insulin* 3:211-218

Cummins E, Royle P, Snaith A, Greene A, Robertson L, McIntyre L, Waugh N. (2010. Clinical effectiveness and cost-effectiveness of continuous subcutaneous insulin infusion for diabetes: systematic review and economic evaluation. *Health Technology Assessment*, 2010(14), 1-208.

Currie, C. J., Peters, J. R., Tynan, A., Evans, M., Heine, R. J., Bracco, O. L., Zagar, T., & Poole, C. D. (2010). Survival as a Function of HbA1c in People with Type 2 Diabetes: A Retrospective Cohort Study. *Lancet*, 375(9713), 481–489.

Dailey, A. M. & Tannock, L. R. (2011). Extreme Insulin Resistance: Indications and Approaches to the Use of U-500 Insulin in Type 2 Diabetes Mellitus. *Current Diabetes Reports*, 11(2):77-82. doi: 10.1007/s11892-010-0167-6

Davis, S. N., Horton, E. S., Battelino, T., Rubin, R. R., Schulman, K. A., & Tamborlane, W. V. (2010). STAR 3 Randomized Controlled Trial to Compare Sensor-augmented Insulin Pump Therapy with Multiple Daily Injections in the Treatment of Type 1 Diabetes: Research Design, Methods, and Baseline Characteristics of Enrolled Subjects. Diabetes Technol Ther, 12(4), 249-255.

DeWitt, D. E., & Hirsch, I. B. (2003). Outpatient Insulin Therapy in Type 1 and Type 2 Diabetes Mellitus: Scientific Review. *JAMA*, 289, 2254-2264.

Duckworth, W., Abraira, C., Moritz, T., Reda, D., Emanuele, N., Reaven, P. D., Huang, G. D., for the VADT Investigators. (2009). Glucose Control and Vascular Complications in Veterans with Type 2 Diabetes. N Engl J Med, 360, 129-39. Funnell, M. M., & Kruger, D. F. (2004). Type 2 Diabetes: Treat to Target. *Nurse Pract*, 29, 11-23.

Garg, R., Johnston, V., McNally, P. G., Davies, M. J., & Lawrence, I. G. (2007). U-500 Insulin: Why, When and How to Use in Clinical Practice. *Diabetes/Metabolism Research and Reviews*, 23(4), 265-268.

Goykhman, S., Drincic, A., Desmangles, J. C., Rendell, M. (2009). Insulin Glargine: A Review 8 Years After its Introduction. *Expert Opin Pharmacother*, 10(4), 705-718.

Grunberger G, Bailey TS, Cohen AJ, Flood TM, Handelsman Y, Hellman R AACE Insulin Pump Management Task Force (2010). Statement by the American Association of Clinical Endocrinologists consensus panel on insulin pump management. Endocrine Practice, 16(5): 746-762.

Hanefeld, M., Brunetti, P., Schernthaner, G. H., Matthews, D. R., & Charbonnel, B. H. for the QUARTET Study Group. (2004). One-Year Glycemic Control with a Sulfonylurea Plus Pioglitazone Versus a Sulfonylurea Plus Metformin in Patients with Type 2 Diabetes. *Diabetes Care*, 27, 141-147.

Hemphill, R. R., Nelson, L. S., & Sergot, P. B. (2010). *Hyperglycemic Hyperosmolar State.* Retrieved from http://emedicine.medscape.com/article/766804-overview

Hoerger, T. J., & Ahmann, A. J. (2008). The Impact of Diabetes and Associated Cardiometabolic Risk Factors on Members: Strategies for Optimizing Outcomes. *J Manag Care Pharm,* 14, S2-14.

Homko, C., Deluzio, A., Jimenez, C., Kolaczynski, J. W., & Boden, G. (2003). Comparison of Insulin Aspart and Lispro: Pharmacokinetic and Metabolic Effects. *Diabetes Care*, 26, 2027-2031.

Institute for Safe Medicine Practices. (January 29,1997). Extra Caution Needed for U-500 Insulin. ISMP MedicationSafetyAlert! Acute Care. Retrieved from http://www.ismp.org/newsletters/acutecare/articles/19970129.asp

International Diabetes Federation. (2007). *Guideline for Management of Postmeal Glucose.* Retrieved from http://www.idf.org/webdata/docs/Guideline_PMG_final.pdf

Ismail-Beigi, F., Moghissi, E., Tiktin, M., Hirsch, I. B., Inzucchi, S. E., & Genuth, S. (2011). Individualizing Glycemic Targets in Type 2 Diabetes Mellitus: Implications of Recent Clinical Trials. *Ann Intern Med,* 154(8), 554-559.

Jellinger, P. S., et al. (2007). Road Maps to Achieve Glycemic Control in Type 2 Diabetes Mellitus. *Endocr Pract,* 13, 260-268.

Johnson, K., O'Neil, R., & Hinnen, D. (2001). Alternate site glucose monitoring: a welcome respite. *Diabetes Spectrum,* 14(4), 193-194.

Kahn, S. E., et al. (2006). Glycemic Durability of Rosiglitazone, Metformin, or Glyburide Monotherapy. *NEJM,* 355, 2427-2443.

Kitabchi, A. E., & Nyenwe, E. A. (2006). Hyperglycemic Crises in Diabetes Mellitus: Diabetic Ketoacidosis and Hyperglycemic Hyperosmolar State. *Endocrinol Metab Clin North Am*, 35(4), 725-751.

Klonoff, D. C., & Schwartz, D. M. (2000). An Economic Analysis of Interventions for Diabetes. *Diabetes Care,* 23, 390-404.

Lane, W. S., Cochran, E. K., Jackson, J. A., Scism-Bacon, J. L., Corey, I. B., Hirsch, I. B., & Skyler, J. S. (2009). High-Dose Insulin Therapy: Is It Time for U-500 Insulin? *Endocrine Practice*, 15(1), 71-79.

Lepore, M., Pampanelli, S., Fanelli, C., et. al. (2000). Pharmacokinetics and Pharmacodynamics of Subcutaneous Injection of Long-Acting Human Insulin Analog Glargine, NPHInsulin, and Ultralente Human Insulin and Continuous Subcutaneous Infusion of Insulin Lispro. *Diabetes*, 49, 2142-2148.

McAulay, V., Deary, I., & Frier, B. (2001). Symptoms of hypoglycaemia in people with diabetes. *Diabetic Medicine,* 18(9): 690-705.

Nathan, D. M. (2002). Clinical Practice: Initial Management of Glycemia in Type 2 Diabetes Mellitus. *NEJM*, 347, 1342-1349.

Nathan, D. M. (2002). Clinical Review 146: The Impact of Clinical Trials on the Treatment of Diabetes Mellitus. *J Clin Endocrinol Metab,* 87, 1929-1937.

Nathan, D. M., et al. (2006). Management of Hyperglycemia in Type 2 Diabetes: A Consensus Algorithm for the Initiation and Adjustment of Therapy: A Consensus Statement from the American Diabetes Association and the European Association for the Study of Diabetes. *Diabetes Care,* 29, 1963-1972.

Nathan, D. M., Kuenen, J., Borg, R., et al. (2008). Translating the A1c Assay into Estimated Average Glucose Values. *Diabetes Care,* 31(8), 1473-1478.

National Diabetes Information Clearinghouse (2008). Continueous Glucose Monitoring. NIH Publication No, 09-4551. http://diabetes.niddk.nih.gov/dm/pubs/glucosemonitor/#continue.

Palumbi, P. J. (2004). The case for insulin treatment early in type 2 diabetes. *Cleveland Clinic Journal of Medicine*, 71(5), 385-405.

Parnes, B. L., Main, D. S., Dickinson, L. M., et al. for CaReNet and HPRN. (2004). Clinical Decisions Regarding HbA1c Resultsin Primary Care: A Report from CaReNet and HPRN. *Diabetes Care,* 27, 13-16.

Pena, A., Riddle, M., Morrow, L.A., Jiang, H.H., Linnebjerg, H., Scott, A., ...Jackson, J.A.(2011). Pharmacokinetics and pharmacodynamics of high-dose human regular U-500 insulin versus human regular U-100 insulin in healthy obese subjects. *American Diabetes Association.* DOI: 10.2337/dc11-0721.

Plank, J., Bodenlenz, M., Sinner, F., et al. (2005). A Double-Blind, Randomized, Dose-Response Study Investigating the Pharmacodynamic and Pharmacokinetic Properties of the Long-Acting Insulin Analog Detemir. *Diabetes Care,* 28(5), 1107-1112.

Porceliati, F., Rossetti, P., Busciantella, N., et. al. (2007). Comparison of Pharmacokinetics and Dynamics of the Long-Acting, Insulin Analogs Glargine and Detemir at Steady State in Type I Diabetes. *Diabetes Care,* 30(10), 2447-2452.

Quinn, S. L., Lansang, M. C., & Mina, D. (2011 July). Safety and effectiveness of U-500 insulin therapy in patients with insulin-resistant type 2 diabetes mellitus. *Pharmacotherapy*, 31(7):695-702.

Rohlfing, C. L., Wiedmeyer, H. M., Little, R. R., England, J. D., Tennill, A., & Goldstein, D. E. (2002) Defining the Relationship Between Plasma Glucose and HbA(1c): Analysis of Glucose Profiles and HbA(1c) in the Diabetes Control and Complications Trial. *Diabetes Care,* 25, 275-278.

Salpeter, S. R., Buckley, N. S., Kahn, J. A., & Salpeter, E. E. (2008). Meta-Analysis: Metformin Treatment in Persons at Risk for Diabetes Mellitus. *Am J Med,* 121, 149-157.

Salpeter, S. R., Greyber, E., Pasternak, G. A., & Salpeter, E. E. (2003). Risk of Fatal and Nonfatal Lactic Acidosis with Metformin Use in Type 2 Diabetes Mellitus: Systematic Review and Meta-Analysis. *Arch Intern Med,* 163, 2594-2602.

Saydah, S. H., Fradkin, J., & Cowie, C. C. (2004). Poor Control of Risk Factors for Vascular Disease among Adults with Previously Diagnosed Diabetes. *JAMA,* 291, 335-342.

Shrestha, S. S., Zhang, P., Barker, L., & Imperatore, G. (2010). Medical Expenditures Associated with Diabetes Acute Complications in Privately-Insured U. S. Youth. *Diabetes Care,* 33(12), 2617-2622.

Ziesmer, A. E., Kelly, K. C., Guerra, P. A., George, K. G., & Dunn, F. L. (2012 Jan-Feb). U500 regular insulin use in insulin-resistant type 2 diabetic veteran patients. *Endocr Pract*, 18(1):34-8.

UK Prospective Diabetes Study Group. (1995). UK Prospective Diabetes 16: overview of 6 years' therapy of type II diabetes: a progressive disease. Diabetes, 44(11), 1249–1258. Erratum: (1996). *Diabetes*, 45(11), 1655.

Wang, Z., Hedringto, M. S., Gogitidze Joy, N., et. al. Dose-Response Effects of Insulin Glargine in Type 2 Diabetes. (2010). *Diabetes Care*, 33(7), 1555-1560.

Warshaw, H. S. (2004). Referral to Diabetes Self-Management Training and Medical Nutrition Therapy: Why Now and How? *Practical Diabetology,* 12-19.

Writing Team for the Diabetes Control and Complications Trial/Epidemiology of Diabetes Interventions and Complications Research Group. (2002). Effect of Intensive Therapy on the Microvascular Complications of Type 1 Diabetes Mellitus. *JAMA,* 287, 2563-2569.

Wyne, K. L. (2003). The Need for Reappraisal of Type 2 Diabetes Mellitus Management. *Type 2 Diabetes Management: A Postgraduate Med. Special Report,* 5-14.

Wyne, K. L., Drexler, A. J., Miller, J. L., Bell, D. S., Braunstein, S., & Nuckolls, J. G. (2003). Constructing an Algorithm for Managing Type 2 Diabetes: Focus on Role of the Thiazolidinediones. *Postgrad Med Special Report,* 63-72.

Section 5: Cardiovascular Care

Concern	Care/Test	Frequency
Cardiovascular Care	▪ Check fasting lipid profile Adult goals: - Total Cholesterol < 200 mg/dL - Triglycerides < 150 mg/dL - HDL ≥ 40 mg/dL (men) - HDL ≥ 50 mg/dL (women) - Non-HDL (Cholesterol) < 130 mg/dL - Non-HDL (Cholesterol) < 100 mg/dL (for very high risk) - LDL < 100 mg/dL (optimal goal) - LDL < 70 mg/dL (for very high risk)	**Children**: After age 2 but before age 10. Repeat annually if abnormal, repeat in 3 – 5 years if normal. **Adults**: Annually. If abnormal, follow NCEP III guidelines.
	▪ Start statin with ongoing lifestyle changes	Adults with overt CVD; Age > 40 yrs without CVD and one or more risk factors for CVD; < age 40 individualize
	▪ Check blood pressure, Adult goal: < 130/80 mmHg♦ (limit total sodium to < 1500 mg/day)	**Children**: Each focused visit; follow National High Blood Pressure Education Program recommendations for Children and Adolescents **Adults**: Each focused visit
	▪ Assess smoking/tobacco use status	Each visit; (5As: Ask, Advise, Assess, Assist, Arrange)
	▪ Start aspirin prophylaxis (unless contraindicated)	Age > 50 yrs for men and > 60 yrs for women with diabetes and at least one other major CVD risk factor; Men ≤ 50 yrs and women ≤ 60 yrs, individualize based on risk

♦More or less stringent Blood Pressure goals must be individualized if < 130/80 is not reasonable to achieve

MAIN TOPICS INCLUDED IN THIS SECTION:

- Lifestyle Modifications
- Tobacco Cessation
- Standard Lipid Assessment and Monitoring in Adults
- Treatment
- Additional Risk Stratification
- Lipid Screening and Treatment in Children and Adolescents
- Blood Pressure Control
- Accurate Blood Pressure Measurement
- Antiplatelet Therapy
- Baseline Electrocardiogram and Diagnostic Stress Testing
- Suggested Criteria for Cardiac Stress Testing in Diabetes
- Heart Failure
- Referral to a Cardiologist and Coordination of Care
- Additional Resources
- References

Coronary artery disease is the leading cause of death in people with type 2 diabetes and is second only to end-stage renal disease (ESRD) as the leading cause of death in people with type 1 diabetes. About 65% of deaths among people with diabetes are related to heart disease and stroke. People with diabetes typically exhibit a combination of risk factors for vascular disease including dyslipidemia, hypertension, abnormal platelet function, and elevated serum markers for vascular inflammation. In addition, diabetes is an independent risk factor for heart disease and stroke. People with type 2 diabetes have equivalent cardiovascular disease risk as people without diabetes who have already had a myocardial infarction. The risk of heart disease and stroke is further increased in people with diabetes who smoke or use other tobacco products.

It is important for health care providers to explain the signs and symptoms of adverse cardiovascular events (e.g., myocardial infarction, cerebrovascular accident, and peripheral artery thrombosis) to people with diabetes so that they and their families know what action to take if such events occur.

Health care providers and other members of the diabetes care team can be instrumental in preventing cardiovascular complications and reducing the occurrence or recurrence of cardiovascular events by aggressively monitoring and treating cardiovascular risk factors, especially blood pressure and cholesterol. Likewise, discussing the benefits of and providing support for positive lifestyle changes, such as dietary modifications, regular physical activity, and tobacco cessation is an essential role of the diabetes care team.

Lifestyle Modifications

Aggressive use of lifestyle modifications can reduce or delay the need for medical interventions. A referral to a registered dietitian can assist people in making lifestyle and dietary modifications for reducing cardiovascular risk.

Modest weight loss (5-10%) and maintenance, when combined with moderate physical activity (e.g., minimum of 150 minutes over at least 3 days each week or vigorous-intensity aerobic activity for a minimum of 75 minutes over at least three days each week), may assist in controlling high blood cholesterol and triglycerides, high blood pressure, and high blood glucose levels, thereby reducing cardiovascular risk. Research demonstrates that structured programs involving health professionals are the most effective for supporting and maintaining lifestyle modifications. Keeping daily logs such as a daily or weekly food record or physical activity record can be useful when making lifestyle changes.

Sodium is an essential nutrient and is needed by the body in relatively small quantities. Many people consume more sodium than needed. A low sodium diet can assist in lowering blood pressure. Sodium recommendations are less than 1500 mg for all people with diabetes (CDC, 2012). Individuals can reduce their consumption of sodium in a variety of ways:

- Read the Nutrition Facts label for information on the sodium content of foods and purchase foods that are low in sodium. Consume more fresh foods and fewer canned, frozen or prepared foods with added sodium.
- Eat more home-prepared foods, where you have more control over sodium and use little or no salt/salt-containing seasonings when cooking or eating foods.
- When eating at restaurants, ask that salt not be added to your food or order lower sodium options, if available. Restaurant websites can help evaluate sodium content of foods.

Evidence-based eating plans effectively targeting high cholesterol and high blood pressure are available. The National Cholesterol Education Program Adult Treatment Panel (ATP) III recommends the Therapeutic Lifestyle Changes (TLC) diet to treat elevated LDL cholesterol levels. The TLC diet limits saturated fat to 7% of calories consumed, dietary cholesterol to less than 200 mg/day and trans fat to less than 1% of total daily calories. If the LDL cholesterol goal is not achieved through use of the TLC diet, adding other cholesterol-lowering foods such as plant stanols/sterols, viscous (soluble) fiber, soy protein, and nuts could be effective in lowering LDL cholesterol further. Adding weight management, regular physical activity, and control of total carbohydrate intake (especially added sugar and fructose) to the TLC diet additionally targets high triglycerides and low HDL cholesterol. Additional information on the TLC diet is available at: http://www.nhlbi.nih.gov/cgi-bin/chd/step2intro.cgi.

The Dietary Approaches to Stop Hypertension (DASH) eating plan can significantly decrease blood pressure. The DASH eating plan is low in sodium and high in fruit, vegetables, low-fat dairy foods, whole grains, fish, poultry, and nuts. It is rich in magnesium, potassium, calcium, and fiber and low in saturated fat, cholesterol, and total fat. Menus and additional information on the DASH eating plan for 1500mg sodium per day are available at: http://www.nhlbi.nih.gov/health/public/heart/hbp/dash/new_dash.pdf.

Oxidative stress is believed to play an important role in the initiation and progression of atherosclerotic vascular disease. Therefore, adequate intake of natural antioxidants found in a variety of fruits, vegetables, whole grains, and omega-3-rich foods is strongly recommended.

Antioxidant supplements, including vitamins A and E, are no longer recommended to reduce the impact of endogenous oxidative stress. Clinical trials of vitamin E use in people with diabetes failed to demonstrate a significant benefit for the reduction of CVD and showed possible blunting of benefits from statins. Vitamins A and C supplements also lack evidence of efficacy and are not advised. Use of vitamin D must be individualized, as there are no specific recommendations at this time.

Tobacco Cessation

Any type of tobacco is harmful to the health of all people, including those with diabetes and pre-diabetes. Morbidity and mortality caused by tobacco use disproportionately impacts certain populations. Wisconsin's young adults, communities of color, low-income, less-educated, and blue-collar workers are the most susceptible to tobacco industry targeting and resulting tobacco addictions.

The Centers for Disease Control and Prevention emphasizes addressing tobacco control efforts in the broader context of tobacco-related diseases. Tobacco use in conjunction with other diseases and risk factors, such as sedentary lifestyle, poor diet, and diabetes, poses a greater combined risk for many chronic diseases than the sum of each individual degree of risk. Collaborative efforts among individuals and groups interested in prevention of cancers, lung diseases, and heart disease, together with those interested in tobacco control, have the potential to synergistically reach greater numbers and effectively improve outcomes for reducing the burden of tobacco-related diseases.

Smoking raises blood glucose, cholesterol, and blood pressure. Tobacco cessation lowers the risk for heart attack, stroke, nerve disease, kidney disease, and oral disease. Since individuals with diabetes are at a greater risk for negative health outcomes if they use tobacco, it is important that tobacco use screening, followed by information on cessation resources if the individual uses tobacco, be included in each diabetes-focused visit.

Interventions that increase quitting success can decrease premature mortality and tobacco-related health care costs in the short term. Tobacco use screening followed by a brief intervention is a top-ranked clinical preventive service in terms of its relative health impact, effectiveness, and cost-effectiveness. Tobacco use treatment is more cost-effective than other commonly provided clinical preventive services.

Health care providers play an important role in helping people with tobacco cessation efforts and in limiting exposure to second-hand and third-hand smoke. Assessing tobacco use status and readiness to quit at each visit is essential. Providers should provide clear and personalized advice on the effective interventions available including pharmacological agents that attenuate nicotine withdrawal and the symptoms associated with withdrawal. For additional information on pharmacological agents to treat tobacco dependence, see tool titled "Tobacco Treatment Chart" in the Tools Section.

Continual assessment of a person's willingness to quit, especially if he/she was not initially successful, can lead to future cessation attempts and success. The "5 As" are a helpful tool to assist health care providers in promoting and discussing tobacco cessation. The 5 As are:

1. Ask "do you use tobacco?"
2. Advise quitting
3. Assess willingness to quit
4. Assist by offering resources (e.g., pharmacological, behavioral)
5. Arrange follow-up

Tobacco practice guidelines and cessation resources are available for both providers and consumers including:

- The Clinical Practice Guidelines: Treating Tobacco Use and Dependence: 2008 Update developed by the United States Department of Health and Human Services is available at: http://www.surgeongeneral.gov/tobacco/treating_tobacco_use08.pdf
- The Wisconsin Tobacco Prevention and Control Program provides links to more information and resources: http://www.dhs.wisconsin.gov/tobacco/
- The University of Wisconsin Center for Tobacco Research and Intervention (UW-CTRI) provides a free Quit Line that offers people that use tobacco free counseling via 1-800-784-8669 (English) or 1-877-266-3869 (Spanish). Their website also provides cessation information: http://www.ctri.wisc.edu, including a list of appropriate cessation medications: http://www.ctri.wisc.edu/Smokers/smokers_FDA.Approved.Medications.htm

The Centers for Disease Control and Prevention's Tobacco Information and Prevention Source (TIPS) provides the resource "How to Quit Smoking": http://www.cdc.gov/tobacco/how2quit.htm.

Standard Lipid Assessment and Monitoring in Adults

Studies demonstrate the beneficial effects of LDL cholesterol reduction on morbidity and mortality from coronary artery disease. Diabetes is usually accompanied by a secondary dyslipidemia characterized by elevated LDL cholesterol, elevated triglycerides, and/or low HDL cholesterol. In this situation, the LDL particles tend to be smaller and more atherogenic. When triglycerides are over 400 mg/dL the LDL-C can no longer be "calculated," and is often omitted on the lab report or reported as "Unable to calculate" When people with type 2 diabetes have elevated triglyceride levels but relatively normal LDL cholesterol values, measuring their non-HDL cholesterol (total cholesterol – HDL cholesterol) can be useful in assessing risk and guiding treatment. The non-HDL cholesterol measures not only LDL cholesterol, but also cholesterol contained in metabolic "remnants" of very low-density lipoproteins (VLDL), the main carriers of triglycerides. Like LDL cholesterol, these remnants promote the buildup of plaque in arteries. In those individuals with triglycerides over 200 mg/dL, the ATP-III Guidelines advise the use of non-HDL cholesterol as a secondary target for therapy once the LDL-cholesterol goal is achieved. Health care providers can use non-HDL cholesterol levels for the initial or follow-up evaluation of serum lipids for people seen in a non-fasting state. Many people with diabetes will require one or more lipid-lowering medications to achieve optimal lipid levels.

The 2004 National Cholesterol Education Program (NCEP) Adult Treatment Panel (ATP) III Guideline panel considers diabetes a coronary heart disease (CHD) risk equivalent, meaning that having diabetes confers that same high risk for a major coronary event (e.g., heart attack) as having known coronary heart disease. For people with CHD and CHD-risk equivalents, ATP III recommends lowering LDL cholesterol to < 100 mg/dL. In addition, ATP III describes an optional LDL cholesterol goal of < 70 mg/dL for very high risk individuals. A person with diabetes and established cardiovascular disease (known stenosis of any major artery such as the coronary, carotids, renal, and iliofemoral arteries) is considered a very high risk individual. Table 5-1 describes current NCEP ATP III recommendations.

Undetected hypothyroidism is a potential secondary cause of an elevated LDL cholesterol level especially in those with type 1 diabetes and in women age > 60. A TSH level should be obtained to rule out hypothyroidism as a cause of the elevated LDL cholesterol.

In female patients on oral contraceptives with elevated triglycerides, consideration should be given to changing to a lower estrogen containing preparation or using other forms of contraception. Post menopausal women using hormone replacement therapy may blunt the effect on hormones and triglycerides by using transdermal preparations.

Table 5-1: Lipid Therapy Goals for Adults with Diabetes

Test	Results
Total Cholesterol	▪ < 200 mg/dL
LDL-Cholesterol	▪ < 100 mg/dL (optimal goal) ▪ < 70 mg/dL (optimal goal for very high risk individuals)
HDL-Cholesterol	▪ Men ≥ 40 mg/dL ▪ Women ≥ 50 mg/dL
Triglycerides	▪ < 150 mg/dL
Non-HDL Cholesterol❖	▪ < 130 mg/dL (optimal goal) ▪ < 100 mg/dL (optimal goal for very high risk individuals)

Source: National Cholesterol Education Program Adult Treatment Panel III Guidelines

❖ Non-HDL Cholesterol = Total Cholesterol – HDL Cholesterol

Treatment

Statin therapy is recommended in addition to medical nutrition therapy, physical activity, and weight loss (if body mass index (BMI) ≥ 25 kg/m2) for:

- people who have diabetes with overt CVD
- people over age 40 with diabetes but without CVD who have at least one or more CVD risk factors
- people with overt dyslipidemia

The statin class of drugs (HMG-CoA reductase inhibitors) has proven to be effective for primarily lowering LDL cholesterol but also provides smaller reductions in triglycerides and increases in HDL cholesterol in some people. A number of clinical trials have reported significant reductions in cardiovascular events in people with diabetes treated with statins. Statins also provide a number of favorable effects that are independent of lipid lowering. These effects include reduction of inflammatory markers (i.e., C-reactive protein) and restoration of endothelial function. Recently FDA approved important safety label changes for statins.

Many people with diabetes require combinations of lipid lowering agents (such as fibrates, nicotinic acid, ezetimibe, resins, and fish oils) to control more complex and refractory dyslipidemias, although outcomes data on event reduction from these agents is variable. Use caution when prescribing fibrates (gemfibrozil or fenofibrate) or high-dose niacin (> 2 g/day) in combination with statins, because the potential for myopathy increases especially in those with impaired renal function.

The American Heart Association endorses the use of 2000-4000 mg (2-4 grams) per day of omega-3 fatty acids (EPA + DHA) in the form of fish oil to manage elevated triglycerides (> 150 mg/dL), but only under the supervision of a physician as high doses of fish oil can lead to excessive bleeding. The EPA and DHA content of fish oil preparations should be carefully reviewed since brands of fish oil vary significantly and reaching the EPA + DHA goal may require the use of multiple capsules each day. For people with diabetes and documented heart disease, it is recommended to take a daily supplement of 1000 mg (1 gram DHA + EPA) of omega-3 fatty acids (fish oil).

It is essential for people with fasting triglyceride levels > 500 mg/dL to be referred to a lipid specialist or cardiologist for treatment and management as well as to an RD for nutrition counseling. Hyperglycemia can also affect triglyceride levels; therefore, as blood glucose levels improve, triglycerides are likely to improve. In addition, reducing alcohol consumption can help reduce triglycerides. When triglycerides are over 500 mg/dL, the treatment of triglycerides rather than LDL cholesterol is the primary lipid target.

Additional Risk Stratification

At this time specialized lipoprotein testing is available and being used. Testing measures the subgroups of lipoproteins, the size/density of lipoproteins, and the numbers of particles. People with diabetes or metabolic syndrome are more likely to have atherogenic small dense LDL particles. Measuring LDL particle size in addition to a lipid profile can be helpful to further stratify risk and optimize lipid goals for people at greatest risk. These measurements may be helpful when considering combination lipid-altering drug treatments but are not necessary before initiating LDL cholesterol-reducing medications such as statins.

Various tests can be used to measure small dense LDL including:

- Berkeley HeartLab, Inc. (www.bhlinc.com) uses an LDL gradient gel electrophoresis
- LipoScience,Inc. (www.lipoprofile.com) LipoProfile® test uses nuclear magnetic resonance (NMR) spectroscopy to provide rapid, simultaneous, and direct measurement of LDL cholesterol particle number and size, as well as direct measurement of HDL cholesterol and very low density lipoprotein (VLDL) cholesterol subclasses
- Arthertec, Inc. (www.thevaptest.com) uses a vertical auto profile

An emerging measure of cardiovascular risk is ApolipoproteinB (ApoB), which is the main structural protein of the atherogenic lipoproteins and provides a good measure of the number of LDL particles. This measure can be especially helpful in conditions like diabetes and metabolic syndrome, which are associated with atherogenic small dense LDL particles.

Although it is currently not a target for cholesterol treatment in the American Diabetes Association (ADA) Clinical Practice Guidelines or the NCEP ATP III guidelines, a consensus panel convened by ADA and American College of Cardiology (ACC) recommended adding ApoB as a therapeutic target in people with diabetes and clinical cardiovascular disease. Suggested goals:

- for those at high risk are: ApoB < 90 mg/dL (along with LDL < 100 mg/dL and non-HDL < 130 mg/dL)
- for those at highest risk are: ApoB < 80 mg/dL (along with LDL < 70 mg/dL and non-HDL < 100 mg/dL)

As research continues to accumulate about the impact of cholesterol particle size and composition on the atherogenic potential, such tests will likely factor more prominently into lipid management plans and covered by more insurance plans. Clarification of LDL cholesterol targets and emphasis on non-HDL cholesterol and LDL particle number will likely be a topic for the NCEP ATP IV guidelines, expected in 2012. Until then, the lipid therapy goals for adults with diabetes remain as indicated in Table 5-1.

Lipid Screening and Treatment in Children and Adolescents

Childhood overweight and obesity in the United States continues to increase. Coincident with this increase in overweight and obesity, more children and adolescents are developing hypertension, metabolic syndrome, type 2 diabetes, and dyslipidemia. The development of atherosclerosis can begin in childhood and there is increasing evidence that risk reduction delays progression toward clinical disease. Children and adolescents with type 1 or 2 diabetes are at increased risk for accelerated atherosclerosis, and as a result, more aggressive screening is recommended for this population. Screening children earlier than age two is not recommended because lipid concentrations are age- and maturation-dependent.

Various recommendations for lipid screening in children and adolescents exist and differ slightly thus, it is important to individualize after age two. For a complete detailed summary and discussion of lipid screening and treatment in children and adolescents refer to:

1. National Heart Lung and Blood Institute(NHLBI) Expert Panel on Integrated Guidelines for Cardiovascular Health and Risk Reduction in Children and Adolescents available at: http://www.nhlbi.nih.gov/guidelines/cvd_ped/index.htm
2. American Academy of Pediatrics (AAP) 2008 Pediatrics article "Lipid Screening and Cardiovascular Health in Childhood," available at: http://pediatrics.aappublications.org/cgi/content/full/122/1/198

Blood Pressure Control

Aggressive evaluation and management of blood pressure to achieve levels of < 130/80 mmHg is critical for people with diabetes. Blood pressure should be monitored at each clinic visit. Lifestyle modifications are effective in lowering blood pressure and may allow some people to achieve normotension without antihypertensive drug therapy. Lifestyle modifications and antihypertensive drug therapy is recommended for people with a baseline blood pressure ≥ 140/90 mmHg. Most people with diabetes require two or more antihypertensive drugs to attain blood pressure control of < 130/80 mmHg. There is some controversy about the safety of lowering blood pressure below 130/80 in people with diabetes and its efficacy for further reducing cardiovascular events. This may depend on an individual's degree of renal dysfunction and proteinuria.

Angiotensin suppression using either angiotensin-converting enzyme inhibitors (ACE inhibitors) or angiotensin receptor blockers (ARBs) is strongly recommended for initial treatment. These agents are especially effective in lowering blood pressure and reducing both cardiovascular events and diabetic nephropathy. Even in people with mild to moderate reduction in renal function, consider ACE inhibitors or ARB treatment because the potential benefits for cardiovascular protection outweigh the possibility of additional impairment of renal function. For people with mild impairment of renal function, start ACE inhibitors or ARB therapy at lower dosages and carefully titrate according to blood pressure response, as well as serum creatinine and potassium levels.

Other classes of antihypertensive drugs are also effective and should be added as necessary. Thiazide diuretics are an option when used in low doses (12.5-25 mg); they can add beneficial effectiveness to ACE inhibitors or ARB therapy and do not affect blood glucose control. However, thiazide diuretics at higher doses may worsen glycemic control; therefore, close monitoring is necessary.

Recent analysis from the Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT) shows that for men and women with metabolic syndrome, and for both black and non-black (Caucasian, Hispanic, Asian/Pacific Islander, and American Indian/Alaskan Native) participants, the less costly chlorthalidone consistently controlled blood pressure and is equally beneficial in preventing heart attacks and coronary heart disease death. Depending on overall risk, it may be as beneficial as newer antihypertensive medications in preventing one or more other forms of cardiovascular disease, including heart failure and stroke.

Selective beta-blocker agents are strongly recommended for people with diabetes who have had a myocardial infarction, as beta-blocking agents are highly effective in reducing recurrent ischemic cardiac events. Past reluctance to use beta-blocker agents in people with diabetes was due to the potential masking of hypoglycemic symptoms and the possibility of worsening glycemic control, for which there are only rare instances documented.

For pregnant women with diabetes and chronic hypertension, blood pressure targets of 110-129/65-79 mmHg are recommended to reduce the risk for poor birth outcomes.

Blood pressure targets for children and adolescents vary from those for adults. For additional information on blood pressure control in children, see the "Pocket Guide to Blood Pressure Measurement in Children" available at: http://www.nhlbi.nih.gov/health/public/heart/hbp/bp_child_pocket/bp_child_pocket.pdf.

Accurate Blood Pressure Measurement

Accuracy of blood pressure measurement is essential in determining proper diagnosis and titrating anti-hypertensive agents. The American Heart Association guidelines for blood pressure measurement provide clear, detailed, and compelling guidance for healthcare professional to improve blood pressure measurement. A wide range of studies show average blood pressure measurement error of between 5-15 mm/Hg (NHBPEP, NHLBI, AHA).

Measuring blood pressure accurately can save money (NHBPEP, NHLBI, AHA). There are multiple factors that can affect accuracy. The chart below lists some of these factors.

Factors Affecting Accuracy of Blood Pressure Measurements

Factors	Magnitutde of systolic/diastolic blood Pressure discrepancy (mmHg)
Talking or active listening	10/10
Distended bladder	15/10
Cuff over clothing	5-50/unknown
Smoking within 30 minutes of measurement	6-20/unknown
Back unsupported	6-10/unknown
Arm unsupported, sitting	1-7/5-11
Arm unsupported, standing	6-8/unknown

Adopted from: Wisconsin Heart Disease and Stroke Program Blood Pressure Toolkit.
Toolkit available at: http://www.dhs.wisconsin.gov/Health/cardiovascular/docs/bpToolkit.pdf.

Home blood pressure measurements using reliable recording units can be useful for those who exhibit "white coat hypertension" during clinic visits.

To assist with improving the accuracy of blood pressure measurement the Wisconsin Heart Disease and Stroke Prevention Program published a toolkit titled" Blood Pressure Measurement Toolkit: Improving Accuracy, Enhancing Care" available at: http://www.dhs.wisconsin.gov/Health/cardiovascular/docs/bpToolkit.pdf.

This toolkit provides information and resources regarding a "refresher" of the salient elements needed to address accuracy for blood pressure measurement in health systems.

The "Standardized Measurement: First Line of Defense in Blood Pressure Control" series is another self-instructional educational opportunity available for all health care providers to improve measurement of blood pressure. For more information on this and other educational opportunities, see: http://sharedcareinc.com/index.html.

Antiplatelet Therapy

Platelet inhibition may be beneficial for the prevention of both primary and secondary ischemic cardiovascular events in people with diabetes. Aspirin therapy (75-162 mg/day) is recommended for men > 50 years of age and women > 60 years of age with diabetes and one or more additional major CVD risk factor. For men ≤ 50 years and women ≤ 60 years with diabetes, individualized therapy based on risk is recommended. People with overt CVD history and diabetes should receive aspirin therapy (75-162 mg/day) for secondary prevention. Consider common contraindications, such as an aspirin allergy or gastric bleeding. Previous concerns that aspirin therapy may aggravate retinal hemorrhage are not substantiated.

Aspirin resistance and the increased level of inflammation present in vascular structures may partially attenuate the relative benefit of aspirin therapy in people with diabetes. Consider other platelet inhibitors, such as clopidogrel (75 mg/day) in higher risk people with known CVD or peripheral arterial disease, and for those who have undergone coronary stent placement.

Baseline Electrocardiogram and Diagnostic Stress Testing

A baseline reference electrocardiogram (ECG) is recommended for all people with new onset type 2 diabetes. For people with type 1 diabetes, it is reasonable to obtain a baseline ECG based on clinical judgment and the number of years the person has had diabetes. The incidence of asymptomatic ischemia or infarction increases significantly in people with longer-standing or poorly-controlled diabetes, especially those with diabetic autonomic neuropathy, which may mask symptoms of angina.

Routine diagnostic stress testing is not necessary for people with lower risk who have well-controlled risk factors. However, consider stress testing for low-risk people prior to starting a physical activity program involving moderate- to high-intensity activities (e.g., tennis, jogging, and aerobics).

All people at higher risk should receive diagnostic stress testing (see the following topic "Suggested Criteria for Cardiac Stress Testing in Diabetes"). Baseline ST-segment and T-wave abnormalities are present in 15-20% of people with diabetes > 40 years. Such baseline ECG abnormalities reduce the reliability of ECG monitoring for detecting stress-induced ischemic changes. Stress testing protocols for these individuals should include radionuclear or echocardiographic imaging to maximize the detection of true ischemic responses.

Suggested Criteria for Cardiac Stress Testing in Diabetes

Due to increased risk for people with diabetes, a cardiac stress test is recommended; however, the recommendations vary from person to person. **Below are six criteria that might suggest the use of a cardiac stress test:**

- Prior to scheduled major surgery or moderate-risk surgery if person has functional limitation (e.g., not able to climb two flights of stairs)
- Prior to starting a physical activity program involving moderate- to high-intensity activities
- Typical or atypical cardiac symptoms (chest, back, or arm pain; dyspnea; or fatigue)
- Resting ECG suggestive of ischemia or infarction
- Presence of peripheral or carotid arterial disease
- Two or more of the following CVD risk factors:
  - Tobacco use
  - Persistent hypertension (blood pressure ≥ 130/80 mmHg with treatment)
  - Dyslipidemia (LDL cholesterol > 130 mg/dL or HDL cholesterol < 40 mg/dL [men], < 50 mg/dL [women])
  - Microalbuminuria

It is important to note that people with diabetes who have an apparently normal radionuclear stress test remain at increased risk for subsequent cardiac events. Despite a normal stress perfusion scan, people with diabetes showed an unexpectedly higher rate (~ 6%) of fatal CVD events over a three-year interval. Therefore, consider a periodic re-evaluation, especially in those people at higher risk.

Heart Failure

Heart failure is a frequent complication in people with diabetes and its prognosis is significantly worse than that of CVD. There are four classes of heart failure; symptoms are described below:

- Class I – No symptoms and no limitation in ordinary physical activity
- Class II – Mild symptoms and slight limitation during usual activity; comfortable at rest
- Class III – Modest symptoms, with considerable limitation in activity due to symptoms (even during minimal daily activities); comfortable at rest only
- Class IV – Severe symptoms and limitations, symptoms even while at rest

Treatment of heart failure using combinations of diuretics, digoxin, ACE inhibitors, ARBs and/or aldosterone antagonists, plus beta-blocking agents is as equally effective in people with diabetes as in those unaffected by diabetes. However, several agents commonly used for glycemic control may aggravate heart failure:

- Metformin is contraindicated in people with symptomatic heart failure (classes III and IV), due to the increased potential for lactic acidosis secondary to impaired cardiac output and reduced renal function
- Thiazolidinediones (TZDs) reduce blood glucose by improving sensitivity to insulin in skeletal and adipose tissue. This class of pharmacological agents has a beneficial effect on dyslipidemia, vascular inflammation, and associated endothelial dysfunction. However, TZD treatment is frequently complicated by fluid retention, lower extremity edema, and potential aggravation of heart failure. See the black box warning on the drug insert for more detailed information. FDA has restricted use of rosiglitazone.

Guidelines recommend careful evaluation of people with diabetes for signs and symptoms of heart failure prior to initiating TZD treatment. For people with asymptomatic left ventricular dysfunction or mild, controlled heart failure, reduce the initial dosage of TZDs (by half) and then gradually titrate to higher levels according to individual response. Avoid concomitant treatment with other fluid retaining drugs (e.g., non-steroidal anti-inflammatories, vasodilators, calcium channel blockers). **Treatment with TZDs is not recommended for people with advanced heart failure (class III or IV).** For all TZDs, it is imperative that health care professionals become familiar with the medication prescribing inserts and warnings.

Referral to a Cardiologist and Coordination of Care

People with diabetes and/or known CVD can benefit from seeing a cardiologist or lipid specialist to achieve optimal primary and secondary prevention outcomes. Offering referrals for cardiac rehabilitation, as well as individual instruction, group education, and support groups, are important as these can provide a unique, cost-effective opportunity for peer support of lifestyle changes.

Additional Resources

1. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) provides clinical practice guidelines for the prevention, detection, and treatment of high blood pressure. http://www.nhlbi.nih.gov/guidelines/hypertension/index.htm.
2. SparkPeople: Online healthy lifestyle support website: http://www.sparkpeople.com/.
3. LIVESTRONG.COM free MyPlate calorie counter application: http://www.livestrong.com/thedailyplate/.
4. Risk Assessment Tool for Estimating 10-year Risk of Developing Hard CHD.
   This risk assessment tool from the National Cholesterol Education Program uses recent data from the Framingham Heart Study to estimate 10-year risk for "hard" coronary heart disease outcomes (myocardial infarction and coronary death). This tool is designed to estimate risk in adults aged 20 and older who do not have heart disease or diabetes: http://hp2010.nhlbihin.net/atpiii/calculator.asp?usertype=prof.

References

Action to Control Cardiovascular Risk in Diabetes (ACCORD) Study Group. (2008). Effects of Intensive Glucose Lowering in Type 2 Diabetes. *NEJM*, 358, 2545-2559.

American Diabetes Association. (2012). Standards of Medical Care in Diabetes - 2012.*Diabetes Care*, 2012 35 (supp 1), S11-S63.

Arauz-Pacheco, C., Parrott, M. A., & Raskin, P. for the American Diabetes Association. (2004). Hypertension Management in Adults with Diabetes. *Diabetes Care*, 27, S65-S67.

Basile, J. N. (2003). An Evidence-Based Approach for Treating Hypertension in Diabetes: Implications from ALLHAT. *Practical Diabetology*, 22, 7-10.

Becker, R. C. (2004). Recent Update to the ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction: Role of Antiplatelet Therapy. *Clin Cardiol*, 27, 119-120.

Boden, W. E., O'Rourke, R. A., Teo, K. K., et al. (2007). Optimal Medical Therapy with or without PCI for Stable Coronary Disease. *NEJM*, 356, 1503-1516.

Brunzell, J. D., Davidson, M., Furberg, C. D., et al. (2008). Lipoprotein Management in Patients with Cardiometabolic Risk: Consensus Statement from the American Diabetes Association and the American College of Cardiology Foundation. *Diabetes Care*, 31(4), 811-822.

Buse, J. (2003). Statin Treatment in Diabetes Mellitus. *Clinical Diabetes*, 21, 168-172.

Buse, J. B., Ginsberg, H. N., Bakris, G. L., et al. (2007). Primary Prevention of Cardiovascular Diseases in People with Diabetes Mellitus: A Scientific Statement from the American Heart Association and the American Diabetes Association. *Circulation*, 115, 114-126.

Centers for Disease Control and Prevention (CDC). (2012 Feb 10). CDC Grand Rounds: Dietary Sodium Reduction - Time for Choice. *MMWR Morb Mortal Wkly Rep.*, 61(5), 89-91

Centers for Disease Control and Prevention. (2007). Cigarette Smoking Among Adults – United States, 2006. *MMWR Morb Mortal Wkly Rep*, 56, 1157-1161.

Chobanian, A. V., Bakris, G. L., Black, H. R., et al. for the National Heart, Lung, and Blood Institute Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure and the National High Blood Pressure Education Program Coordinating Committee. (2003). The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: The JNC 7 Report. *JAMA*, 289, 2560-2572.

Colwell, J. A. for the American Diabetes Association. (2004). Aspirin Therapy in Diabetes. *Diabetes Care*, 27, S72-S73.

Cubbon, R., Kahn, M., & Kearney, M. T. (2008). Secondary Prevention of Cardiovascular Disease in Type 2 Diabetes and Prediabetes: A Cardiologist's Perspective. *Int J Clin Pract*, 62, 287-299.

Daniels, S. R., Greer, F. R., and the Committee on Nutrition. (2008). Lipid Screening and Cardiovascular Health in Childhood. *Pediatrics*, 122, 198-208.

Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. (2001). Executive Summary of The Third Report of The National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol In Adults (Adult Treatment Panel III). *JAMA*, 285, 2486-2497.

Gibbons, R. J., & Fihn, S. D. (2007). Coronary Revascularization: New Evidence, New Challenges. *Ann Intern Med*, 147, 732-734.

Gluckman, T. J., Baranowski, B., Ashen, M. D., et al. (2004). A Practical and Evidence-Based Approach to Cardiovascular Disease Risk Reduction. *Arch Intern Med*, 164, 1490-1500.

Grundy, S. M., Cleeman, J. I., Merz, C. N., et al. for the National Heart, Lung, and Blood Institute, the American College of Cardiology Foundation, and the American Heart Association. (2004). Implications of Recent Trials for the National Cholesterol Education *Program Adult Treatment Panel III Guidelines.* Circulation, 110, 227-239.

Haffner, S. M. for the American Diabetes Association. (2004). Dyslipidemia Management in Adults with Diabetes. *Diabetes Care*, 27, S68-S71.

Haire-Joshu, D., Glasgow, R. E., & Tibbs, T. L. for the American Diabetes Association. (2004). Smoking and Diabetes. *Diabetes Care*, 27, S74-S75.

Hajjar, I., & Kotchen, T. A. (2003). Trends in Prevalence, Awareness, Treatment, and Control of Hypertension in the United States, 1988-2000. *JAMA*, 290, 199-206.

Heart Outcomes Prevention Evaluation Study Investigators. (2000). Effects of Ramipril on Cardiovascular and Microvascular Outcomes in People with Diabetes Mellitus: Results of the HOPE Study and MICRO-HOPE Substudy. *Lancet*, 355, 253-259.

Hennekens, C. H., Sacks, F. M., Tonkin, A., et al. (2004). Additive Benefits of Pravastatin and Aspirin to Decrease Risks of Cardiovascular Disease: Randomized and Observational Comparisons of Secondary Prevention Trials and Their Metaanalyses. *Arch Intern Med*, 164, 40-44.

Hughes, J. R. (2003). Motivating and Helping Smokers to Stop Smoking. *J Gen Intern Med*, 18, 1053-1057.

Institute of Medicine of the National Academies. (2010). *Dietary Reference Intakes for Calcium and Vitamin D* [consensus brief]. Washington, DC: National Academies Press.

Jenkins, D. J. A., Kendall, C. W. C., Marchie, A., et al. (2003). Effects of a Dietary Portfolio of Cholesterol-Lowering Foods vs Lovastatin on Serum Lipids and C-Reactive Protein. *JAMA*, 290, 502-510.

Jenkins, D. J. A., Kendall C. W. C., Marchie, A, et. al. (2005) Direct Comparison of a Dietary Portfolio of Cholesterol-lowering Foods with a Statin in Hypercholesterolemic Participants. *Am J Clin Nutr*, 81, 380-387.

Khan, A., Sa Tibbs, T. L., & Haire-Joshu, D. (2002). Avoiding High-Risk Behaviors: Smoking Prevention and Cessation in Diabetes Care. *Diabetes Spectrum*, 15, 164-169.

Kip, K. E., Marroquin, O. C., Kelley, D. E., et al. (2004). Clinical Importance of Obesity Versus the Metabolic Syndrome in Cardiovascular Risk in Women: A Report from the Women's Ischemia Syndrome Evaluation (WISE) Study. *Circulation*, 109, 706-713.

Kris-Etherton, P. M., Harris, W. S., & Appel, L. J. (2002). Fish Consumption, Fish Oil, Omega-3 Fatty Acids, and Cardiovascular Disease. *Circulation*, 106, 2747-2757.

Lee, C. D., Folsom, A. R., Pankow, J. S., & Brancati, F. L. of the Atherosclerosis Risk in Communities (ARIC) Study Investigators. (2004). Cardiovascular Events in Diabetic and Nondiabetic Adults with or without History of Myocardial Infarction. Circulation, 109, 855-860.

Liao, Y., Kwon, S., Shaughnessy, S., et al. (2004). Critical Evaluation of Adult Treatment Panel III Criteria in Identifying Insulin Resistance with Dyslipidemia. *Diabetes Care*, 27, 978-983.

Lu, W., Resnick, H. E., Jablonski, K. A., et al. (2003). Non-HDL Cholesterol as a Predictor of Cardiovascular Disease in Type 2 Diabetes: The Strong Heart Study. *Diabetes Care*, 26, 16-23.

McAlister, F. A., Ezekowitz, J., Tonelli, M., & Armstrong, P. W. (2004). Renal Insufficiency and Heart Failure: Prognostic and Therapeutic Implications from a Prospective Cohort Study. *Circulation*, 109, 1004-1009.

Miller, M., Stone, N., Ballantyne, C., Bittner, V., Cirqui, M., Ginsber, H..& Pennathur, S. (2011). Triglycerides and cardiovascular disease: a scientific statement from the American Heart Association. *Circulation*, 123, 2292-2333: originally published online April 18, 2011.

Mooradian, A. D. (2003). Cardiovascular Disease in Type 2 Diabetes Mellitus: Current Management Guidelines. *Arch Intern Med*, 163, 33-40.

Nesto, R. W., Bell, D., Bonow, R. O., et al. of the American Heart Association and the American Diabetes Association. (2003). Thiazolidinedione Use, Fluid Retention, and Congestive Heart Failure: A Consensus Statement from the American Heart Association and American Diabetes Association. *Circulation*, 108, 2941-2948.

Otvos, J. D., Jeyarajah, E. J., & Cromwell, W. C. (2002). Measurement Issues Related to Lipoprotein Heterogeneity. *Am J Cardiol*, 90, 22i-29i.

Pearson, T. A., Bazzarre, T. L., Daniels, S. R., et al. for the American Heart Association Expert Panel on Population and Prevention Science. (2003). American Heart Association Guide for Improving Cardiovascular Health at the Community Level: A Statement for Public Health Practitioners, Healthcare Providers, and Health Policy Makers from the American Heart Association Expert Panel on Population and Prevention Science. *Circulation*, 107, 645-651.

Peterson, J. G., Topol, E. J., Sapp, S. K., Young, J. B., Lincoff, M. A., & Lauer, M. S. (2000). Evaluation of the Effects of Aspirin Combined with Angiotensin-Converting Enzyme Inhibitors in Patients with Coronary Artery Disease. *Am J Med*, 109, 371-377.

Rubenfire, M., Brook, R. D., & Rosenson, R. S. (2010). Treating Mixed Hyperlipidemia and the Atherogenic Lipid Phenotype for Prevention of Cardiovascular Events. *American Journal of Medicine*, 123(10), 892-898.

Sacco, M., Pellegrini, F., Roncaglioni, M. C., Avanzini, F., Tognoni, G., & Nicolucci, A. for the Primary Prevention Project Collaborative Group. (2003). Primary Prevention of Cardiovascular Events with Low-Dose Aspirin and Vitamin E in Type 2 Diabetic Patients: Results of the Primary Prevention Project (PPP) Trial. *Diabetes Care*, 26, 3264-3272.

Tobacco Use and Dependence Clinical Practice Guideline Panel, Staff, and Consortium Representatives. (2000). A Clinical Practice Guideline for Treating Tobacco Use and Dependence: A US Public Health Service Report. *JAMA*, 283, 3244-3254.

Tuomilehto, J., Lindstrom, J., Erkisson, J. G., et al. for the Finnish Diabetes Prevention Group. (2001). Prevention of Type 2 Diabetes Mellitus by Changes in Lifestyle among Subjects with Impaired Glucose Tolerance. *NEJM*, 344, 1343-1350.

U. S. Department of Health and Human Services. (2004). *The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure* (NIH Publication No. 04-5230). Washington, D.C.: U. S. Government Printing Office.

U. S. Department of Health and Human Services. (2005). *The Fourth Report on the Diagnosis, Evaluation, and Treatment of High Blood Pressure in Children and Adolescents* (NIH Publication No. 05-5267). Washington, D.C.: U. S. Government Printing Office.

Wagner, A. M., Perez, A., Zapico, E., & Ordonez-Llanos, J. (2003). Non-HDL Cholesterol and Apolipoprotein B in the Dyslipidemic Classification of Type 2 Diabetic Patients. *Diabetes Care*, 26, 2048-2051.

Wilcox, R., Kupfer, S., & Erdmann, E.: PROactive Study Investigators. (2008). Effects of Pioglitazone on Major Adverse Cardiovascular Events in High-Risk Patients with Type 2 Diabetes: Results from PROspective PioglitAzone Clinical Trial in Macro Vascular Events (PROactive 10). *American Heart Journal*, 155(4), 712-717.

Willi, C., Bodenmann, P., Ghali, W. A., et al. (2007). Active Smoking and the Risk of Type 2 Diabetes. *JAMA*, 298, 2654-2964.

Yusuf, S., Dagenais, G., Pogue, J., Bosch, J., & Sleight, P. for the Heart Outcomes Prevention Evaluation Study Investigators. (2000). Vitamin E Supplementation and Cardiovascular Events in High-Risk Patients. *NEJM*, 342, 154-160.

Yusuf, S., Sleight, P., Pogue, J., Bosch, J., Davies, R., & Dagenais, G. of the Heart Outcomes Prevention Evaluation Study Investigators. (2000). Effects of an Angiotensin-Converting-Enzyme Inhibitor, Ramipril, on Cardiovascular Events in High-Risk Patients. *NEJM*, 342, 145-153.

Section 6: Kidney Care

Concern	Care/Test	Frequency
Kidney Care	▪ Check albumin/creatinine ratio for microalbuminuria using a random urine sample; Goal < 30 mg/g	**Type 1**: At puberty or after 5 years duration, then annually **Type 2**: At diagnosis, then annually
	▪ Check serum creatinine and estimate GFR	At diagnosis, then annually
	▪ Perform routine urinalysis	At diagnosis, then as indicated

MAIN TOPICS INCLUDED IN THIS SECTION:

- Screening for Kidney Disease and Interpreting the Results
- Serum Creatinine and Estimated Glomerular Filtration Rate (eGFR)
- Management of Kidney Disease
- Blood Pressure Control
- Hypoglycemia
- Ongoing Evaluation and Monitoring of Therapy
- Referral to a Nephrologist and Coordination of Care
- Additional Resources
- References

High blood glucose associated with poorly controlled diabetes is the leading cause of chronic kidney disease in the United States. Diabetic nephropathy occurs in 20-40% of people with diabetes. Without treatment, individuals with diabetic kidney disease often progress to kidney failure. Progression of diabetic kidney disease is influenced primarily by glycemic control and use of agents that block the rennin-angiotensin-aldosterone system (angiotensin converting enzyme inhibitors or angiotensin receptor blockers) to control blood pressure. These agents should not be used in women planning a pregnancy or are pregnant. Interventions after early detection of kidney damage, such as careful blood glucose control and angiotensin II blockad reduce the risk of the development and progression of diabetic nephropathy. Furthermore, cardiovascular risk increases as albuminuria increases and the estimated glomerular filtration rate (eGFR) decreases. Screening for and treating diabetic kidney disease adds years to life and is cost effective.

People with diabetes should be informed of the link between diabetes and kidney disease and should understand how they can decrease their risk. Special educational, cultural, and literacy needs must be taken into consideration while respecting the individual's willingness to change behavior. Key educational points include:

- The role of blood glucose control in preventing or slowing the progression of kidney disease
- The importance of blood pressure control for cardiovascular health
- The use of specific agents for kidney-protection
- The importance of an annual kidney function test and appropriate follow-up. People in the early stages of chronic kidney disease are typically asymptomatic
- The importance of lifestyle modifications (e.g., weight loss, physical activity, tobacco cessation, and dietary changes) as needed for preventing or slowing the progression of kidney disease and any individual sodium and protein restrictions
- The benefits of early referral to a nephrologist for declining eGFR and what to expect from the visit

Ongoing support and continued reinforcement are essential for self-management and for learning to cope with chronic complications of declining kidney function.

Screening for Kidney Disease and Interpreting the Results

Kidney disease in people with diabetes generally progresses from microalbuminuria (loss of small amounts of albumin in the urine) to macroalbuminuria (loss of large amounts of albumin in the urine), and eventually leads to loss of kidney function. However, people with type 2 diabetes do not necessarily follow this progressive and detectable sequence and often present with more advanced kidney disease.

People with type 2 diabetes should be screened for microalbuminuria using an albumin/creatinine ratio test (using a random urine sample) and have a serum creatinine test to estimate glomerular filtration rate (GFR) at the time of diagnosis and annually thereafter.

People with type 1 diabetes should be screened for microalbuminuria using an albumin/creatinine ratio test (using a random urine sample) after five years of disease duration or at the onset of puberty (whichever occurs first) and annually thereafter. They should also have a serum creatinine test to estimate glomerular filtration rate (GFR) at the time of diagnosis and annually thereafter. If the initial screening test is positive (> 30 mg/dL), the albumin/creatinine ratio test should be repeated in 3-6 months to confirm the diagnosis. See the Tool: Screening and Initial Recommendations for Diabetic Kidney Disease Pathway located in the Tools Section.

Screening should also be considered for certain groups, such as those with a family history of kidney disease and/or hypertension, those with a history of chronically poor glycemic control, and those of African American, Hispanic/Latino, or American Indian race/ethnicity. Interpretation of albumin/creatinine ratio results are presented in Table 6-1.

Table 6-1: Albumin/Creatinine Ratio Results

Condition	Value
Normal	< 30 mg/g
Microalbuminuria	30-300 mg/g
Macroalbuminuria	> 300 mg/g

It is appropriate to obtain a routine urinalysis when a person is diagnosed with diabetes and then to check as indicated to assess for infection, ketones, or any other abnormalities. **A routine urinalysis is not sensitive enough to detect microalbuminuria and is therefore not an appropriate test for early detection of diabetic kidney disease.**

The albumin/creatinine ratio (sometimes called a microalbumin/creatinine ratio) from a random urine sample is the most accurate and easiest test available to assess microalbuminuria. It can be used to both screen for and track the progression of proteinuria and the response to treatment. Check with your lab to find out how to order the albumin/creatinine ratio, as a lab may request that you order both a urine microalbumin and a urine creatinine together, as shown in the example in the box below. Some labs provide the calculated ratio while others require that you calculate the ratio yourself.

Example: Calculating the albumin/creatinine ratio in mg/g

If the urine microalbumin is 10 mg/L and the urine creatinine is 100 mg/dL, then the albumin/creatinine ratio is 10 mg/g. In this example, you first need to multiply the urine creatinine value by 10 in order to convert mg/dL to mg/L (i.e., 100 mg/dL x 10 dL/L = 1000 mg/L). Then simply divide the urine albumin value (10 mg/L) by the urine creatinine value (1000 mg/L) to arrive at the ratio (10 mg/L /1000 mg/L = 0.01). Then multiply by 1000 to express the value as (mg albumin/g creatinine). If the two values are already in the same units, simply divide the albumin value by the creatinine value and then multiply by 1000.

There are several other ways to measure microalbuminuria; these tend to be less accurate or in the case of timed collections (e.g., overnight or 24-hour urine collections), more cumbersome. Albumin excretion can vary from day to day and can be affected by uncontrolled blood pressure, high blood glucose, fever, urinary tract infection, hematuria, and strenuous physical activity.

Once a person has an albumin/creatinine ratio of > 300 mg/g (macroalbuminuria), a protein/creatinine ratio is an appropriate method to track changes in proteinuria. The protein/creatinine ratio can be measured from a random urine sample and can be used to follow progression of kidney disease and response to therapy. A mid-morning collection is considered most accurate.

Serum Creatinine and Estimated Glomerular Filtration Rate (eGFR)

An estimated glomerular filtration rate (eGFR), derived from serum creatinine, is also recommended at diagnosis and then annually in all adults with diabetes regardless of the degree of urine albumin excretion. Estimated GFR is considered the best marker of kidney function in people with chronic kidney disease. A serum creatinine alone (without eGFR) is inadequate to estimate kidney damage or function.

Multiple calculators are available to estimate GFR based on a serum creatinine and other individual characteristics. The Cockcroft Gault equation requires a person's weight. The Modification of Diet in Renal Disease (MDRD) Study equation requires serum creatinine, age, gender, and race. Two web-based calculators are provided below:

1. http://www.nkdep.nih.gov/professionals/gfr_calculators/orig_con.htm
2. http://www.kidney.org/professionals/KDOQI/gfr_calculator.cfm

The MDRD Study equation is most accurate for individuals with eGFRs < 60 ml/min/1.73 m^2 (stage 3 chronic kidney disease and higher). Based on the level of eGFR, individuals with diabetic kidney disease can be placed into one of five stages, as shown in Table 6-2. This is helpful in designing a clinical action plan.

Table 6-2: Stages of Chronic Kidney Disease – A Clinical Action Plan

Chronic Kidney Disease Stage	GFR (ml/min/1.73 m^2)	Action (including action from preceding stages)
Stage 1: Kidney damage with normal or ↑ GFR❖	≥ 90	Diagnosis, treatment, treatment of comorbid conditions, slowing progression, cardiovascular disease risk reduction
Stage 2: Kidney damage with mild ↓ GFR	60-89	Estimate progression
Stage 3: Moderate ↓ GFR	30-59	Evaluate and treat complications; refer to a nephrologist
Stage 4: Severe ↓ GFR	15-29	Preparation for kidney replacement therapy; referral to a nephrologist (if not already done); possible referral for transplantation
Stage 5: Kidney failure	< 15 (or dialysis)	Kidney replacement therapy (if uremia present)

❖ most commonly microalbuminuria

Estimated GFR is most valid for values less than 60 mL/min/1.73 m^2, which includes the clinically significant chronic kidney disease categories. While many labs in Wisconsin now automatically report eGFR when a serum creatinine is ordered, some labs provide the absolute number when the value is < 60 mL/min/1.73 m^2 and report "> 60 mL/min/1.73 m^2" when the value is above 60 mL/min/1.73 m^2 to account for the uncertainty of the calculation at that value.

Management of Kidney Disease

Angiotensin-coverting Enzyme (ACE) inhibitors or Angiotensin Receptor Blockers (ARBs) are effective treatments for microalbuminuria or macroalbuminuria. They slow the progression of diabetic kidney disease independent of their effect on lowering blood pressure. No adequate head-to-head comparisons have been made between ACE inhibitors and ARBs; therefore, clinical judgment should be used to guide treatment decisions, taking an individual's characteristics into account. The use of ARBs has been studied more thoroughly in people with type 2 diabetes than in people with type 1 diabetes. An ACE inhibitor is a reasonable first line option for cost and efficacy in controlling progression of microalbuminuria. If there is persistent proteinuria and/or ACE inhibitor intolerance, changing to an ARB is reasonable.

The effect of ACE inhibitors/ARB therapy on albuminuria is dose dependent. Medium to high ACE inhibitor/ARB doses were used in clinical trials. Adverse effects from the use of ACE inhibitors and ARBs are more common in people with chronic kidney disease. The most common side effects (e.g., early decrease in eGFR, hypotension, and hyperkalemia) can usually be managed without discontinuing the agent. With careful monitoring of therapy, ACE inhibitors or ARBs can treat most people, even those with low eGFRs.

Blood Pressure Control

In addition to ACE inhibitor/ARB therapy, aggressive blood pressure control is a priority in people with diabetic kidney disease. According to recent studies, most people require more than one antihypertensive agent to meet the blood pressure target of < 130/80 mmHg. If blood pressure remains high on ACE inhibitors/ARBs alone, adding medication from a second class of antihypertensive can help achieve blood pressure control. Diuretics are particularly effective when added to ACE inhibitors or ARBs. For additional information, see the Kidney Disease Outcomes Quality Initiative Guidelines on Hypertension and Antihypertensive Agents in Chronic Kidney Disease: http://www.kidney.org/professionals/kdoqi/guidelines.cfm.

Caution: Do not prescribe ACE inhibitor/ARB therapy to women of childbearing age who are not using contraception or to pregnant women because of the potential risk for fetal abnormalities.

Hypoglycemia

Hypoglycemia is a major concern for people with CKD and diabetes. Insulin and some oral medications may have a prolonged half-life when kidney function is impaired. It is imperative for people on insulin therapy or oral agents that can lead to hypoglycemia (e.g., sulfonylureas) to monitor their glucose levels closely and reduce doses of oral medications and insulin as needed to avoid hypoglycemia.

Ongoing Evaluation and Monitoring of Therapy

Evaluate individuals with diabetes annually for kidney disease. This includes checking for microalbuminuria, hypertension, and decreased eGFR (serum creatinine to estimate the GFR). For people with documented chronic kidney disease, base ongoing follow-up on clinical circumstances (e.g., blood pressure, kidney function, potassium level, and medication dose changes). Repeat the albumin/creatinine ratio or the protein/creatinine ratio every three to six months to monitor progression of kidney disease and response to therapy.

People with diabetes and CKD have increased risk of cardiovascular disease and commonly have dyslipidemia. Treat these people according to current lipid guidelines for high-risk groups.

Referral to a Nephrologist and Coordination of Care

Referral to a nephrologist is recommended in all of the following circumstances:

- The eGFR is less than 60 mL/min/1.73 m^2
- Loss of kidney function is rapid (i.e., greater than 10-15 mL/min/1.73 m^2 loss per year)
- The blood pressure target cannot be achieved
- Anytime the primary care provider feels he or she needs assistance in carrying out the recommended action plan (see Table 6-2)

Caring for people with kidney disease is challenging and requires expertise from a variety of specialists (e.g., dietitians, mental health care providers, nurses, pharmacists, social workers), all of whom must carefully integrate diabetes and kidney disease care. Early intervention and timely referrals for consultation with kidney experts and other specialty services can lead to optimal management of diabetes and kidney disease.

Epidemiologic data have shown that early referral to nephrologists for subjects with chronic kidney disease are associated with better long-term outcomes.

Additional Resources

1. "Diabetes and Kidney Disease" pamphlet developed by the National Kidney Foundation. Website located at: http://www.kidney.org/atoz/pdf/diabetes.pdf.
2. Educational DVD Titled: The Links to Chronic Kidney Disease: Diabetes High Blood Pressure, and Family History, Most of Us Don't Know the Half of it! Website located at: http://wlf.info/index.php?option=com_content&view=article&id=37&Itemid=40&28e5bbf660cb545fc854f5c048c7be7c=b55b09b55cbea4590b9e105f86de8b0f.

References

American Diabetes Association. (2010). Standards of Medical Care American Diabetes Association. (2012). Standards of Medical Care in Diabetes - 2012.*Diabetes Care*, 2012 35 (supp 1), S11-S63.

Bakris, G. L.,Weir, M. R., Shanifar, S., et al. for the RENAAL Study Group. (2003). Effects of Blood Pressure Level on Progression of Diabetic Nephropathy: Results from the RENAAL Study. *Arch Intern Med,* 163, 1555-1565.

Bang, H., Mazumdar, M., Kern, L. M., Shoham, D. A., August, P. A., & Kshirsagar, A. V. (2008). Validation and Comparison of a Novel Screening Guideline for Kidney Disease: KEEPing SCORED. *Arch Intern Med*, 168(4), 432-435.

Bernheim, S., Chen, S., Gomez, M., et al. (2003). A Better Alternative for Estimating Renal Function. *Arch Intern Med*, 163, 2248-2249.

Bruno, G., Merletti, F., Biggeri, A., et al. (2003). Progression to Overt Nephropathy in Type 2 Diabetes: The Casale Monferrato Study. *Diabetes Care,* 26, 2150-2155.

Chan, M., Dall, A., Fletcher, K., Lu, N., & Hariprasad, T. (2007). Outcomes in Patients with Chronic Kidney Disease Referred Late to Nephrologists: A Meta-analysis. *AJM*, 120(12), 1063-1070.

Chen, J., Muntner, P., Hamm, L. L., et al. (2004). The Metabolic Syndrome and Chronic Kidney Disease in U. S. Adults. *Ann Intern Med*, 140, 167-174.

Chronic Kidney Disease Prognosis Consortium (2010). Association of Estimated Glomerular Filtration Rate and Albuminuria with All-cause and Aardiovascular Mortality in General Population Cohorts: A Collaborative Meta-analysis. *Lancet*, 375(9731), 2073-2081.

Fox, C. S., Larson, M. G., Leip, E. P., Culleton, B., Wilson, P. W., & Levy, D. (2004). Predictors of New-Onset Kidney Disease in a Community-Based Population. *JAMA*, 291, 844-850.

Heart Outcomes Prevention Evaluation Study Investigators. (2000). Effects of Ramipril on Cardiovascular and Microvascular Outcomes in People with Diabetes Mellitus: Results of the HOPE Study and MICRO-HOPE Substudy. *Lancet*, 355, 253-259.

Hoerger, T., Wittenbon, J., Segel, J.et. al. for the Centers for Disease and Control and Prevention CKD Initiative. (2010). A Health Policy Model of CKD: The Cost-Effectiveness of Microalbuminuria Screening. *American Journal of Kidney Diseases*, 55(3), 463-473.

Holechek, M. (2003). Glomerular Filtration: An Overview. *Nephrol Nurs J*, 30, 285-292.

Hollenberg, N. K. (2004). Treatment of the Patient with Diabetes Mellitus and Risk of Nephropathy: What Do We Know, and What Do We Need to Learn? *Arch Intern Med*, 164, 125-130.

Keane, W. F., & Eknoyan, G. for the National Kidney Foundation. (1999). Proteinuria, Albuminuria, Risk, Assessment, Detection, Elimination (PARADE): A Position Paper of the National Kidney Foundation. *Am J Kidney Dis*, 33, 1004-1010.

Kunz, R., Friedrich, C., Wolbers, M., & Mann, J. F. (2008). Meta-Analysis: Effect of Monotherapy and Combination Therapy with Inhibitors of the Renin Angiotensin System on Proteinuria in Renal Disease. *Ann Intern Med*, 148(1), 30-48.

Levey, A. S., Bosch, J. P., Lewis, J. B., Greene, T., Rogers, N., & Roth, D. of the Modification of Diet in Renal Disease Study Group. (1999). A More Accurate Method to Estimate Glomerular Filtration Rate from Serum Creatinine: A New Prediction Equation. *Ann Intern Med*, 130, 461-470.

Levey, A. S., Coresh, J., Balk, E., et al. for the National Kidney Foundation. (2003). National Kidney Foundation Practice Guidelines for Chronic Kidney Disease: Evaluation, Classification, and Stratification. *Ann Intern Med*, 139, 137-147.

Molitch, M. E., DeFronzo, R. A., Franz, M. J., et al. for the American Diabetes Association. (2004). Nephropathy in Diabetes. *Diabetes Care*, 27, S79-S83.

National Kidney Foundation, Kidney Disease Outcomes Quality Initiative. (2007). KDOQI Clinical Practice Guidelines and Clinical Practice Recommendations for Diabetes and Chronic Kidney Disease. *Am J Kidney Dis*, 49(2 supp 2), S12-154.

Orlowski, J. (2004). Update in Nephrology. Ann Intern Med, 140, 106-111.

Perkins, B. A., Ficociello, L. H., Silva, K. H., Finkelstein, D. M., Warram, J .H., & Krolewski, A. S. (2003). Regression of Microalbuminuria in Type 1 Diabetes. *NEJM*, 348, 2285-2293.

Ruggenenti, P., & Remuzzi, G. (1998). Nephropathy of Type-2 Diabetes Mellitus. J Am Soc Nephrol, 9, 2157-2169.

Swedko, P. J., Clark, H.D., Paramsothy, K., & Akbari, A. (2003). Serum Creatinine is an Inadequate Screening Test for Renal Failure in Elderly Patients. *Arch Intern Med*, 163, 356-360.

UKPDS Group. (1998). Tight Blood Pressure Control and Risk of Macrovascular and Microvascular Complications in Type 2 Diabetes (UKPDS 38). *BMJ*, 317, 703-713.

Zandbergen, A. A., Baggen, M. G., Lamberts, S. W., Bootsma, A. H., de Zeeuw, D., & Ouwendijk, R. J. (2003). Effect of Losartan on Microalbuminuria in Normotensive Patients with Type 2 Diabetes Mellitus. A Randomized Clinical Trial. *Ann Intern Med* 139, 90-96.

Section 7: Eye Care

Concern	Care/Test	Frequency
Eye Care	▪ Dilated eye exam by an ophthalmologist or optometrist	**Type 1**: If age ≥ 10 yrs within 5 years of onset, then annually **Type 2**: At diagnosis, then annually; two exceptions exist

MAIN TOPICS INCLUDED IN THIS SECTION:

- Annual Dilated Eye Exams
- Referral to an Ophthalmologist or Optometrist and Coordination of Care
- Treating Diabetic Retinopathy
- Additional Resources
- References

Diabetes is the leading cause of new cases of blindness among adults ages 20-74. Studies show that early detection and proper treatment reduces the risk of diabetic retinopathy and blindness by 50-60%. Dilated eye exams are therefore essential for early detection of blinding diabetic eye disease. Proper glycemic control can also reduce the risk of progression of retinopathy by 34-76%. For each two unit decrease in A1C (e.g., A1C of 8.5% to 6.5%) there is a 50-75% reduction in complications. There is also preliminary evidence that effective treatment of dyslipidemia may augment the impact of proper glucose control in reducing the rate of progression of diabetic retinopathy. Retinal screening exams and early treatment can result in increased years of sight and also assist with cost savings. Diabetic retinopathy is preventable and optimal glycemic and blood pressure control can reduce its severity.

Annual Dilated Eye Exams

People with diabetes should usually receive yearly dilated eye exams from an ophthalmologist or optometrist fully trained in recognizing diabetic retinopathy (see exceptions below). Abnormal findings should result in either prompt treatment or timely referral for the management of diabetic retinopathy.

People with type 1 diabetes ≥ 10 years of age should have an initial dilated eye exam within 5 years of onset of diabetes. After initial exam, they should be performed annually. People with type 2 diabetes should have their first dilated eye exam at diagnosis and then annually thereafter. **Note: a vision screening exam is not an acceptable substitute for the dilated eye exam.**

Two exceptions to the annual dilated eye exam are sometimes made at the discretion of the ophthalmologist or optometrist:

1. Annual screening is generally not indicated for people with type 1 diabetes within the first 5 years of diagnosis or before the age of ten years
2. People with type 2 diabetes may have a dilated exam **on alternate years** if **all** of the following requirements are met:
   - A1C levels are within one percent of normal (this assumes that A1C levels were measured within the last six months)
   - Consistent blood pressure control (< 130/80 mmHg) is achieved
   - A dilated eye exam within the last year revealed no retinopathy

Pregnancy may accelerate the progression of diabetic retinopathy. A baseline dilated comprehensive eye exam should be done as early as possible in the pregnancy and, if retinopathy is found, the exam be repeated as needed during the pregnancy. If the retinopathy is found to be rapidly progressive, laser treatment can be safely done even during pregnancy. The risk for retinopathy is present up to one year following childbirth.

In some regions of the state, digital photos of the eyes are taken and sent for review by ophthalmologists located elsewhere. This can be a helpful adjunct to diabetic eye care but should never be used as a permanent substitute for a comprehensive eye exam done by a qualified eye care doctor.

Referral to an Ophthalmologist or Optometrist and Coordination of Care

It is necessary that the ophthalmologist or optometrist communicate the results and recommendations of each eye exam to the primary care provider, in addition to the person with diabetes. It is beneficial if the primary care provider can provide the eye care specialist with the person's current A1C and blood pressure values. People with diabetes need to know the importance of reporting vision-threatening symptoms immediately (e.g., floaters, shadows, or persistent blurred vision). The "Dilated Retinal Eye Exam Communication Form" promotes communication between eye care specialists and other health care providers, allowing eye exam results to be shared. This form can be found in the Tools Section.

Treating Diabetic Retinopathy

Retinopathy does not require specific eye treatment until it results in:

- Macular edema: swelling of the retina within the macula
- Progresses to either a very severe non-proliferative stage or to a proliferative stage (growth of new blood vessels in the inner lining of the eye)
- Vitreous hemorrhage: bleeding into the central cavity of the eye

For macular edema, the traditional proven treatment has been the limited application of laser to the area of the macula. Recent studies have demonstrated that repeated intravitreal injections of anti-VEGF drug (Vascular Endothelial Growth Factor) with or without laser treatment can produce better results than laser treatment alone. The long-term consequence of this treatment remains to be seen. For very severe non-proliferative or some forms of proliferative retinopathy (growth of new blood vessels in the inner lining of the inner lining of the eye) so-called panretinal laser treatment has been proven beneficial though this too many be supplemented with intravitreal injections of anti-VEGF drugs. Panretinal laser treatment involves extensive applications of laser to the inner lining of the eye. For a vitreous hemorrhage, the initial treatment is typically to wait for spontaneous clearing since blood tends to disappear from the inside of the eye like a bruise clears from under the skin. If clearing does not begin to occur within a month or so, then surgical removal of the blood-containing vitreous, or vitrectomy, is considered.

Additional Resources

1. An educational DVD titled "Protect Your Vision: The Dilated Eye Exam," was created by the Wisconsin Diabetes Prevention and Control Program, the Wisconsin Lions Foundation, and other partners. This seven-minute DVD (English and Spanish are available on the same DVD) provides a simple educational message to persons with diabetes and can be played in waiting rooms or exam rooms as persons are waiting to be seen by providers. This DVD can be viewed on the Wisconsin Lions Foundation website: http://wlf.info/index.php?option=com_content&view=article&id=39&Itemid=42&. Order DVDs through the Wisconsin Lions Foundation, using the order form titled "Eye DVD Order Form" in the Tools Section. A second DVD titled "Diabetic Retinopathy: A Potential Consequence of Uncontrolled Diabetes" is also available using this order form.

2. The Diabetes Sight website exists to educate diabetics and their families about diabetic eye diseases/ disorders: http://www.diabetes-sight.org/.
3. Prevent Blindness Wisconsin serves the state by promoting healthy vision and eye safety through eye screenings, information and referral services, and public and professional education: http://www.preventblindness.org/wi/.
4. National Eye Institute: Conducts and supports research, training, health information dissemination, and other programs with respect to blinding eye diseases: http://www.nei.nih.gov/.
5. American Academy of Ophthalmology: Providing authoritative information about eye care for the public and members: http://www.aao.org/.
6. American Optometric Association: Sets professional standards, lobbies government, and provides research and education to provide the public with quality vision and eye care: http://www.aoa.org/.

References

American Diabetes Association. (2001). Implications of the Diabetes Control and Complications Trial. *Diabetes Care*, 24, S25-S27.

American Diabetes Association. (2012). Standards of Medical Care in Diabetes - 2012.*Diabetes Care*, 2012 35 (supp 1), S11-S63.

Chew, E. Y., Ambrosius, W. T., Davis, M. D., et al. for the ACCORD Study Group and ACCORD Eye Study Group. (2010). Effects of Medical Therapies on Retinopathy Progression in Type 2 Diabetes. *NEJM*, 363(3), 233-244.

Chew, E. Y., Mills, J. L., Metzger, B. E., et al., for the National Institute of Child Health and Human Development Diabetes in Early Pregnancy Study. (1995). Metabolic Control and Progression of Retinopathy. *Diabetes Care*, 18, 631-637.

Diabetes Control and Complications Trial Research Group. (1993). The Effect of Intensive Treatment of Diabetes on the Development and Progression of Long-Term Complications in Insulin-Dependent Diabetes Mellitus. *NEJM*, 329, 977-986.

Diabetes Control and Complications Trial Research Group. (2000). Effect of Pregnancy on Microvascular Complications in the Diabetes Control and Complications Trial. *Diabetes Care*, 23, 1084-1091.

Early Treatment Diabetic Retinopathy Study Research Group. (1985). Photocoagulation for Diabetic Macular Edema. Early Treatment Diabetic Retinopathy Study Report Number 1. *Arch Ophthalmol*, 103, 1796-1806.

Elman, M. J., Aiello, L. P., et al. for Diabetic Retinopathy Clinical Research Network. (2010). Randomized Trial Evaluating Ranibizumab Plus Prompt or Deferred Laser or Triamcinolone Plus Prompt Laser for Diabetic Macular Edema. *Ophthalmol*, 117, 1064-1077.

Ferris, F. L. 3rd, Chew, E. Y., & Hoogwerf, B. J., for the Early Treatment Diabetic Retinopathy Study Research Group. (1996). Serum Lipids and Diabetic Retinopathy. *Diabetes Care*, 19, 1291-1293.

Fong, D. S., Aiello, L., Gardner, T. W., et al. for the American Diabetes Association. (2004). Retinopathy in Diabetes. *Diabetes Care*, 27, S84-S87.

Genuth, S., Eastman, R., Kahn, R., et al., for the American Diabetes Association. (2001). Implications of the United Kingdom Prospective Diabetes Study. *Diabetes Care*, 24, S28-S32.

Javitt, J. C., & Aiello, L. P. (1996). Cost-Effectiveness of Detecting and Treating Diabetic Retinopathy. *Ann Intern Med*, 124, 164-169.

Klein, R. (2002). Prevention of Visual Loss from Diabetic Retinopathy. *Survey of Ophthalmology*, 47(2), S246-S252.

Klonoff, D. C., & Schwartz, D. M. (2000). An Economic Analysis of Interventions for Diabetes. *Diabetes Care*, 23, 390-404.

Scanlon, P. H., Malhotra, R., Thomas, G., et al. (2003). The Effectiveness of Screening for Diabetic Retinopathy by Digital Imaging Photography and Technician Ophthalmoscopy. *Diabetes Med*, 20, 467-474.

Schachat, A. P. (2010). A New Approach to the Management of Diabetic Macular Edema. *Opthalmol* 117, 1059-1060.

UKPDS Group. (1998). Intensive Blood-Glucose Control with Sulphonylureas or Insulin Compared with Conventional Treatment and Risk of Complications in Patients with Type 2 Diabetes (UKPDS 33). *Lancet*, 352, 837-853.

Section 8: Neuropathies and Foot Care

Concern	Care/Test	Frequency
Neuropathies and Foot Care	▪ Assess/screen for neuropathy (autonomic/DPN)	**Type 1**: Five years after diagnosis, then annually **Type 2**: At diagnosis, then annually
	▪ Visual inspection of feet with shoes and socks off	Each focused visit; stress daily self-exam
	▪ Perform comprehensive lower extremity/ foot exam	At diagnosis, then annually
	▪ Screen for PAD (consider ABI)	At diagnosis, then annually

MAIN TOPICS INCLUDED IN THIS SECTION:

- Classification of Diabetic Neuropathy
- Distal Symmetric Polyneuropathy
- Autonomic Neuropathy
- Peripheral Arterial Disease
- Screening: Routine Visual Inspection and Comprehensive Foot Exam
- Assessing Vibration Perception with Tuning Fork
- Risk Categorization
- Ulceration
- Infection
- Charcot Foot
- Referral to a Podiatrist and Coordination of Care
- Vibration/Sensation Resources
- Additional Resources
- References

Diabetic neuropathy is an anatomically diffuse process that affects sensory and autonomic fibers. It has a range of clinical manifestations of which pain and numbness in the lower extremities is the most well-known. Both sensory and autonomic neuropathy can cause significant morbidity, disability, and decreased quality of life.

The prevalence of neuropathy increases with the duration of diabetes and the duration and severity of hyperglycemia. Primary health care providers need to emphasize optimal glycemic control and tobacco cessation as important factors in preventing and slowing neuropathy and peripheral vascular disease.

Neuropathy is considered a progressive disease that affects nerves and can be asymptomatic. Neuropathy may not be evident for several years after the onset of diabetes (especially in type 1 diabetes) but may be present at diagnosis in type 2 diabetes. Screening for both distal symmetric polyneuropathy (DPN) and autonomic neuropathy should take place annually beginning five years after diagnosis for people with type 1 diabetes and at diagnosis for people with type 2 diabetes.

A discussion of peripheral arterial disease (PAD) is also included in this section because poor blood flow to the lower extremities exacerbates the potential complications of sensory diabetic neuropathy such as ulceration and infection by impairing wound healing. Together, PAD and DPN set the stage for lower extremity amputations in people with diabetes. Primary health care providers need to emphasize optimal glycemic control and tobacco cessation as important factors in preventing and slowing neuropathy and PAD.

Classification of Diabetic Neuropathy

Clinically, neuropathy is diagnosed and defined through symptoms, signs, and objective measures and classified into syndromes according to the distribution of peripheral nervous system involvement. Specific treatment for the underlying nerve damage related to neuropathy is not currently available. However, there are medications available to reduce symptoms associated with sensory and autonomic neuropathy. Improved glycemic control and reduced variations in blood glucose excursions can slow the progression of neuropathy. Signs and symptoms of neuropathies are presented in Table 8-1.

Sensorimotor Neuropathy

Types of sensorimotor neuropathy include:

- Distal symmetric polyneuropathy (DPN)
- Focal neuropathy
- Diabetic mononeuropathy (cranial, truncal, peripheral nerves)
- Mononeuropathy multiplex
- Diabetic amyotrophy (weakness, excruciating pain of thigh, hip, and buttocks muscles)

Autonomic Neuropathy

Types of autonomic neuropthy include:

- Hypoglycemic unawareness
- Abnormal pupillary function
- Cardiovascular autonomic neuropathy

- Vasomotor neuropathy
- Sudomotor neuropathy (sweat glands)

Gastrointestinal Autonomic Neuropathy

Type of gastrointestinal autonomic neuropthy include:

- Gastric atony
- Diabetic diarrhea or constipation
- Fecal incontinence

Genitourinary Autonomic Neuropathy

Types of genitourinary autonomic neuropthy include:

- Bladder dysfunction
- Sexual dysfunction

Table 8-1: Signs and Symptoms of Neuropathies

Small-Fiber Sensory	Large-Fiber Sensory	Autonomic
Burning pain	Loss of vibration sensation	Heart rate abnormalities
Cutaneous hyperesthesia	Loss of proprioception	Orthostatic hypotension
Numbness/paresthesia	Loss of or diminished reflexes	Abnormal sweating
Lancinating pain	Slowed nerve conduction velocities	Gastroparesis
Inability to feel pain and temperature sensation		Neuropathic diarrhea or constipation
Ulcers/sores		Sexual dysfunction
Loss of visceral pain		

The remainder of this section focuses on screening for and prevention of sensorimotor neuropathy (distal symmetric polyneuropathy) and autonomic neuropathy.

Distal Symmetric Polyneuropathy

Distal symmetric polyneuropathy (DPN) is the most common type of sensorimotor neuropathy for people with diabetes. This type of neuropathy presents as numbness, tingling, and a sensation of tightness in the legs and/or feet. Neuropathy pain can present itself as a burning sensation, sharp and/or shooting pains, or as a deep aching pain. Symptoms typically begin insidiously in the toes and then advance proximally up the legs. Both small- and large-fiber sensory neurons are involved. Small-fiber sensory neuron involvement results in loss of pain and temperature sensation, leading to increased risk of injury, trauma, ulceration, and infection. Large-fiber neuron involvement leads to a loss of vibratory sensation, proprioception, and absent or reduced deep tendon reflexes. Together, these sensory deficiencies put people at increased risk for traumatic injury, ulceration, infection, and musculoskeletal deformity.

Acute painful neuropathy is a distal sensory polyneuropathy characterized by severe pain in the leg(s), most often worse at night. Frequently, there is a sensitivity to even bed sheets covering the feet. A neurological

examination often reveals only slight temperature change and sensation loss with little change in the deep tendon reflexes. Painful neuropathy can be seen following significant weight loss and prolonged periods of poor glycemic control. Symptoms can ease with improved glycemic control. Screening for DPN is best accomplished through an **annual comprehensive foot exam.**

Autonomic Neuropathy

Autonomic neuropathy is a family of nerve disorders that manifest in people with type 1 or type 2 diabetes. The risk for autonomic neuropathy increases with age, being overweight or obese, the duration of time a person has diabetes, and how well controlled their blood sugar and blood pressure are over time. Autonomic neuropathy affects nerves that regulate:

- Blood pressure and blood flow
- Flow through the gastrointestinal tract
- Urinary and sexual function
- Perspiration/skin hydration
- Pupil responses to light
- Bone composition of the foot

Some people with nerve damage due to autonomic neuropathy exhibit no symptoms, but primary care providers can screen for autonomic neuropathy during a history and physical exam. Clinical manifestations and symptoms of autonomic neuropathy include:

- Exercise intolerance
- Abnormal heart rate variability and cardiac arrhythmia (e.g., resting tachycardia)
- Orthostatic hypotension (i.e., drop in blood pressure upon standing)
- Swallowing difficulty
- Constipation or diarrhea
- Gastroparesis (i.e., delayed gastric emptying)
- Erectile dysfunction
- Female sexual dysfunction
- Frequent urinary infections or incontinence
- Sweat gland dysfunction (e.g., skin cracks or body temperature regulation problems)
- Vision problems (e.g., difficulty driving at night)
- Foot deformity (e.g., bone and tendon collapse)
- Hypoglycemia unawareness (i.e., not able to sense hypoglycemia)

The two most common autonomic neuropathies are cardiovascular and gastrointestinal. Cardiovascular autonomic neuropathy presents as resting tachycardia (> 100 beats per minute) and orthostatic hypotension (a drop in systolic blood pressure of > 20 mmHg upon standing). These can lead to exercise intolerance and lightheadedness or syncopal episodes. Gastrointestinal autonomic neuropathies include esophageal enteropathy, gastroparesis, constipation, diarrhea, and fecal incontinence. Constipation is the most common gastrointestinal problem and is commonly associated with intermittent diarrhea. With gastroparesis, slow gastrointestinal emptying leads to bloating and esophageal reflux and can be evaluated with a solid-phase gastric emptying test.

Autonomic neuropathy can also impair the body's ability to react to an inflammatory response, leading to skin ischemia and poor wound healing. Vasodilatation can shunt blood flow from the capillaries and may lead to bone demineralization and osteolysis, both of which contribute to foot deformity. In addition, cracking and fissures associated with decreased skin hydration provides a portal of entry for microorganisms and increases the risk of infection.

Peripheral Arterial Disease

Peripheral arterial disease (PAD) describes the narrowing of arteries, often due to calcification, that reduces blood flow to the extremities. Like coronary artery disease, people with diabetes have a high risk of developing PAD. Hyperglycemia, dyslipidemia, tobacco use, and hypertension are known risk factors for PAD. PAD is found in five percent of people with diabetes only one year after diagnosis. Screening for PAD should be done at diagnosis and then annually; screening includes assessing a person's history of claudication and assessing pedal pulses. Primary care providers should ask about claudication.

PAD is more likely to occur below the knee in people with diabetes due to inadequate blood supply (i.e., ischemia) to the lower limbs. The earliest sign of PAD is intermittent lower extremity (usually calf) pain that begins with walking and resolves with rest. People with PAD often also complain of cold feet. Physical exam findings suggesting PAD include:

- Weak or absent pulses
- Presence of bruits
- Muscle atrophy
- Hair loss
- Thickened toenails
- Smooth and shiny skin
- Reduced skin temperatures
- Ulcers and gangrene

Providers should not rely solely on a physical exam to detect PAD. The ankle-brachial index (ABI) is a simple, reliable, and non-invasive means for screening and diagnosing PAD. This screening test has a sensitivity and specificity of 90% and higher. A diagnostic ABI is recommended for any person with diabetes and symptoms of PAD. An ABI should also be performed on any person with diabetes who is over age 50 or who has risk factors for PAD (e.g., tobacco use, duration of diabetes more than 10 years, high blood pressure, high cholesterol) because PAD is commonly asymptomatic in people with diabetes.

The ABI is the ratio of systolic blood pressure in the ankle to systolic blood pressure in the arm obtained using a hand-held Doppler and blood pressure cuff. The normal range for ABI is 0.9 to 1.2. An ABI < 0.9 signifies PAD. Heavily calcified arteries, as can be seen with longstanding diabetes, chronic kidney disease, and in the elderly, reduce the accuracy of blood pressure cuff readings and make the ABI less reliable. Pulse volume recording (PVR) is a useful adjuvant to the ABI. Unlike ABI, PVR is not affected by calcified arteries. PVR records a waveform that corresponds to blood flow. A PVR wave form which shows a rapid raise and fall with a sharp peak suggests adequate blood flow while a flatter, nonpulsatile waveform can signify PAD.

Screening: Routine Visual Inspection and Comprehensive Foot Exam

Diabetic neuropathy is the leading cause of lower limb amputations. To prevent lower limb amputations and other foot complications, all people with diabetes should receive an annual comprehensive exam and a routine visual inspection of their feet at each diabetes-related visit. Table 8-2 describes the components of a routine visual foot inspection and a comprehensive foot exam.

Table 8-2: Differences between Routine Visual Foot Inspection and Comprehensive Foot Exam

Recommended Exam*	Exam Includes*
Routine Visual Foot Inspection conducted at each diabetes-related visit: ▪ Detect presence of acute problems ▪ Reinforce importance of preventive foot health strategies	▪ Visual inspection of foot, heel, and between toes ▪ Check for injuries, calluses, blisters, fissures, ulcers, and/or other unusual changes ▪ Check for signs of decreased blood supply, such as skin that is thin, shiny, fragile, or hairless ▪ Inspect nails for thickening, ingrown corners, length, and fungal infection ▪ Check socks or hose for discharge ▪ Check shoes for foreign objects ▪ Inquire about and check for appropriate footwear ▪ Educate about self-care of the feet
Comprehensive Foot Exam conducted annually: ▪ Determine or re-evaluate person's risk status ▪ Determine need for referral ▪ Determine need for protective foot wear	▪ Use a **10-gram monofilament** to assess sensory impairment and a **128-Hz tuning fork** to assess vibration perception. The combined use of both assessment tools has a > 87% sensitivity in detecting peripheral neuropathy by a health care provider. Loss of 10-gram monofilament perception and reduced vibration perception is predictive of foot ulcers. Pinprick sensation, ankle reflexes, and vibration perception threshold can also be used but are less predictive of future complications. ▪ Identify people at risk for foot problems and categorize their level of risk (see Table 8-3) ▪ Identify current problems and changes since last exam ▪ Assess or reassess musculoskeletal abnormalities or deformities; vascular and neurological status; and skin, nail, and soft tissue changes ▪ Assess foot and lower extremity pulses, gait, range of motion, and recommend referrals as necessary ▪ Assess pain level ▪ Develop a management plan ▪ Educate about the importance of glycemic control ▪ Exam serves as a baseline to compare with future exams ▪ Educate about self-care of the feet

* Exam performed by health care provider knowledgeable and experienced in completing a routine visual inspection and/or comprehensive exam.

These foot examinations can assist health care providers with:

- Early identification of risk
- Early detection, diagnosis, and referral for problems including ulceration, infection, and painful neuropathy
- Early intervention and treatment to prevent problems from worsening
- Teaching self-management and preventive foot care strategies

Self-management education for preventive foot care should include encouraging people to check their own feet daily and contact their health care provider promptly if they have any concerns. A family member/friend or a mirror can help with seeing all parts of the foot. Health care providers can also discuss appropriate footwear and use foot care education as an additional opportunity to reinforce the importance of good glycemic control. According to published studies, people who received foot self-management education and had a foot examination performed by a health care provider were significantly more likely to regularly check their own feet.

Tools such as the ID Pain™ questionnaire, Neuropathic Pain Questionnaire, or pain*DETECT* questionnaire can be useful for identifying painful neuropathy. For a review of screening tools to identify neuropathic pain, see http://www.neurology.wisc.edu/publications/2007/Neuro_7.pdf.

Assessing Vibration Perception with Tuning Fork

Assess peripheral neuropathy using a 128-Hz tuning fork to determine vibration perception. The assessment is abnormal if the person cannot sense the vibration of the tuning fork when it is pressed against the foot. Vibration perception and proprioception use the same nerve pathways. Therefore, as vibration perception decreases, there is an increased risk of falls due disequilibrium from decreased position sense. The following steps address using a tuning fork to assess vibration perception:

1. Strike the tuning fork to initiate vibration
2. Touch the tuning fork to the medial aspect of the 1st metatarsal head
3. Ask the patient to state when the tuning fork has stopped vibrating. If the patient states that the vibration has stopped before the vibration has stopped in the examiner's hand the test is (–) abnormal.
4. Avoid calluses, which are relatively insensate
5. Document the results with a (+) for normal and (–) for abnormal

Risk Categorization

Determine risk category upon completion of the comprehensive foot exam. A definition of "low risk" and "high risk" for recurrent ulceration and eventual amputation is provided in Table 8-3 along with the suggested minimal management guidelines. People identified as high risk may require a more comprehensive evaluation. Many other foot exam forms and risk categorization schemes exist. The tool titled "Annual Comprehensive Diabetes Foot Exam Form" is located in the Tools Section and is available online: http://ndep.nih.gov/diabetes/pubs/FootExamForm.pdf.

Table 8-3: Risk Categories and Management Guidelines for Foot Exam

Risk Category Defined	Management Guidelines
Low Risk Having all of the following: ▪ Intact protective sensation ▪ Pedal pulses present ▪ No deformity ▪ No prior foot ulcer ▪ No amputation	▪ Perform an annual comprehensive foot exam ▪ Assess/prescribe appropriate footwear ▪ Provide education for preventive self-care to person with diabetes ▪ Perform visual foot inspection at every visit
High Risk Having one or more of the following: ▪ Loss of protective sensation ▪ Absent pedal pulses ▪ Foot deformity ▪ History of foot ulcer ▪ Prior amputation	▪ Perform an annual comprehensive foot exam ▪ Perform visual foot inspection at every visit ▪ Demonstrate preventive self-care of the feet ▪ Refer to specialist(s) and an educator as indicated (always refer to a specialist if Charcot foot is suspected) ▪ Assess/prescribe appropriate footwear ▪ Certify Medicare recipients for therapeutic shoe benefits ▪ Explain benefit of prescription footwear/therapeutic shoes and the importance of breaking in new shoes gradually for prevention of foot complications

Source: Feet Can Last a Lifetime: A Health Care Provider's Guide to Preventing Diabetes Foot Problems.

Ulceration

Peripheral neuropathy is the single largest cause of foot ulceration. Foot ulceration, in turn, is the single most prevalent precursor to lower extremity amputation among people with diabetes. Risk factors for ulceration include structural deformity, trauma, improperly fitted shoes, calluses, prior history of ulceration/amputation, prolonged pressures, limited joint mobility, hyperglycemia, tobacco use, peripheral vascular disease, duration of diabetes, loss of vision, end stage renal disease, and advanced age. The assessment and treatment of foot ulcers is complex. The tool titled "Diabetic Foot Ulceration" provides a summary of the important parameters for both assessment and treatment of foot ulcers and is available in the Tools Section.

Infection

Foot infections are a major cause of hospitalization for people with diabetes and are almost always a factor in lower limb amputations. Foot infections are divided into non-limb-threatening and limb-threatening categories. The assessment and treatment of foot infections is complex. The tool titled "Diabetic Foot Infection" provides a summary of the important parameters for both assessment and treatment of foot infections and is available in the Tools Section.

Charcot Foot

Charcot foot (i.e., neuropathic osteoarthropathy) is a progressive condition characterized by joint dislocation, pathologic fractures, and severe destruction of the pedal architecture. Charcot foot is associated with severe peripheral neuropathy. Charcot foot is frequently dismissed as a sprain or strain, resulting in improper treatment and further weakening of the foot condition. The assessment and treatment of Charcot foot is complex. The tool titled "Charcot Foot" provides a summary of the important parameters for both assessment and treatment of Charcot foot and is available in the Tools Section.

Referral to a Podiatrist and Coordination of Care

Early recognition of lower extremity problems, prompt referral, and aggressive treatment by a multidisciplinary team is necessary. A foot care team may include podiatrists, orthopedic or vascular surgeons, footwear specialists for pedorthic preventive care (e.g., extra depth shoes or inserts), or rehabilitation specialists. Referrals to specialists for co-management and consultation regarding foot care and treatment can help reduce the likelihood of more severe problems. A multidisciplinary approach is recommended for individuals with peripheral vascular disease, foot ulcers, or high-risk feet, especially those with a history of prior ulcer or amputation.

Vibration/Sensation Resources

- The Center for Specialized Diabetes Foot Care, (800) 543-9055
- Medical Monofilament Manufacturing, LLC, (508) 746-7877
- North Coast Medical, Inc., (800) 821-9319
- Sensory Testing Systems, (225) 923-1297
- Health Resources and Services Administration: http://www.ask.hrsa.gov, Lower Extremity Amputation Prevention (LEAP) Program (888) Ask-HRSA (275-4772)
- Contact a podiatrist or pharmaceutical representative for possible supplies

Additional Resources

1. Diabetic Foot Disorders: A Clinical Practice Guideline – American College of Foot and Ankle Surgeons: http://www.acfas.org/cpg/.
2. Feet Can Last a Lifetime: A Health Care Provider's Guide to Preventing Diabetes Foot Problems. Includes tools for diabetes foot exams, foot exam instructions, Medicare information, reference and resource materials, and patient education materials: http://www.ndep.nih.gov/diabetes/pubs/Feet_HCGuide.pdf.
3. Take Care of Your Feet for a Lifetime. An easy-to-read, illustrated patient booklet, available in English and Spanish, providing step-by-step instructions for proper foot care: (English and Spanish) http://www.ndep.nih.gov/campaigns/Feet/Feet_overview.htm.
4. Lower Extremity Amputation Prevention (LEAP) is a comprehensive program that can dramatically reduce lower extremity amputations in individuals with diabetes, Hansen's disease, or any condition that results in loss of protective sensation in the feet: http://www.hrsa.gov/leap/.
5. Medicare foot care definitions and billing codes: http://www.medicarenhic.com/providers/pubs/Foot%20Care%20Billing%20Guide.pdf.
6. Medicare Physician Quality Reporting System Measures (formerly known as Medicare Physician Quality Reporting Initiative). This page contains information about Physician Quality Reporting System quality measures, including detailed specifications and related release notes for the individual Physician Quality Reporting System quality measures. https://www.cms.gov/PQRS//15_MeasuresCodes.asp.

References

American College of Cardiology & American Heart Association. (2006). 2005 Guidelines for the Management of Patients with Peripheral Arterial Disease (Lower Extremity, Renal, Mesenteric, and Abdominal Aortic). *J Am Coll Cardiol*, 47(6), 1239-1312.

American Diabetes Association. (2012). Standards of Medical Care in Diabetes - 2012.*Diabetes Care*, 2012 35 (supp 1), S11-S63.

Boulton, A. J. M., Armstrong, D. G., Albert, S. F., Frykberg, R. G., Hellman, R., Kirkman, M. S., Lavery, L. A., LeMaster, J. W., Mills Sr., J. L., Mueller, M. J., Sheehan, P., & Wukich, D. K. (2008). Comprehensive Foot Examination and Risk Assessment –A Report of the Task Force of the Foot Care Interest Group of the American Diabetes Association, with endorsement by the American Association of Clinical Endocrinologists. *Diabetes Care*, 31(8), 1679-1685.

Freynhagen, R., Baron, R., Gockel, U., & Tolle, T. (2006). painDETECT: A New Screening Questionnaire to Detect Neuropathic Components in Patients with Back Pain. *Curr Med Res Opin*, 22, 1911–1920.

Frykberg, R. G., Zgonis, T., Armstrong, D. G., et al. for the American College of Foot and Ankle Surgeons. (2006 Revision). Diabetic Foot Disorders: A Clinical Practice Guideline. *J Foot Ankle Surg*, 45(5), S1-S66.

Krause, S. J., & Backonja, M. M. (2003). Development of a Neuropathic Pain Questionnaire. *Clin J Pain*, 19, 306–314.

Mayfield, J. A., Reiber, G. E., Sanders, L. J., Janisse, D., & Pogach, L. M. for the American Diabetes Association. (2004). Preventive Foot Care in Diabetes. *Diabetes Care*, 27, S63-S64.

Portenoy R. (2006). Development and Testing of a Neuropathic Pain Screening Questionnaire: ID Pain. *Curr Med Res Opin*, 22, 1555–1565.

Section 9: Oral Care

Concern	Care/Test	Frequency
Oral Care	▪ Simple inspection of gums and teeth for signs of periodontal disease	At diagnosis, then each focused visit
	▪ Oral exam by general dentist or periodontal specialist	At diagnosis, then individualize based an oral assessment and risk

MAIN TOPICS INCLUDED IN THIS SECTION:

- Visual Oral Inspection and Oral Health Education by Primary Provider
- Oral Examination by Dentist
- A Team Approach: Medical-Dental Collaboration
- Identifying Undiagnosed Diabetes in the Dental Care Setting
- Identifying Undiagnosed Periodontal Disease in the Primary Care Setting
- Additional Resources
- References

People with diabetes are more susceptible to oral infections such as periodontal disease. Susceptibility is further increased during periods of poor glycemic control or prolonged periods of hyperglycemia. The presence of active periodontitis can, in turn, impair glycemic control and increase risk of developing systemic complications of diabetes, particularly cardiovascular disease and stroke. Pregnant women with diabetes may be at increased risk of periodontitis and as a result could be at increased risk of pre-term delivery with a low birth weight infant. Individuals can avoid the negative outcomes of periodontitis through early screening, referral, and treatment.

Evidence of the influence of periodontal infection on chronic inflammatory disease states continues to mount. The current etiological theory of periodontal disease extends beyond its local effect, making a compelling rationale for prevention and early intervention. Accumulating evidence suggests that periodontal infection may increase the risk for atherosclerosis-induced conditions, including coronary heart disease and stroke, adverse pregnancy outcomes, complications of diabetes, respiratory disease, and neurodegenerative disease.

Other common, yet avoidable, oral health problems associated with diabetes include tooth decay, fungal infections, inflammatory mucosal disease, taste impairment, and salivary gland dysfunction. Xerostomia (drying of the mouth), caused by salivary gland dysfunction, may lead to burning tongue or mouth, as well as rampant caries.

Primary care providers need to perform a visual inspection of gums and teeth of persons with diabetes for signs of periodontal disease at diagnosis and during each diabetes-focused visit. An oral examination by a dentist is an essential component of optimal diabetes care but is often overlooked. An oral examination is recommended at diagnosis and then the recommended interval should be determined specifically for each patient, and tailored to meet his or her needs, on the basis of an assessment of disease levels and risk of or from oral disease. General guidelines suggest an oral examination every 6 months if dentate or every 12 months if edentate and more frequently if advised.

Visual Oral Inspection and Oral Health Education by Primary Provider

Primary care providers can be critical in detecting early signs of periodontal disease especially in people that are known not to see a dentist routinely. This is accomplished through a simple inspection of a person's gums and teeth. Optimally this is done at diagnosis of diabetes and then at each diabetes-focused visit. Visual inspection of gums and teeth can detect early periodontal disease and referral to a dentist can ensure prompt treatment of a problem that may otherwise go undetected. Some early signs and symptoms of periodontal disease include:

- Red, sore, swollen, bleeding, or receding gums or gums pulling away form teeth, causing teeth to look longer than before
- Loose or sensitive teeth; separation of teeth
- Change in the way teeth fit together with biting down
- Halitosis
- Missing teeth
- Accumulation of food debris or plaque around teeth

People with diabetes should be informed of the risks associated with poor dental and oral care and to receive prompt referrals and treatment. Educational strategies should take into consideration special educational and cultural needs and literacy level/skill, while respecting the individual's willingness to change behavior. Key education points include:

- Encouraging people to inform their dentist or dental specialist of their current status of glycemic control, pertinent past or present medical information, and any changes in medical history or medications (both prescription and over-the-counter)
- Discussing the increased risk for preventable, but potentially life-threatening, oral infections (e.g., periodontal disease)
- Discussing strategies for preventing oral infections, such as controlling blood glucose levels and cholesterol, routine oral hygiene, and regular dental care
- Discussing the correlation between duration of diabetes and the increased risk of periodontal disease for people who use insulin
- Discussing the increased likelihood for people with diabetes not using insulin to have periodontal attachment loss (2.8 times more likely) and periodontal bone loss (3.4 times more likely), compared to people without diabetes
- Discussing the importance of early intervention and treatment options
- Explaining that periodontal disease is often asymptomatic
- Explaining that periodontal disease can lead to tooth loss, decrease the effectiveness of medications used to treat diabetes, and/or increase the risk of diabetes complications (e.g., cardiovascular disease, vascular disease, and stroke)
- Explaining that for pregnant women, an increased risk of periodontitis may be associated with a pre-term and/or low birth weight

Refer a person at risk for or with diabetes who is suspected of having periodontal disease to a dentist or dental specialist (periodontist) to ensure early and prompt diagnosis and treatment. People without teeth (edentate) should also receive a visual inspection for signs of tissue inflammation or irregularities, white or red lesions, and any change in the fit of their dentures.

Oral Examination by Dentist

A dentist should perform an oral examination at diagnosis and then the recommended interval should be determined specifically for each person, and tailored to meet his or her needs, on the basis of an assessment of disease levels and risk of or from oral disease. General guidelines suggest an oral examination every six months for dentate people or every 12 months for edentate people. More frequent dental exams are necessary if an oral screening indicates signs of new or persistent problems. Ongoing communication between the diabetes team and the dentist/dental specialist is essential to ensure optimal glycemic control. The following may be a part of standard dental care for a person with diabetes:

- Oral and dental examinations, including a complete periodontal examination
- Non-surgical and/or surgical periodontal therapy with adjunctive antibiotics
- Rigorous oral hygiene care, including self-care instruction
- Frequent follow-up to ensure that disease is controlled

A Team Approach: Medical-Dental Collaboration

These *Guidelines* encourage medical-dental collaboration to address the increased concern of the systemic influence of periodontal infection on chronic inflammatory disease states, striving for early intervention and treatment. There is sufficient evidence to support recommendations and guidelines to assist medical and dental providers in: 1) identifying persons at risk for periodontal disease if they have diabetes and/or 2) identifying persons at risk for type 2 diabetes if they have existing periodontal disease. **Medical-dental collaboration can and must be embraced by health care providers, educational institutions, governmental agencies, and public and private partners to provide a historical marker to address prevention and treatment of systemic and oral disease.**

The team approach: medical-dental collaboration is based on the Scottsdale Project. The project convened an independent panel of experts to identify and address whether there was sufficient evidence to support the development of guidelines to assist medical and dental providers in identifying people at risk for periodontal disease, diabetes, and cardiovascular disease. The Scottsdale Project encouraged the team approach to promote shared responsibility for co-management of persons at risk for or with diabetes who may or may not have periodontal disease. Experts acknowledge a number of studies that demonstrate periodontal therapy has the potential to positively impact glucose control; however, the experts succinctly noted that the supporting evidence was inconclusive. Despite this, the Scottsdale Project Report provided a consensus statement for two key recommendations:

1. Guidelines can assist **medical providers** in identifying people who are at risk for periodontal disease, or in screening people who may have undiagnosed periodontal disease and who need to be referred to a dentist or dental specialist
2. Guidelines can assist **dental providers** in identifying people who are at risk for or have diabetes and/or cardiovascular disease, or in screening people for undiagnosed diabetes and/or cardiovascular disease who need to be referred to physicians

The following section is a brief summary of recommendations for medical and dental providers to consider as they embrace a team approach to address periodontal disease.

Identifying Undiagnosed Diabetes in the Dental Care Setting

The risk of having undiagnosed type 2 diabetes when newly diagnosed with periodontal disease is unknown. However, periodontal disease is a complication of diabetes. Evolving scientific evidence supports a relationship between the two diseases, especially in people with poorly controlled diabetes, hyperglycemia, or hyperlipidemia. People with diabetes have increased susceptibility to oral infections, including periodontitis. Periodontitis occurs with greater frequency and increased severity when other systemic complications of diabetes are more advanced. This increased susceptibility does not correlate with dental plaque or calculus levels. Among people with insulin-dependent diabetes the risk for periodontitis positively correlates with the duration of diabetes. People with non-insulin-dependent diabetes are 2.8 times more likely to have periodontal attachment loss and 3.4 times more likely to have periodontal bone loss than those without diabetes.

As recognition of periodontal disease increases, there are opportunities for dental offices to assist in identifying people at risk for or with type 2 diabetes. This may be the first step in an effort for dental practices to work collaboratively with medical professionals to address prevention and early detection. Due to the increased prevalence of diabetes in the past 10 years, dentists and dental hygienists may have a considerable opportunity and increased responsibility in assisting with screening people for undiagnosed diabetes. Dentists and dental hygienists may want to consider utilizing the tool titled "Assessing Risk and Testing for Type 2 Diabetes Pathway" in the Tools Section. This tool is an easy way to assist dentists and dental hygienists in increasing their awareness of who is at risk for type 2 diabetes and what steps they can recommend to the population they serve. This tool can be incorporated and utilized in multiple ways across dental care settings in Wisconsin.

Strategies to consider in the dental setting:

1. People at risk for type 2 diabetes, regardless of oral presentation, should be referred by dentists to have a fasting blood glucose level checked; most often, this will be done by the primary care provider as well as further diagnostic evaluation as needed.
2. People with severe periodontitis (e.g., severe for age, failure to respond to treatment, abscesses) or a fungal infection must be referred to their primary care provider for a fasting blood glucose test for diabetes.
3. Dentists and dental hygienists choosing to check a blood glucose should do so in accordance with the American Diabetes Association screening guidelines or the *Wisconsin Diabetes Mellitus Essential Care Guidelines* (*Section 13: Assessing Risk and Prevention of Type 2 Diabetes*), and ensure appropriate follow up and communication of results with the person's primary care provider.
4. To achieve the best possible outcomes for people diagnosed with diabetes and/or cardiovascular disease, dentists and dental hygienists must collaborate with primary care providers to optimize blood glucose and lipid control.
5. Professional communication is essential and use of a bidirectional communication tool is recommended. An example is the tool titled "Medical-Dental: Team Referral Form" in the Tools Section.
6. Dentists and dental hygienists can inquire and determine if a person has not had medical evaluation within two years and/or two or more of the following:
   - > 50 years of age
   - At risk for type 2 diabetes
   - Hypertension
   - Dyslipidemia with a family history of coronary heart disease or stroke
   - Tobacco use
   - History consistent with cardiovascular disease
7. Refer and document the recommendation for additional assessment of diabetes and cardiovascular risk.
8. If a person diagnosed with diabetes does not have a primary care provider and is at risk for a cardiovascular event, he/she must be referred to a health care provider.

Identifying Undiagnosed Periodontal Disease in the Primary Care Setting

Infections, including advanced periodontal disease, can lead to increased insulin resistance and a decline in blood glucose control. Occasionally, oral infections are documented as life threatening to people with diabetes. Research shows that insulin requirements are reduced in some insulin-dependent subjects following periodontal therapy. In a recent prospective study, severe periodontitis at baseline was associated with poor glycemic control, defined as an A1C of ≥ 9% at follow-up. Elimination of periodontal infection and reduction of periodontal inflammation resulted in a significantly reduced A1C level.

It is not feasible for most primary care providers to include periodontal probing and intraoral radiographic x-rays, which are commonly used for the assessment and diagnosis of periodontal disease. Nevertheless, health care providers can screen by inspecting gums and teeth for signs and symptoms frequently associated with periodontal disease. Early periodontal disease can be identified based on a person's history, as well as symptoms and visual assessment of the teeth and gums.

- Red, sore, swollen, bleeding, or receding gums or gums pulling away form teeth, causing teeth to look longer than before
- Loose or sensitive teeth; separation of teeth
- Change in the way teeth fit together with biting down
- Halitosis
- Accumulation of food debris or plaque around teeth
- History of abscess
- Missing teeth

A screening tool for primary care providers titled "Diabetes: Screening Tool for Inspection of Gums and Teeth" is in the Tools Section.

Strategies for medical professionals to consider:

1. Inquire if person with diabetes has seen a dentist in the last year. If not, refer him/her to a dental provider. An oral examination is recommended at diagnosis of diabetes and then the recommended interval should be determined specifically for each person, and tailored to meet his or her needs, on the basis of an assessment of disease levels and risk of or from oral disease. General guidelines suggest an oral examination every six months for dentate people or every 12 months for edentate people. More frequent dental exams are necessary if an oral screening indicates signs of new or persistent problems.
2. If person with diabetes has seen a dentist within the last year and there are signs of periodontal disease, advise him/her to make an appointment to see a dentist right away.
3. At each visit, ask if person has bleeding gums, loose teeth, and/or gum recession.
4. Professional communication is essential and use of a bidirectional communication tool is recommended; an example is the tool titled "Medical-Dental: Team Referral Form" in the Tools Section.
5. Discuss the seriousness of periodontal disease, as chronic infection of the gums can be a complication of diabetes.
6. Advise persons with periodontal disease of an associated risk for other health problems, including poor metabolic control, heart and artery disease, and stroke.
7. Provide encouragement that periodontal disease is preventable and treatable by a dentist and dental hygienist.

Additional Resources

1. Working Together to Manage Diabetes: A Guide for Pharmacists, Podiatrists, Optometrists, and Dental Professionals, developed by the National Diabetes Education Program: http://www.ndep.nih.gov/diabetes/pubs/PPODprimer_color.pdf.
2. The Report of the Independent Panel of Experts of the Scottsdale Project: http://www.atlantadentalspa.com/articles/Periodontitis_and_systemic_health_issues_scottsdale.PDF.

References

Amar, S., & Han, X. (2003). The Impact of Periodontal Infection on Systemic Diseases. *Med Sci Monit*, 9, RA291-RA299.

American Diabetes Association. (2012). Standards of Medical Care in Diabetes - 2012.*Diabetes Care*, 2012 35 (supp 1), S11-S63.

Cutler, C. W., & Iacopino, A. M. (2003). Periodontal Disease: Links with Serum Lipid/Triglyceride Levels Review and New Data. *J Int Acad Periodontol*, 5, 47-51.

Dasanayake, A. P., Chhun, N., Tanner, A. C., et al. (2008). Periodontal Pathogens and Gestational Diabetes Mellitus. *J Dent Res*, 87, 328-33.

Hein, C., Cobb, C., & Iacopino, A. (2007). *Report of the Independent Panel of Experts of the Scottsdale Project*. Retrieved from http://downloads.pennnet.com/pnet/gr/scottsdaleproject.pdf.

Iacopino, A. M. (2001). Periodontitis and Diabetes Interrelationships: Role of Inflammation. *Ann Periodontol*, 6, 125-137.

Iacopino, A. M., & Cutler, C. W. (2000). Pathophysiological Relationships between Periodontitis and Systemic Disease: Recent Concepts Involving Serum Lipids. *J Periodontol*, 71, 1375-1384.

Ryan, M. E., Carnu, O., & Kamer, A. (2003). The Influence of Diabetes on the Periodontal Tissues. *J Am Dent Assoc*, 134, 34S-40S.

Ship, J. A. (2003). Diabetes and Oral Health: An Overview. *J Am Dent Assoc*, 134, 4S-10S.

Taylor, G. W. (2003). The Effects of Periodontal Treatment on Diabetes. *J Am Dent Assoc*, 134, 41S-48S.

Tsai, C., Hayes, C., & Taylor, G. W. (2003). Poorly Controlled Diabetes is Associated with a Greater Prevalence of Severe Periodontitis. *J Evid Base Dent Pract*, 3, 19-21.

U. S. Department of Health and Human Services. (2000). *Oral Health in America: A Report of the Surgeon General*. Rockville, MD: U. S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health.

Section 10: Emotional and Sexual Health Care

Concern	Care/Test	Frequency
Emotional and Sexual Health Care	▪ Assess emotional health; screen for depression	Each focused visit
	▪ Assess sexual health concerns	Each focused visit

MAIN TOPICS INCLUDED IN THIS SECTION:

- Psychosocial Factors Associated with Diabetes
- Depression and Other Psychological Disorders
- Diabetes-Specific Distress
- Postpartum Depression
- Depression Screening
- Treatment for Depression
- Encouraging Self-Help
- Other Psychological Disorders
- Sexual Health Concerns
- Essential Education
- Additional Resources
- References

Psychosocial Factors Associated with Diabetes

There are psychosocial factors crucial to understanding a person's reaction to a diagnosis of diabetes, as well as his or her ability to self-manage and adhere to recommendations. Being diagnosed with diabetes can be traumatic. Such a diagnosis can trigger a myriad of reactions including a sense of mourning and loss, guilt and shame, fear about the future, and a preoccupation or obsession with blood glucose control. Acknowledging emotions can help a person to self-manage their diabetes and obtain optimal long-term blood glucose control.

For many, having diabetes is perceived as a chronic stressor due to the self-management that is needed. Ongoing obligations of healthy eating, physical activity, weight management, blood glucose monitoring, and timing and dosage of prescribed medication regimens can be overwhelming. Diabetes management is particularly challenging for those who have not previously practiced much discipline in their lives. Planning meals, remembering to check blood sugars, sticking to a routine, and carving out time to tend to self-care are self-discipline skills that are important to effective diabetes management.

Social support can alter the emotional impact of diabetes and have a positive influence on health. People with diabetes may cope better when they have friends and family who support their efforts at managing their diabetes and do so in a manner that is gentle and respectful. Some support can be negative, especially when a person with diabetes is nagged or harassed about their self-care behaviors (Behavioral Diabetes Institute, 2007). Family and friends can undermine a person's attempts at diabetes self-care, either intentionally or unintentionally. Even when family members are emotionally supportive of a person's self-management care plan, they are often not interested in making similar changes in their own lifestyle habits. As a result, they may inadvertently make it more difficult for the person with diabetes to adhere to dietary or physical activity regimens. Family interventions or counseling can be helpful when incorporated into the diabetes care plan. People with diabetes may need help with negotiating their relationships and learning how to ask for the kind of help that they need. It may also be necessary for people with diabetes to learn to accept help.

While many people with diabetes know what they should do to improve their health, many do not make the recommended changes or have trouble following the advice they have been given. This occurs because of a problem with their "mindset" or approach towards behavior change. It is not a reflection of their motivation or willpower although many will attribute their failed attempts at behavior change to these two concepts. Many people attempt to tackle all of their lifestyle problems at once and take an "all-or-nothing" approach to change. Most are unrealistic with their expectations for self-care and frequently set themselves up for failure by setting unattainable goals. When people are unable to meet their goals, they end up frustrated and feeling bad about themselves for not being able to follow through. Past failed attempts at behavior change contribute to frustration, detract from motivation, and erode a person's sense of self-efficacy. A shift in mindset is often needed before successful health-related behavior changes can occur. A more appropriate mindset is one that focuses on **small, gradual, and consistent change**.

Many people with diabetes are concerned about developing complications and grow impatient with a slow pace of behavior change. It is helpful to provide frequent reminders that the goal of diabetes management is sustained behavior change. A slow pace of change enables the new behaviors to become more easily incorporated into a person's general lifestyle, and the new behaviors become self-reinforcing because many small goals are achieved sequentially over time.

People with diabetes bring with them a history shaped in part by the circumstances surrounding their diagnosis and treatment and the reaction of family, friends, parents, and others to their diagnosis. A person with type 1 diabetes who was secretive and felt helpless and ashamed as a child may present in adulthood

with similar feelings. Some people feel angry or responsible for "causing" their diabetes. A person's misconceptions and experiences with others who have diabetes can form and/or alter their ability to cope, learn, and self-manage positively or negatively.

There are a myriad of psychosocial factors that may contribute to poor self-management or an inability to attain or maintain optimal blood glucose control. Some common obstacles to self-care include lack of knowledge or skill, communication problems with health care provider(s), harmful health beliefs, unachievable goals, environmental obstacles, poor social support, limited coping skills, and cultural issues. Identifying and understanding these psychosocial factors is necessary in order to enhance the treatment and management of diabetes.

Depression and Other Psychological Disorders

Depression is common among people with diabetes and is the most frequently cited psychological disorder associated with diabetes. It is roughly three times more prevalent in those with diabetes (18-35% of people) (Fisher, Glasgow, Mullan, Skaff, & Polonsky, 2008) than in those without diabetes. Depression has an adverse impact on diabetes outcomes (Bogner, Kanshawn, Post & Bruce, 2007). Evidence linking depression to both type 1 and type 2 diabetes complications continues to accumulate (Katon et al., 2004).

Depression differs from normal negative emotions in both duration and intensity. Major depression is a clinical disorder which is diagnosed by a cluster of mental and physical changes, all of which may persist and worsen over an extended period of time. People with diabetes experiencing major depression usually struggle to adhere to meal plans and medications, testing schedules, and activity recommendations. Poor adherence leads to high blood glucose levels, increasing the risk of long-term complications (Groot, Anderson, Freedland, Clouse, & Lustman, 2001). Typical symptoms of depression are:

- Decreased ability to cope with changes or challenges in life
- Crying spells for no apparent reason
- Changes in sleep patterns
- Changes in weight or appetite
- Fatigue or loss of energy
- Changes in ability to concentrate or make decisions
- Changes in sexual desire
- Increased pessimism
- Loss of interest in normal daily activities or things once enjoyed
- Feeling sad and down
- Feeling guilt, hopelessness, or worthlessness
- Thoughts of death or suicide

Females have a higher prevalence of major depression than males. There are also differences in the prevalence of major depression among racial and ethnic subgroups. Hispanics have higher rates of depression than non-Hispanic whites (Dunlop, Song, Lyons, Manheim, & Chang, 2003). The lowest prevalence is seen among Asian Americans (1%) and the highest prevalence is found among American Indians and Alaskan Natives (28%). Different cultures attach different meanings to symptoms of depression and their severity based on what is considered "normal" in those cultures. In some cultures, emotional distress and suffering may be more likely to be expressed in terms of physical symptoms and functional impairment.

Depression has been linked to poor glycemic control, less optimal lifestyle/self-care habits, higher obesity, increased risk of long-term complications, higher health care costs, and higher morbidity and mortality (Finkelstein, 2003). Depression has a strong impact not only on medical outcomes in diabetes but also on psychological and social outcomes. Quality of life is considerably reduced with respect to psychological, physical, and social functioning (e.g., the ability to work). Satisfaction with diabetes treatment is lower when a depressive comorbidity is present (Hermanns, Kulzer, Krichbaum, Kubiak, & Haak, 2006).

Depression may be more severe, with a longer duration and a higher recurrence rate, in people with diabetes (Behavioral Diabetes Institute, 2007). Recurrent periods of depression are common; therefore, ongoing assessment or reassessment is essential. Lack of optimal diabetes self-care is sometimes interpreted or labeled as non-compliance by health care providers, when in fact a lack of self-care could be a possible sign of depression. Therefore, screening for depression is crucial. Early detection of depression, prompt treatment, and referral may lead to improved diabetes self-care and quality of life.

The cause of increased instances of depression in people with diabetes is not clearly understood. The rigors of managing diabetes can be stressful and lead to symptoms of depression. Diabetes management requires considerable attention and effort. The person with diabetes is asked to adjust eating patterns and selection of foods, increase physical activity, monitor blood glucose levels, take medication, perform foot care, and make multiple decisions each day based on this information. In addition to these demands, there is also stress associated with fears about the future, complications, difficulties dealing with well-intended but potentially intrusive friends or family members, and keeping up with treatment options.

Diabetes-related complications may trigger or worsen symptoms of depression. Frequent high and low blood glucose levels can be frustrating and exhausting. Depression can affect task performance and effective communication. It can also lead to poor lifestyle decisions such as unhealthy eating habits, decreased physical activity, tobacco use, and weight gain.

Depression varies in terms of how the symptoms manifest (i.e., emotionally, physically, or cognitively). A person can have a major depressive episode that is mild, moderate, or severe. Mild depression is present when a person has some symptoms and extra effort is needed to complete normal daily activities. Even minor depression can affect diabetes care and should be treated (Petrack & Herpertz, 2009). Moderate depression is present when a person has many symptoms, often keeping the person from doing normal daily activities. Severe depression is present when a person has nearly all the symptoms, preventing them from doing normal daily activities.

A large proportion of people suffering from depression and diabetes never receive help for their depression. Proper diagnosis of depression in people with diabetes can be difficult as the symptoms of depression are often similar to those stemming from the poor management of diabetes. People who are depressed may not communicate their feelings of sadness to their health care providers, attribute their symptoms of depression to their diabetes, or even realize that they are depressed. The fear of being stigmatized can also prevent people from admitting, even to themselves, that they are depressed. It is important for providers to be sensitive and assist in eliminating the stigmatization often associated with depression. Early identification of depression is critical so appropriate treatment can be initiated.

Diabetes-Specific Distress

Depression is not the only common emotional problem in people with diabetes. Many people with diabetes are also affected by diabetes-specific distress (Polonsky et al., 2005). Diabetes-specific distress is defined as the emotional burden experienced by a person that is caused by concerns of disease management, support, and access to care. Although there can be considerable overlap between symptoms of depression and diabetes-specific distress, the concepts are not identical. In fact, data suggests that they are distinct conditions. Diabetes-specific distress seems to have an independent negative impact on glycemic control and diabetes self-management, separate from general emotional distress. Diabetes-specific distress has been found to be about twice as prevalent as major depressive disorder and more persistent over time than major depressive disorder. In light of the high prevalence of both conditions, providers should continue to screen for depression and recognize that an assessment of diabetes-related emotional problems can be of great clinical utility. The information obtained from a diabetes-specific distress assessment can be incorporated in the formulation of a diabetes treatment plan or specific interventions to target the particular source(s) of distress. Assessments can also serve the function of facilitating a therapeutic dialogue between the provider and the person with diabetes.

The Diabetes Distress Scale (DDS17, containing 17 items) and an abbreviated 2-Item Diabetes Distress Screening Scale (DDS2) can effectively screen people with diabetes for diabetes-specific distress (Polonsky et al., 2005). Both of these Distress Screening Scales are available in English and Spanish and are available in PDF format at: http://www.annfammed.org/cgi/data/6/3/246/DC1/1.

The DDS2 can be used as an initial screening instrument (Fisher et al., 2008). Respondents rate the degree to which they feel overwhelmed by the demands of living with diabetes and the degree to which they feel they are often failing with their diabetes regimen on a 6-point scale, from 1 (not a problem) to 6 (a very serious problem). The full DDS17 can be administered to help define the content of the distress and to direct intervention for those respondents whose average to the two screening items is greater than 3, or whose sum is greater than 6. The DDS17 targets different areas of potential diabetes-specific distress and consists of four subscales:

1. Emotional burden (feeling overwhelmed by diabetes)
2. Physician distress (worries about access, trust, and care)
3. Regimen distress (concerns about diet, physical activity, medications)
4. Interpersonal distress (not receiving understanding and appropriate support from others)

The Problem Areas in Diabetes (PAID) questionnaire was developed as a measure of diabetes-related stress that can be useful in measuring the association between psychological adjustment to diabetes and adherence to self-care behaviors. More information on the Problem Areas in Diabetes questionnaire is available at: http://www.musc.edu/dfm/RCMAR/PAID.html and the questionnaire is available in PDF format at: http://www.dawnstudy.com/News_and_activities/Documents/PAID_problem_areas_in_diabetes_questionnaire.pdf. The PAID questionnaire is widely used and is available in several languages (only English is available at the link above) (Polonsky et al., 2005). This 20-item survey asks respondents to rate, on a 5-point Likert scale, the degree to which each item is currently problematic for them from 0 (not a problem) to 4 (a serious problem). The PAID measures diabetes-related emotional problems, treatment-related problems, food-related problems, and social support-related problems. PAID scores "have been linked to diabetes self-care behaviors and glycemic control and are associated with general emotional distress, perceived burden of diabetes, diabetes-related health beliefs, diabetes coping, and marital adjustment"(Polonsky et al., 2005, p. 626). The instrument is responsive to change and is sensitive enough to detect changes following an intervention.

Postpartum Depression

"Postpartum depression (PPD) affects 10-15% of mothers within the first year after giving birth" (CDC, 2008, p. 1). Given the prevalence of depression in people with diabetes, it is prudent to address PPD in women who have either pre-existing diabetes or gestational diabetes. It is recommended that women with diabetes be screened for PPD at the 4- to 6-week postpartum visit. Women exhibit the same symptoms listed above, as well as these additional characteristics:

- Worried/concerned about ability to care for baby
- Not feeling close to or having difficulty bonding with baby
- Thoughts of harming self or baby

When working with women with symptoms of postpartum depression, it is important to check for thyroid peroxidase (TPO) antibodies and obtain a thyroid-stimulating hormone (TSH) level to assess for potential postpartum thyroiditis (PPT). PPT can cause hypothyroidism and hyperthyroidism in postpartum women and women with type 1 diabetes have an 18%-25% higher incidence of PPT due to a higher prevalence of TPO antibodies. Symptoms of hypothyroidism include fatigue, weight gain, loss of concentration and depression. Because PPT typically occurs 2-10 months postpartum, the primary care provider is in the best position to recognize symptoms, diagnose and treat this disorder.

Depression Screening

Screening for mood disorders is an important part of diabetes care because of the high prevalence of the depression-diabetes comorbidity. Depression screening tools (examples are provided in Table 10-1) can assist providers in identifying depression symptoms and determining whether additional assessment or treatment is necessary (Hermanns, Kultzer, Krichbaum, Kubiak &Haak, 2005). Health systems can make depression screening tools more accessible by building them into electronic medical records. Depression can be effectively detected in primary care settings with the use of the Patient Health Questionnaire (PHQ), Version 2 and Version 9 (PHQ-2 and PHQ-9). The PHQ-9 is a self-reporting questionnaire that is available in multiple languages and has been shown to be equally effective among white, Hispanic/Latino, Chinese American, and African American populations (Huang, Chung, Kroenke, Delucchi, & Spitzer, 2005). The PHQ-2 is a simple, direct, sensitive screening measure. It asks the following two questions:

1. "Over the past two weeks, have you ever felt down, depressed, or hopeless?"
2. "Have you felt little interest or pleasure in doing things?"

People who respond "no" to both questions are unlikely to have major depression. Therefore, unless clinical suspicion for depression is high, patients do not require additional screening after the two-question screen yields a negative result. A "yes" response to one or both questions in the screen indicates an approximately 80% likelihood of the person having major depression and warrants further assessment.

The PHQ-9 can be used independently or as a follow-up for individuals who score positive on the PHQ-2. The PHQ-9 is an instrument whose nine items are based on the DSM-IV diagnostic criteria for major depression disorder. Each of the nine items can be scored from 0 (not at all) to 3 (nearly every day). The PHQ-9 result is positive for depression if someone scores 10 or higher; scores over 20 represent severe depression. The PHQ-9 can also be used to monitor response to treatment in people who have already been diagnosed with depression as scores on the questionnaire will decrease when depressive symptoms improve (Lowe, Unutzer, Callahan, Perkins, & Kroenke, 2004).

The Center for Epidemiologic Studies Depression (CES-D) Scale is another widely used assessment tool for depression (Radloff, 1977) (Kim, Huang, DeCoster & Chiriboga, 2011). It is a 20-item self-report measure that asks about the frequency of being bothered by depressive symptoms during the previous week on a scale of 0 (rarely) to 3 (most of the time). This scale was developed to screen for clinical depression in community samples. It places greater emphasis on the affective components of depression. CES-D scores range from 0 to 60 with higher scores indicating more severe depressive symptoms. A score of 16 or higher identifies potential clinical depression.

Table 10-1: Depression Screening Tools

Name of Test	Contact Information	Other Information
Patient Health Questionnaire-9 (PHQ-9), adapted from *PRIME-MD Today,* developed by Spitzer, Williams, Kroenke, and colleagues	Information and a copy of the PHQ-9 is available from the MacArthur Initiative on Depression and Primary Care at: http://www.depression-primarycare.org/clinicians/toolkits/materials/forms/phq9/	No charge; reproduction permitted for the purposes of clinical care and research only
Center for Epidemiologic Studies-Depression (CES-D) Scale and Edinburgh Depression Scale (English, Spanish, and Hmong) available at the Wisconsin Association of Perinatal Care website	http://www.perinatalweb.org/index.php?option=content&task=view&id=86	No charge
Beck Depression Inventory (BDI): *Fast Screen for Medical Patients* (for adolescents and adults)	Psychological Corporation Harcourt Assessment P.O. Box 839954 San Antonio, TX 78283-3954 (800) 211-8378 http://www.psychcorp.com (type "Beck Depression Inventory" into search box)	Complete kit (including manual and 25 record forms), $110
HANDS® Harvard National Depression Screening Day Scale	Harvard Department of Psychiatry National Depression Screening Day Scale One Washington Street, Suite 304 Wellesley Hills, MA 02481-1706 (781) 239-0071 or (781) 431-7447 http://www.nmisp.org	Contact them by phone or email for additional information.
Postpartum Depression Screening Scale by Cheryl Beck at the University of Connecticut	Western Psychological Services 12031 Wilshire Boulevard Los Angeles, CA 90025-1251 (310) 478-2061 http://www.wpspublish.com (type "Postpartum depression screening scale" into search box)	Complete kit (including 25 auto-score test forms and manual), $79.75

Note: These are only a few of the many depression screening tools available.

Treatment for Depression

Treatment of depression in diabetes should be directed toward improving both psychological and medical outcomes. Improvement or resolution of depressive symptoms is the major psychological objective. The desired physical outcomes include improving glycemic control and reducing the risk for short-term and long-term complications and premature mortality.

Effective treatments for depression include: medication, psychotherapy, or a combination of medication and psychotherapy. Results are relatively good and are comparable to those for people who have depression without diabetes. As researchers continue to test various interventions, a treatment plan that includes both medication and psychotherapy is recommended, along with a good self-care program.

Scientific evidence indicates that several forms of short-term psychotherapy (cognitive, interpersonal, or behavioral) are effective in treating most cases of mild and moderate depression. Cognitive-Behavioral Therapy (CBT) operates on an assumption that negative and destructive beliefs lead to depressive and anxious symptoms. Altering that type of thinking in psychotherapy can be part of an effective treatment for depression and other psychological disorders. Interpersonal Psychotherapy focuses on the interpersonal components of the dysfunctional behavior. Events, conflicts, and interactions that are related to the situation are specifically addressed in the context of psychotherapy. Although there is no singular definition of Behavioral Therapy, it is generally recognized as a treatment approach that focuses on identifying and changing negative and destructive behaviors through the use of various psychological techniques.

Regular physical activity (i.e., 150 minutes over at least 3 days) can be an effective treatment for people with mild to moderate depression (Dunn, Madhukar, Trivedi, Kamper, Clark, & Chambliss, 2005). Relaxation exercises, deep breathing practices, hot baths, positive self-talk, mindfulness, and meditation can also be beneficial for some symptoms of depression such as difficulty sleeping or excessive worrying.

There are many different kinds of medications used to treat depression. The primary medications used to treat depression include selective serotonin-reuptake inhibitors (SSRIs), serotonin norepinepherine reuptake inhibitor (Effexor, Pristiq, Cymbalta), trycyclic antidepressants (TCAs), and monomamine oxidase inhibitors (MAOIs). Atypical antipsychotic medications – aripiprazole (Abilify) and ziprasidone (Geodon) – do not tend to have adverse metabolic effects. Others such as clozapine (Clozaril) and olanzapine (Zyprexa) are very likely to have metabolic adverse effects (e.g., weight gain, diabetes risk, dyslipidemia) and compromise glycemic control due to a potential side effect of weight gain (American Diabetes Association, et al. 2004). The choice of treatment is based on the history and nature of the disorder and the severity of the depressive episode. A new antipsychotic medication – Invega (Paliperidone palmitate) – is being used and currently lists hyperglycemia as a metabolic side effect.

Treatment should be delivered collaboratively between diabetes and behavioral health providers or by providers trained to treat both diabetes and depression (Van Voorhees et al., 2003). Behavioral health professionals, particularly those familiar with diabetes, can offer appropriate education, support, and treatment for depression. In fact, there is evidence that increased understanding of depression and its treatment modalities directly correlates with an increased adherence to provider recommendations. Behavioral health professionals are also skilled at assessing people with depression for suicide risk by direct questioning about suicidal thinking, impulses, and personal history of suicide attempts.

Encouraging Self-Help

Depression can make even the simplest parts of daily living very difficult and can leave a person feeling hopeless, helpless, and worthless. It is important for those who suffer from depression to recognize that their negative thinking is a function of their depression and that it will fade with appropriate treatment.

Providers can ask questions to assess underlying issues, acknowledge that the person is not feeling well, and encourage discussion about what is causing them to feel poorly. Encouraging self-help opportunities, positive coping strategies, and recommending psychotherapy may provide assistance.

Self-help tips for people who feel depressed include:

- Avoid being alone; seek support from friends and family
- Participate in activities (e.g., social gatherings) that are enjoyable
- Avoid alcohol, drugs, or excessive food
- Delay making major life decisions; take life "one day at a time"
- Create a daily routine to help with organization and planning each day
- Be positive
- Engage in physical activity
- Avoid blame and self-judgment, as depression can happen to anyone
- Be patient; even the smallest tasks can seem impossible

Other Psychological Disorders

People with diabetes can also experience a variety of psychological disorders including:

- Anxiety (e.g., generalized anxiety disorder, obsessive compulsive disorder)
- Stress and stress-related disorders (e.g., adjustment disorder, eating disorder)
- Other mental disorders (e.g., personality disorders, schizophrenia, and other psychoses)

Emotional, physiological, and behavioral reactions to stress can lead to a deterioration of glycemic control. When stress hormones are released, the liver produces more glucose, blood pressure elevates, heart rate elevates, cortisol increases, and the immune system is compromised. Increased education in diabetes self-management, as well as training in problem-solving, coping skills, and relaxation/meditation can help people with diabetes reduce stress. Severe cases may require treatment such as psychotherapy or medications.

Special attention is needed to differentiate psychological problems from diabetes-related symptoms. Symptoms of psychological disorders can frequently mimic symptoms of diabetes or typical diabetes care (e.g., hyperglycemia symptoms can be similar to symptoms of depression or anxiety disorders, a focus on eating can be either healthy attentive self-care or an early sign of an eating disorder).

Anxiety

Clinical anxiety is another problem common to people with diabetes that can interfere with effective diabetes management. Symptoms of clinical anxiety include restlessness, feeling on edge, fatigue, difficulty concentrating, excessive worrying, irritability, muscle tension, and sleep disturbance. People experiencing anxiety may also describe an intense fear of hypoglycemia, or may not take the required amount of medication or insulin to adequately control blood sugar levels. People may have exaggerated fears about complications. Other fears or anxieties may focus on injections and testing blood glucose levels. Anxiety can compromise glycemic control. Severe cases may require treatment such as psychotherapy or medications.

Stress

People with diabetes must deal with the challenges of diabetes in addition to the stresses that are a part of everyday life in our culture (Surwitt et al., 2002). Because of the 24/7 nature of diabetes self-care, feelings of frustration are common. In addition, newly diagnosed individuals can be fearful or concerned about the impact of the disease on an already difficult job or family situation.

Dealing with stress effectively is particularly important for people with diabetes because it can have such a profound effect on blood glucose control. Learning stress reduction techniques is an important part of a diabetes self-management plan. Stress directly and indirect effects on glucose levels. The direct effect of stress raises blood glucose levels because it causes the body to produce stress hormones, thus increase blood sugar levels. The indirect effect of stress is that people with diabetes are less likely to take good care of themselves when they are stressed. In general, people tend to be less disciplined and more self-indulgent when under a lot of stress. Common indirect effects include:

- Poor sleep habits or disruptions in usual sleep patterns can decrease energy levels
- More alcohol or less exercise-both of which can affect blood glucose levels
- Poorer food choices-less time and energy to prepare healthy meals
- Overeating and or skipping meals
- Missing medication or pay less attention to matching insulin doses to meals or activity

Eating Disorders/Disordered Eating Patterns

The daily management of diabetes in addition to the focus on eating and nutrition has the potential to trigger disordered eating habits Anorexia nervosa, bulimia nervosa, and binge eating disorder can affect people with diabetes(American Diabetes Association, 2011). In the United States, approximately 25% of all females with insulin-dependent diabetes may have a diagnosable eating disorder. Eating disorders appear most frequently in young women with type 1 diabetes.

Anorexia nervosa is characterized as a severe, self-imposed restriction of food usually coupled with high levels of physical activity. Misuse of laxatives and enemas is also common. For some people with insulin diabetes, insulin omission is used to manipulate weight. Bulimia nervosa is classified as being at a normal or near-normal body weight with periods of food binges usually, but not always, following by some sort of purging activity (vomiting). Bulimia also frequently involves the use of diuretics and laxatives. Binge eating disorder is defined as eating an excessively large amount of food over a two-hour period without being able to stop. Binge eating disorder is different from bulimia nervosa, as individuals with binge eating disorder usually do not purge. Binge eating commonly occurs in secret. The American Psychiatric Association's DSM-IV currently classifies binge eating disorder as an "eating disorder not otherwise specified." Women with type 2 diabetes

are more likely to suffer from binge eating disorders than from anorexia or bulimia. In contrast to other eating disorders, where the majority of cases are female, one-third of all patients with binge eating disorder are men (Hudson, Hiripi, Pope, & Kessler, 2007).

Radical dieting, restricting, and bingeing behaviors can occur when a person with diabetes also has an eating disorder. Those who suffer from eating disorders will manipulate their insulin or purposefully not take it in an attempt to lose and control weight. Varied food intake, along with inconsistent insulin use, can increase the risk of poor glycemic control and other complications.

Diagnosis of an eating disorder can be difficult. The dietary concerns of diabetes can easily mask the eating disordered behavior. It is often hard to tell if the behaviors are symptoms of an eating disorder or just careful dietary management of diabetes. People with an eating disorder often claim that they are just practicing dietary control. One warning sign may be an unexplained elevated A1C. Early detection and referral to a specialist for assistance with an eating disorder is essential.

Researchers believe that people who have engaged in frequent fad dieting or who have followed overly restrictive eating plans are more prone to disordered eating patterns. Disordered eating patterns can also arise when people use food to cope with painful situations and feelings, or to relieve stress. This can happen without the person realizing it and can undermine successful diabetes management. Referral to a behavioral health provider can help a person with diabetes develop more appropriate behavior change and coping strategies.

Sexual Health Concerns

Sexual problems are common and can affect approximately 75% of men and 35% of women with diabetes. Sexual dysfunction for people with diabetes can be due to autonomic neuropathy, cardiovascular disease, endothelial dysfunction, hormone abnormalities, and psychological concerns such as depression, stress, and anxiety, or a combination of these.

The most common sexual problems for men are erectile dysfunction, retrograde ejaculation, and hypogonadism (low testosterone). Also known as impotence, erectile dysfunction is the consistent or recurrent inability of a man to attain and/or maintain a penile erection sufficient for sexual activity. Retrograde ejaculation results from damage to the sympathetic nerves that normally coordinate the closure and relaxation of the internal and external vesicle sphincters. Retrograde ejaculation can be a functional concern for men of reproductive age with diabetes who wish to father children. Hypogonadism or a subnormal level of free testosterone is found in approximately 30% of men with diabetes in general and in approximately 50% of obese diabetic men 45 years of age or older (Dhindsa et al., 2010). “Androgen therapy of hypogonadal men improves insulin sensitivity, fasting glucose, and A1C levels” (Traish, Saad & Guays, 2009, p. 23).

The most common sexual difficulties for a woman with diabetes involve problems with arousal, decreased vaginal lubrication during stimulation, and anorgasmia (i.e., the inability to have an orgasm) despite normal libido. Women can also experience more frequent yeast infections or other vaginal infections with diabetes, which can contribute to sexual difficulties.

It is important for providers to inquire about sexual health concerns for both men and women, offer referrals to medical and psychological specialists for diagnosis and counseling, and review therapeutic options. Although these topics may be uncomfortable to discuss, most people will appreciate the opportunity to address these important quality of life issues.

Additional Resources

1. An International Awareness Packet from the World Federation for Mental Health. (2010). *Diabetes and Depression: Why Treating Depression and Maintaining Positive Mental Health Matters When You Have Diabetes.* Woodbridge, VA: World Federation for Mental Health.
2. Surwit, R. S. & Bauman, A. (2004). *The Mind Body Diabetes Revolution: A Proven New Program for Better Blood Sugar Control.* New York, NY: Free Press.
3. Rubin, R. L., Biermann, J., & Toohey, B. (1999). *Psyching Out Diabetes: A Positive Approach to Your Negative Emotions* (3rd ed.). Lincolnwood, IL: Lowell House.
4. National Institute of Mental Health: http://www.nimh.nih.gov.
5. American Association of Diabetes Educators. *Take Charge. Talk T. What Men with Diabetes Need to Know about Low Testosterone* [brochure]. 1-800-338-3663.
6. Polonsky, W. H. & Guzman, S. J. (April 15, 2009). *Patients with Diabetes: What Mental Health Experts Need to Know* [PowerPoint Slides]. Retrieved from http://behavioraldiabetesinstitute.org/resources-diabetes-information-publications-PPT-Patients-With-Diabetes.html.
7. Arsham, G.M., Feste, C., Marrero, D.G., Rubin, S.H. (2003). 101 Tips For Coping With Diabetes. Alexandria, Va.: American Diabetes Association.

References

American Diabetes Association. *Living with Diabetes: Eating Disorders.* Retrieved from www.diabetes.org/living-with-diabetes/complications/women/eating-disorders.html.

American Diabetes Association. (2012). Standards of Medical Care in Diabetes - 2012. *Diabetes Care*, 2012 35 (supp 1), S11-S63.

American Diabetes Association, American Psychiatric Association, American Association of Clinical Endocrinologists, North American Association for the Study of Obesity. (2004). Consensus Development Conference on Antipsychotic Drugs and Obesity and Diabetes. *Diabetes Care*, 27, 596-601.

Behavioral Diabetes Institute. (2007). *The Emotional Side of Diabetes: 10 Things You Need to Know* [brochure]. Retrieved from www.behavioraldiabetes.org.

Bogner, H. R., Morales, K. H., Post, E. P., & Bruce, M. L. (2007). Diabetes, Depression, and Death: A Randomized Controlled Trial of a Depression Treatment Program for Older Adults Based in Primary Care (PROSPECT). *Diabetes Care*, 30, 3005-3010.

Centers for Disease Control and Prevention. (2008). Prevalence of Self-Reported Postpartum Depressive Symptoms – 17 States, 2004-2005. *MMWR Morb Mortal Wkly Rep*, 57, 361-366.

Citrome, L. L. (2004). The Increase in Risk of Diabetes Mellitus from Exposure to Second-Generation Antipsychotic Agents. *Drugs Today*, 40, 445-464.

de Groot, M., Anderson, R., Freedland, K. E., Clouse, R. E., & Lustman, P. J. (2001). Association of Depression and Diabetes Complications: A Meta-Analysis. *Psychosom Med*, 63, 619-630.

Department of Health and Human Services, Public Health Service, National Institutes of Health. (2002). *Depression and Diabetes* (DHHS Publication No. 02-5003). Washington, DC: U. S. Government Printing Office.

Dhindsa, F., Miller, M. G., McWhirter C. L., Mager, D. E., Ghanim, H., Chaudhuri, A., & Dandona, P. (2010). Testosterone Concentrations in Diabetic and Nondiabetic Obese Men. *Diabetes Care*, 33(6), 1186-1192.

Dunlop, D. D., Song, J., Lyons J. S., Manheim, L. M., & Chang, R. W. (2003) Racial/Ethnic Differences in Rates of Depression among Preretirement Adults. *American Journal of Public Health*, 93(11), 1945-1952.

Dunn, A. L., Trivedi, M. H., Kampert, J. B., Clark, C. G., & Chambliss, H. O. (2005). Exercise Treatment for Depression: Efficacy and Dose Response. *American Journal of Preventive Medicine*, 28(1), 1-8.

Finkelstein, E. A., Bray, J. W., Chen, H., et al. (2003). Prevalence and Costs of Major Depression among Elderly Claimants with Diabetes. *Diabetes Care*, 26, 415-420.

Fisher, L., Glasgow, R. E., Mullan, J. T., Skaff, M. M., & Polonsky, W. H. (2008). Development of a Brief Diabetes Distress Screening Instrument. *Annals of Family Medicine*, 6(3), 246-252.

Grossman, H. (2004). Misplacing Empathy and Misdiagnosing Depression. How to Differentiate among Depression's Many Faces. *Geriatrics*, 59, 39-41.

Hermanns, N., Kulzer, B., Krichbaum, M. Kubiak, T., & Haak, T. (2006). How to Screen for Depression and Emotional Problems in Patients with Diabetes: Comparison of Screening Characteristics of Depression Questionnaires, Measurement of Diabetes-specific Emotional Problems and Standard Clinical Assessment. *Diabetologia*, 49, 469-477.

Huang, F., Chung, H., Kroenke, K., Delucchi, K., & Spitzer, R. (2005). Using the Patient Health Questionnaire-9 to Measure Depression among Racially and Ethnically Diverse Primary Care Patients. *Journal of General Internal Medicine*, 21, 547-552.

Hudson, J. I., Hiripi, E., Pope Jr., H. G., & Kessler, R.C. (2007). The Prevalence and Correlates of Eating Disorders in the National Comorbidity Survey Replication. *Biological Psychiatry*, 61(3), 348-58.

Iglehart, J. K. (2004). The Mental Health Maze and the Call for Transformation. *NEJM*, 350, 507-514.

Katon, W., von Korff, M., Ciechanowski, P., et al. (2004). Behavioral and Clinical Factors Associated with Depression among Individuals with Diabetes. *Diabetes Care*, 27, 914-920.

Kim, G., Huang, C., DeCoster, J., & Chiriboga, D. (2011). Race/ethnicity and the factor structure of the center for epidemiologic studies depression scale: a meta-analysis. *Cultural Diversity and Ethnic Minority Psychology*, 17, (4), 381-396.

Lowe, B., Unutzer, J., Callahan, C. M., Perkins, A. J., & Kroenke, K. (2004). Monitoring Depression Treatment Outcomes with the Patient Health Questionnaire-9. *Med Care*, 42, 1194-1201.

Moussavi, S., Chatterji, S., Verdes, E., Tandon, A., Patel, V., & Ustun, B. (2007). Depression, Chronic Diseases, and Decrements in Health: Results from the World Health Surveys. *Lancet*, 370, 851-858.

National Institute of Mental Health. *How Can I Help a Friend or Relative Who is Depressed?* [fact sheet]. Retrieved from www.nimh.nih.gov/health/publications/depression/how-can-i-help-a-friend-or-relative-who-is-depressed.shtml

Petrak, F., & Herpertz, S. (2009). Treatment of Depression in Diabetes: An Update. *Current Opinions Psychiatry*, 22(2), 211-217.

Polonsky, W. H., Fisher, L., Earles, J., Dudl, R. J., Lee, R., Mullan, J., & Jackson, R. A. (2005). Assessing Psychosocial Distress in Diabetes: Development of the Diabetes Distress Scale. *Diabetes Care*, 28(3), 626-631.

Radloff, L. S. (1977). The CES-D Scale: A Self-Report Depression Scale for Research in the General Population. *Applied Psychological Measurement*, 1(3), 385-401.

Rosene-Montella, K., Keely, E. J., Lee, R. V., & Barbour, L. A. (2008). Thyroid Disorders. In E. J. Keely & L. A. Barbour (Eds.), *Medical Care of the Pregnant Patient* (2nd ed.) (pp. 253-270). Philadelphia, PA: American College of Physicians.

Rubin, R. R., Ciechanowski, P., Egede, L. E., Lin, E. H., & Lustman, P. J. (2004). Recognizing and Treating Depression in Patients with Diabetes. *Curr Diabetes Rep*, 4, 119-125.

Rubin, R. R., & Peyrot, M. (2001). Psychological Issues and Treatments for People with Diabetes. *J Clin Psychol*, 57, 457-478.

Sherman, S. E., Chapman, A., Garcia, D., & Braslow, J. T. (2004). Improving Recognition of Depression in Primary Care: A Study of Evidence-Based Quality Improvement. *Jt Comm J Qual Saf*, 30, 80-88.

Surwit, R. S., van Tilburg, M. A., Zucker, N., et al. (2002). Stress Management Improves Long-Term Glycemic Control in Type 2 Diabetes. *Diabetes Care*, 25, 30-34.

Therapeutic Research Center. (2005). Role of Atypical Antipsychotics in Treating Patients with Schizophrenia: Are They Better than the Older Agents? *Pharmacist's Letter/Prescriber's Letter*, 21(211107).

Traish, A. M., Saad, F, Guay, A. (2009). The Dark Side of Testosterone Deficiency: II. Type 2 Diabetes and Insulin Resistance. *Journal of Andrology*. 30(1), 23-32.

Van Voorhees, B. W., Cooper, L. A., Rost, K. M., et al. (2003). Primary Care Patients with Depression are Less Accepting of Treatment than those seen by Mental Health Specialists. *J Gen Intern Med*, 18, 991-1000.

Section 11: Communicable Disease Prevention

Concern	Care/Test	Frequency
Influenza and Pneumococcal Immunizations	▪ Provide influenza vaccine	Annually, if age ≥ 6 months
	▪ Provide pneumococcal vaccine	Once; then per Advisory Committee on Immunization Practices
	▪ Provide Hepatitis B series	19-59 yrs of age at Diagnosis, Individualize if ≥ 60 yrs.
	▪ Screen for Turberculosis infection or disease	As needed

MAIN TOPICS INCLUDED IN THIS SECTION:

- Influenza Vaccine
- Pneumococcal Polysaccharide Vaccine and Pneumococcal Conjugate Vaccine
- Preventing Pneumococcal Disease in Infants and Children
- Hepatitis B Vaccine
- Tuberculosis
- Immunization Record Keeping
- References

Influenza Vaccine

Despite vaccine-preventable diseases greatly decreasing since the beginning of the 20th century, an estimated 42,000 adults and 300 children still die in the United States each year from these diseases or their complications. The majority of these are adults who die of complications from influenza and pneumococcal disease. In Wisconsin in 2009, influenza and pneumococcal disease together were the ninth leading cause of death for all ages and the seventh leading cause of death for adults 85 years and older (Wisconsin Department of Health Services 2011). The elderly and people with chronic health conditions like diabetes are more likely to develop serious, life-threatening complications than younger, healthier people.

Influenza exacerbates underlying chronic conditions like diabetes and can compromise glucose control, resulting in erratic blood sugars (i.e., hypoglycemia or hyperglycemia). In the year 2006, only 33% of United States adults and 36% of Wisconsin adults were immunized for seasonal influenza despite evidence that an annual influenza vaccination can prevent illness and death caused by influenza. Of those with diabetes, 58% of United States adults and 69% of Wisconsin adults were immunized for influenza (Wisconsin Department of Health Services, 2009). While Wisconsin is immunizing a higher percentage of adults with diabetes than the United States, there is still much improvement needed in Wisconsin. In 2005, approximately 22,000 people were hospitalized in Wisconsin for influenza and pneumonia and there were 1,267 resident deaths. In 2009 there were 949 deaths (WISH Data Set). One study found that influenza vaccination reduced hospital admissions by 79% for persons with diabetes.

The Advisory Committee on Immunization Practices (ACIP) recommends that all individuals with diabetes ≥ 6 months of age receive the influenza vaccine annually, due to increased risk of severe complications. The trivalent inactivated influenza vaccine (TIV) should be used for persons with diabetes. The 2011 influenza vaccination recommendations have included the Fluzone High-Dose vaccine as an acceptable influenza vaccine for persons age 65 years or older (Poland Collaborative framework for care and control of tuberculosis and diabetes & Mulligan, 2009). Fluzone High-Dose contains more influenza antigen than the regular vaccine and is intended to create a stronger immune response in older adults. There is currently no contraindication to the use of this vaccine in older adults with diabetes (CDC, 2011).

The live, attenuated influenza vaccine (LAIV) vaccine (FluMist®) should not be given to people with diabetes because it is a live vaccine (CDC, 2010).

Two doses of influenza vaccine (doses separated by ≥ 4 weeks) are recommended for children 6 months through 8 years of age who are receiving the influenza vaccine for the first time. Vaccination is also advised for healthy household contacts (including children) and caregivers of children aged < 5 years and adults aged ≥ 50 years, with particular emphasis on vaccinating contacts of children aged < 6 months. The live, attenuated influenza vaccine (LAIV) vaccine (FluMist®) is approved for use among people aged 2-49 years without medical contraindications. Each year the influenza vaccine contains the antigens that are expected to cause influenza in our hemisphere (American Academy of Pediatrics Committee on Infectious Diseases, 2011).

Immunization is advised for healthy household contacts (including children) and caregivers of persons with medical conditions that put them at higher risk for severe complications from influenza (including diabetes). No preference is indicated for use of the trivalent inactivated vaccination (as opposed to the live attenuated influenza vaccine) by persons who have close contact to persons with diabetes. It is important that all health care providers serving people with diabetes are vaccinated against influenza to reduce the transmission of the virus from health care provider to vulnerable persons (Committee on Infectious Diseases, 2009).

All women with diabetes who are pregnant or will be pregnant during influenza season should be vaccinated with TIV. LAIV is not licensed for use in pregnant women. ACIP recommends that pregnant women be given the influenza vaccine any time during their pregnancy. If a woman failed to receive the influenza vaccine during her pregnancy, she should be given the influenza vaccine in the immediate postpartum period as a household contact of the infant.

Annual vaccination with a currently licensed influenza vaccine, as soon as the vaccine becomes available, is recommended for all individuals aged 6 months or older. Peak activity for seasonal influenza can vary, but generally occurs in January or February. Vaccination efforts should continue throughout the influenza season because duration of the influenza season varies. Immunizations can begin when vaccine for the upcoming influenza season becomes available.

For more specific precautions, specific contraindications to vaccination, side effects, and adverse reactions, consult the ACIP recommendations found at: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6033a3.htm.

Pneumococcal Polysaccharide Vaccine and Pneumococcal Conjugate Vaccine

In the year 2006, 52% of United States adults with diabetes and 64% of Wisconsin adults with diabetes reported ever having received the pneumococcal vaccination.

Streptococcus pneumoniae (pneumococcus) infection is among the leading causes worldwide of illness and death for children, people with underlying debilitating medical conditions, and the elderly (Austriam & Gold, 1964). Annually, the bacterium causes serious infections, resulting in an estimated 175,000 hospitalized cases of pneumococcal pneumonia, more than 50,000 cases of bacteremia, and an estimated 3,000 to 6,000 cases of bacterial meningitis (National Foundation for Infectious Diseases, 2002). According to the Centers for Disease Control and Prevention (CDC), invasive pneumococcal disease causes more than 6,000 deaths annually. About half of these deaths are preventable with the use of the 23-valent pneumococcal polysaccharide vaccine (PPV23). The risk of serious complications, as well as the recent evidence of antibiotic-resistant pneumococci, compound the management of invasive pneumococcal disease and emphasize the importance of the recommendations from ACIP and the Academy of Pediatrics Report of the Committee on Infectious Diseases. Pneumococcal vaccination is intended for reduction of the occurrence of invasive pneumococcal disease; however, the efficacy of the vaccine in preventing against non-invasive pneumococcal infection is limited (Centers for Disease Control and Prevention, 2010).

Advisory Committee on Immunization Practices (ACIP) for prevention of invasive pneumococcal disease (IPD) through use of the 23-valent pneumococcal polysaccharide vaccine (PPSV23) among all adults aged ≥65 years and those adults aged 19-64 years with underlying medical conditions that put them at greater risk for serious pneumococcal infection. A detailed summary of the Adult Immunization Schedule can be found at: http://www.cdc.gov/vaccines/schedules/easy-to-read/adult.html.

For more specific precautions, specific contraindications to vaccination, side effects, and adverse reactions, consult the ACIP recommendations found at: http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6033a3.htm.

Preventing Pneumococcal Disease in Infants and Children

Infants and children (especially those with diabetes) are at risk for pneumococcal infection. The immunization and reimmunization schedules are complex and lengthy; therefore, they are not included in this document. Detailed recommendations for use of the pneumococcal conjugate vaccine (PCV13) and the pneumococcal polysaccharide vaccine (PPV23) for children age 6 weeks to age 18 years can be found in:

- Recommended immunization schedules for persons aged 0-18 years – United States, 2012. MMWR 2012; 61(05):1-4, http://www.cdc.gov/vaccines/recs/schedules/child-schedule.htm.
- Updated Recommendations for Prevention of Invasive Pneumococcal Disease Among Adults Using the 23-Valent Pneumococcal Polysaccharide Vaccine (PPSV23). MMWR; 59(34);1102-1106, http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5934a3.htm.
- Licensure of a 13-Valent Pneumococcal Conjugate Vaccine (PCV13) and Recommendations for Use Among Children – Advisory Committee on Immunization Practices (ACIP), 2010. MMWR 2010; 59(09); 258-261, http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5909a2.htm.

Hepatitis B Vaccine

Hepatitis B is a serious disease that can become chronic and lead to liver damage or cancer. People infected with the virus can spread it to others through contact with blood or other body fluids even if they show no symptoms. Hepatitis B can be prevented through a 3-dose immunization series for those ages 19-59. Individualize based on risk for those ≥ 60 years old.

In 2011, the Advisory Committee on Immunization Practices (ACIP) recommended adults with diabetes be included in the high-risk group and should be vaccinated against hepatitis B virus. People with diabetes who are younger than 60 years old were more than twice as likely to get infected with the hepatitis B virus as people without diabetes. There is no significant increase of hepatitis B virus infection found in people with diabetes who are older than 60 years of age and vaccines in older adults are less efficacious and cost-effective than those provided to younger adults, but ACIP states people with diabetes older than 60 years of age may still receive the vaccine (Advisory Committee on Immunization Practices, 2011).

The hepatitis B vaccine series should be administered as soon as feasible after diabetes is diagnosed. There is no advantage to any specific hepatitis B vaccine, dosage, or approved schedule for adults with diabetes. No serologic testing or additional hepatitis B vaccination is recommended for adults who received a complete series of hepatitis B vaccinations prior to their diagnoses of diabetes (CDC, 2011).

Tuberculosis (TB)

People with diabetes have a 2-3 times higher risk of TB than people with no diabetes, a link that has been known for many years. In 1997, Pablos-Mendez et.al. published an article identifying a relationship between diabetes and tuberculosis and further research has confirmed the relationship.

People at risk for developing TB fall into two categories: "those who have an increased likelihood for exposure to persons with TB disease, and those with clinical conditions that increase the risk of progression from LTBI (Latent Tuberculosis Infection) to TB disease" (CDC, 2011, p.1). Persons with diabetes are at increased risk of progression from LTBI to active TB and should be considered for screening. For more information on these two categories visit: http://cdc.gov/tb/publications/factsheets/testing/skintestresults.com.

In 2011, the World Health Organization published the Collaborative Framework for Care and Control of Tuberculosis and Diabetes which presents recommendations based on evidence from three systematic reviews and a series of expert consultations. The report recommends all people with TB should be screened for diabetes and that screening for TB in people with diabetes should be considered, particularly in settings with high TB prevalence. Collaborative Framework for Care and Control of Tuberculosis and Diabetes (2011).

Testing for TB infection may be done with either the TB skin test or a blood test. For more information, please call your local health department or the Wisconsin TB Program (608-261-6319).

Immunization Record Keeping

To help prevent the administration of unnecessary doses, every person should receive a record of their vaccinations. Recording vaccinations in a shared electronic registry, such as the Wisconsin Immunization Registry (http://www.dhs.wisconsin.gov/immunization/WIR.htm), is recommended to allow health care providers around the state access to individual vaccination records. Primary care providers should also ensure that childhood and other recommended preventive vaccinations are up to date.

Each year CDC updates the recommended immunization schedule for the United States. The most recent version can be found at www.cdc.gov/mmwr/preview/mmwrhtml/mm6104a9.htm.

References

Advisory Committee on Immunization Practices, October 25, 2011, Odds of Acute Hepatitis B Among Persons with Diabetes at Eight Emerging Infection Program Sites Sarah Schillie, MD, MPH, MBA, Emily Smith, MPH
Meredith Reilly, MPH, Trudy V. Murphy, MD, Division of Viral HepatitisNCHHSTP, CDC

American Academy of Pediatrics Committee on Infectious Diseases. (2011). Recommendations for Prevention and Control of Influenza in Children, 2011–2012. *Pediatrics* (128) No. 4, 813-825.

American Diabetes Association. (2010). Standards of Medical Care in Diabetes – 2011. *Diabetes Care*, 34(1), S11-S61.

Austriam, R., & Gold, J. (1964). Pneumococcal Bacteremia with Especial Reference to Bacteremic Pneumococcal Pneumonia. *Ann Intern Med*, 60, 759-776.

Centers for Disease Control and Prevention. (2010). Prevention of Pneumococcal Disease Among Infants and Children--Use of 13-Valent Pneumococcal Conjugate Vaccine and 23-Valent Pneumococcal Polysaccharide Vaccine (ACIP). *MMWR*, 59 (RR-11): 1-15.

Centers for Disease Control and Prevention. (2011). Prevention and Control of Influenza: Recommendation of the Advisory Committee on Immunization Practices (ACIP). *MMWR* 60(33):1128-1132.

Centers for Disease Control and Prevention. (2009). Behavioral Risk Factor Surveillance System Survey Data. Atlanta, GA: U. S. Department of Health and Human Services, Centers for Disease Control and Prevention.

Centers for Disease Control and Prevention. (2012). Recommended Adult Immunization Schedule – United States 2012. *MMWR*, 61(04), 1-7.

Centers for Disease Control and Prevention. (2011). Recommended Immunization Schedules for Persons Aged 0-18 Years – United States, 2012. *MMWR*, 61(05), 1-4.

Centers for Disease Control and Prevention. (2010). Questions and Answers: The Nasal-Spray Flu Vaccine (Live Attenuated Influenza Vaccine [LAIV]). Retrieved from http://www.cdc.gov/flu/about/qa/nasalspray.htm.

Centers for Disease Control and Prevention. (2011). General Recommendations on Immunizations: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR*, 60(RR-02), 1-61.

Centers for Disease Control and Prevention (2011). Targeted tubercoulosis testing and interpreting tuberculin skin test results.http://www.cdc.gov/tb/publications/factsheets/testing/skintestresults.htm.

Centers for Disease Control and Prevention (2011). Use of hepatitis B vaccination for adults with diabetes mellitus: recommendations of the advisory committee on immunization practices (ACIP), *MMWR*, 60(50), 1709-1711)

Collaborative framework for care and control of tuberculosis and diabetes. (2011) Stop TB Department and Department of Chronic Diseases and Health Promotion; World Health Organization, Geneva, Switzerland and The International Union Against Tuberculosis and Lung Disease, Paris, France http://whqlibdoc.who.int/publications/2011/9789241502252_eng.pdf

Committee on Infectious Diseases, American Academy of Pediatrics. Red Book. (2009). 2009 Report of the Committee on Infectious Diseases (28th ed.). Elk Grove Village, IL: American Academy of Pediatrics.

Kronenberger, C. B., Hoffman, R. E., Lezotte, D. C., & Marine, W. M. (1996). Invasive Penicillin-Resistant Pneumococcal Infections: A Prevalence and Historical Cohort Study. Emerg Infect Dis, 2, 121-124.

Monto, A. S., Ansaldi, F., Aspinall, R., et al. (2009). Influenza Control in the 21st Century: Optimizing Protection of Older Adults. Vaccine, 27, 5043.

National Foundation for Infectious Diseases. (2002). Facts about Pneumococcal Disease. Retrieved from http://www.nfid.org/_old1/content/factsheets/pneumofacts.html.

Pablos-Méndez, A Blustein, J. & Knirsch, C. (1997). The role of diabetes mellitus in the higher prevalence of tuberculosis among Hispanics. American Journal of Public Health. 87(4) 574-579. doi: 10.2105/AJPH.87.4.574

Poland, G. A., & Mulligan, M. J. (2009). The Imperative of Influenza Vaccines for Elderly Individuals – An Evolving Story. J Infect Dis, 200, 61-163.

Stop TB Department and Department of Chronic Diseases and Health Promotion; World Health Organization, Geneva, Switzerland and The International Union Against Tuberculosis and Lung Disease, Paris, France (2011)
Collaborative framework for care and control of tuberculosis and diabetes http://whqlibdoc.who.int/publications/2011/9789241502252_eng.pdf

Wisconsin Department of Health Services, Division of Public Health, Bureau of Health Information and Policy. (2009). Wisconsin Behavioral Risk Factor Survey. Madison, WI: Wisconsin Department of Health Services.

Wisconsin Department of Health Services, Division of Public Health, Office of Health Informatics. (2011). Wisconsin Deaths, 2009 (P-45368-09). Retrieved from http://www.dhs.wisconsin.gov/deaths/pdf/09deaths.pdf.

Section 12: Preconception, Pregnancy, and Postpartum Care

Concern	Care/Test	Frequency
Preconception, Pregnancy, and Postpartum Care	▪ Ask about reproductive intentions/assess contraception	At diagnosis and then every visit◈
	▪ Provide preconception counseling/assessment	3 – 4 months prior to conception◈
	▪ Screen for undiagnosed type 2 diabetes in women with known risk	At first prenatal visit
	▪ Screen for GDM in all women not known to have diabetes	At 24 – 28 weeks gestation◈
	▪ Screen for type 2 diabetes in women who had GDM	At 6 – 12 weeks postpartum, then at least every 3 years lifelong

◈Consider referring to provider experienced in care of women with diabetes during pregnancy

MAIN TOPICS INCLUDED IN THIS SECTION:

- Maternal/Child Risks Associated with Diabetes
- Pre-Existing (Pre-Gestational) Diabetes
- Diabetes Medications and Pregnancy Planning
- Gestational Diabetes
- Screening and Diagnosis
- Care of Women with Gestational Diabetes
- Gestational Diabetes: Postpartum Care
- Pre-Existing Diabetes: Postpartum Care
- Breastfeeding and Lactation
- Additional Resources
- References

Maternal/Child Risks Associated with Diabetes

"Major congenital malformations remain the leading cause of infant mortality and serious morbidity in women with type 1 and type 2 diabetes" (ADA, 2012). Maternal normoglycemia is necessary prior to conception, during fetal organogenesis, and throughout gestation, and is known to decrease infant and maternal morbidity and mortality (ADA, 2012). Both fasting and post-prandial plasma glucose levels are strong predictors of the outcomes of pregnancy complicated by diabetes. The A1C level is a strong predictor of fetal congenital anomalies and first trimester miscarriages. The risk of malformation increases directly with increasing maternal glycemia during the first 6-8 weeks of gestation as measured by a first trimester A1C level (ADA, 2012). Near-normal A1C levels (goal of at least < 7.0% (ADA, 2012), but some health care provider groups use a goal of 6.5% or less) are ideal before attempting conception.

Women with either pre-existing or gestational diabetes are at higher risk of maternal and infant complications during pregnancy and postpartum when compared to women without diabetes. However, with preconception counseling and intensive glycemic management before and during pregnancy, women with diabetes can achieve outcomes similar to women without diabetes. A team of providers experienced in caring for women with diabetes can facilitate good pregnancy outcomes (ADA, 2012).

Fetal/infant risks related to maternal hyperglycemia include (ADA, 2012):

- Insulin effect and other fetal growth factors may be associated with macrosomia and birth injuries (e.g., shoulder dystocia)
- Maternal vascular disease affects the uterine blood supply, resulting in fetal growth restriction (FGR) or intrauterine growth restriction (IUGR)
- Hypoglycemia is more common in infants born to mothers on insulin and may require intravenous glucose infusions
- Effects of hyperviscosity or hyperbilirubinemia may be complications in the infant
- Fetal lung maturity may be delayed, resulting in respiratory distress syndrome (RDS) at higher gestational ages than typically seen
- Hypertrophic cardiomyopathy may be significant enough to require medication
- Neurologically, infants may be immature, have hypotonicity, and a poor suck reflex that delays adequate oral feeding development
- Infants born to mothers with diabetes are at a higher risk for overweight or obesity, as well as glucose intolerance in childhood and thereafter

These risks increase in proportion to the degree of maternal hyperglycemia. Other maternal risks of uncontrolled diabetes potentially include aggravation of pre-existing diabetes complications, increased risk of hypertensive disorders such as pre-eclampsia, and increased risk for cesarean delivery.

Pre-Existing (Pre-Gestational) Diabetes

Pre-existing or pre-gestational diabetes refers to type 1 diabetes, type 2 diabetes, MODY, and cystic fibrosis-related diabetes diagnosed prior to pregnancy. Research shows that less than 50% of pregnancies in women with pre-existing diabetes are planned. Moreover, serious congenital malformations can occur early in pregnancy (often before a woman discovers that she is pregnant) (ADA, 2012). Preconception care is recommended for all women with pre-existing diabetes. Preconception care is defined as a set of interventions that aim to identify and modify biomedical behavorial and social risks to a woman's health or pregnancy outcome through prevention and management. It is important for providers to assess a woman's desire for pregnancy, obtain routine diabetes screenings, exams and lab tests, and carefully monitor and re-evaluate existing complications as necessary in order to prepare for a desired or unexpected pregnancy.

The guidelines provided in Table 12–1 are general recommendations for preconception care, intrapartum care, and postpartum care. Take into consideration cultural preferences, level/skill of literacy, and other needs when designing and implementing a care plan for women with diabetes. If the woman is already pregnant, begin prenatal care and counseling about diabetes in pregnancy as soon as possible.

Ongoing communication among all professionals involved in treating women with pre-existing or pre-gestational diabetes is essential to ensure optimal diabetes management during preconception and pregnancy.

Screening for Pre-Existing Diabetes at First Prenatal Visit

Women at risk for diabetes should be screened at the first prenatal visit. This includes women with the following criteria:

- Women with BMI ≥ 25 kg/m2
- A1C ≥ 5.7%, IGT, IFG or prediabetes
- Race/ethnicity (Hispanic/Latino, African American, Native American, Asian American, or Pacific Islander) (ACOG, 2001)
- Family history (first-degree relative with diabetes)
- History of Gestational Diabetes Mellitus (GDM) baby weighing more than 9 lbs at birth, unexplained stillbirth, or malformed infant.
- Markers of insulin resistance (e.g., acanthosis nigricans and/or waist circumference > 35 inches (> 31 inches for Asian women)
- Women with Polycystic Ovary Syndrome (PCOS)
- Medications which affect normoglycemia
- Physical inactivity
- History of hypertension (> 140/90 mmHg) or on therapy for hypertension
- History of cardiovascular disease
- History of dyslipidemia: HDL < 35 mg/dL and/or triglycerides ≥ 250 mg/dL

For additional information, see *Section 13: Assessing Risk and Prevention of Type 2 Diabetes*.

Women with cystic fibrosis (CF) also require prompt pregnancy counseling and diabetes screening. Cystic fibrosis–related diabetes (CFRD) is a common comorbidity and disproportionately affects women. New published screening guidelines recommend screening women with CF for diabetes prior to conception or when pregnancy is confirmed.

Table 12-1: Preconception, Intrapartum, and Postpartum Care Recommendations

Care	Recommendations
General Counseling/ Education	▪ Provide information on maternal and neonatal risk of pregnancy ▪ Inform women that risk is minimized with optimal glycemic control prior to conception ▪ Encourage communication of desire/intent to become pregnant, discuss pre-pregnancy planning such as tobacco, alcohol, and recreational drug cessation, and eliminating exposure to secondhand smoke ▪ Discuss importance of folic acid supplementation and benefits of breastfeeding ▪ Assess individual circumstances (e.g., years with diabetes, level of control, and history of complications) ▪ Consult or refer to multidisciplinary team (e.g., CDE, dietitian) experienced in caring for pregnant women with diabetes ▪ Discuss potential for frequent medical visits (up to two visits per week after 32 weeks) and frequent phone contact during pregnancy ▪ Detect pregnancy as early as possible; if suspected, seek testing and medical care immediately ▪ Discuss potential infertility issues; refer for counseling if attempts to become pregnant have exceeded six months
Contraception	▪ Review contraceptive options; oral contraception is a viable option for women with diabetes unless contraindicated (e.g., significant vasculopathy, hypertension, or a strong family history of thromboembolic disease) ▪ Educate women about emergency contraception
Medications	▪ Evaluate all glucose lowering agents for safety and switch to an intensive insulin regimen to reduce risk to infant (Refer to Table 12-2) ▪ Evaluate all other medications/supplements for safety and teratogenicity (including other prescriptions, over-the-counter medications, herbal remedies, and teas)
Initial Medical Assessment/ Diabetes-Focused Visits, Including Complication Screening *(Screening for Pre-conception complications is essential)*	▪ Complete a history and physical, including past pregnancy history, a gynecological exam, and a comprehensive foot exam ▪ Order lab work for: fasting lipid profile, urinalysis (culture and sensitivity), albumin/creatinine ratio or creatinine clearance, serum creatinine for eGFR, A1C, thyroid stimulating hormone (TSH), and any other lab work related to general health screening with pre-existing diabetes. During pregnancy, 24-hour urine collections are utilized to assess protein and creatinine clearance since normal levels for other kidney screening tests have not been developed in pregnancy ▪ Advise a daily prenatal vitamin and vitamin D supplementation per provider recommendation. (For women with prior history of neural tube defects, a 4.0 mg tablet of folic acid during the preconception period is recommended to reduce the risk of birth defects.) ▪ Stabilize any existing health problems prior to pregnancy (e.g., hypertension, retinopathy, renal dysfunction, gastroparesis, or other neuropathies) ▪ Assess risk factors for CVD. Obtain a resting electrocardiogram in asymptomatic patients age 35 years or older. Women with a history of CVD symptoms should be referred for cardiology consultation and further testing. ▪ Make a referral for a dilated retinal exam; if disease is present, frequent and close monitoring by a retinal specialist will be necessary ▪ Refer to dentist for complete oral screening exam (see *Section 9: Oral Care*) ▪ Provide immunizations as scheduled ▪ Discuss routine prenatal care, including how to contact a health care provider
Emotional/ Mental Health	▪ Discuss the risk of intrapartum and postpartum depression ▪ Assess and screen for depression and other psychosocial concerns (see *Section 10: Emotional and Sexual Health Care*) ▪ Refer to mental health specialist as needed

Table 12-1: Preconception, Intrapartum, Postpartum Care Recommendations (continued)

Care	Recommendations
Medical Nutrition Therapy	▪ Refer to registered dietitian (RD) for nutritional assessment/recommendations and incorporation of required nutrients needed during preconception, pregnancy, and lactation (referral to a lactation consultant may be helpful) ▪ Assess for potential disordered eating in women with type 1 diabetes and type 2 diabetes ▪ Discuss small and frequent meals to prevent post-prandial hyperglycemia and pre-meal starvation ketosis ▪ Individualize weight goals based on pre-pregnancy weight and consider the Institute of Medicine's recommendations for weight gain during pregnancy
Self-Management/ Self-Monitoring	▪ Refer to a certified diabetes educator (CDE) for an educational assessment and to intensify self-management skills, including self-monitoring of blood glucose (SMBG) and testing frequency (fasting, 1- or 2-hr post-meal) ▪ Verify accuracy of meter by ordering a meter/lab correlation to ensure that values are accurate (within 10% of lab) ▪ Teach self-adjustments to treatment plans (diet, physical activity, and medication) based on SMBG results ▪ Discuss how pregnancy affects metabolism and how insulin needs will change ▪ Explain hypoglycemia and treatment options, including use of Glucagon (if using insulin) ▪ Discuss the demands of intensive diabetes management during preconception, pregnancy, and postpartum ▪ Encourage written blood glucose logs for clinical review and or download meters to assess recent blood glucose numbers ▪ Provide instructions for urine ketone testing with recommended testing times and appropriate actions to take if results are positive
Pregnancy Confirmed	▪ Discuss the specialized tests and exams to closely monitor fetal development and monitor for signs of distress (ultrasounds, including targeted anatomic assessment, formal fetal echocardiogram, serial growth ultrasound, and antenatal testing, biophysical profiles, non-stress tests, etc.) ▪ Refer for grief/loss counseling with pregnancy loss
Postpartum Care	▪ Encourage continued self-management to maintain excellent glycemic control ▪ Discuss changes in insulin requirements (women with pre-existing diabetes will have a precipitous drop postpartum and insulin doses will need to be recalculated) ▪ Explain insulin requirements during lactation (insulin requirements drop during the night when glucose is siphoned into the breast milk; therefore, there may be an increased risk of hypoglycemia) ▪ Women with type 2 diabetes controlled with oral medication prior to pregnancy can discuss the option of switching back to oral medications. (Due to limited availability on the safety of the use of these drugs during lactation, it is recommended that women review this with their primary care provider and infant's pediatrician.) ▪ Offer contraception options prior to delivery or immediately postpartum if no plan has been determined. ▪ Discuss importance of maintaining or resuming care with usual primary care provider ▪ Communicate any necessary information needed for resuming care such as date of last dilated eye exam, lab results, and any other diabetes care issues to primary care provider ▪ Resume preconception counseling/education

Diabetes Medications and Pregnancy Planning

Women taking the insulin Detemir or Glargine should be transitioned to NPH or insulin pump therapy, preferably before conception. Table 12-2 provides a list of common medications used in women with type 2 diabetes. This table is only a guide; specific information regarding any medication use during the preconception period must be individualized.

Table 12-2: Common Medications in Type 2 Diabetes and the Preconception Period◎

Medication	Placental Transfer	Teratogenicity	Pregnancy Class††	Preconception Period
Oral Antidiabetics				
▪ Metformin	Yes	No	Class B	Continue
▪ TZD	Unknown	Unknown	Class C	Discontinue
▪ Sulfonylurea	No	No	Class B/C	Continue (Glyburide only)
▪ Exenatide	Minimal	Unknown	Class C◆	Discontinue
▪ DPP-4	Unknown	Unknown	Class C◆	Discontinue
Antihypertensives				
▪ ACE/ARB	Yes	Yes	Class X	Discontinue
▪ Beta-blocker	Minimal	No	Class C	Continue (except Atenelol Class D)
▪ Calcium Channel Blocker	Minimal	No	Class C	Continue
▪ Diuretic	No	No	Class B	Continue
Hyperlipidemic agents				
▪ Statin	Yes	Yes	Class X	Discontinue
▪ Fibrate	No	No	Class C	Discontinue and re-evaluate need
Bile Acid Sequestrant/Resin	No	No	Class B	Continue❖

Source: Valika, B and Urban R.

††Explanation of Pregnancy Classes:
Pregnancy Class A - Controlled studies show no risk
Pregnancy Class B - No evidence of risk in humans
Pregnancy Class C - Risk cannot be ruled out
Pregnancy Class D - Positive evidence of risk
Pregnancy Class X - Contraindicated in pregnancy

◆ Registry available for these drugs via manufacturer for patients with prenatal exposure

❖May lead to malabsorption of prenatal vitamins so separate from vitamins by at least 3-4 hours.

◎Detemir (Levemir) was recently approved by the FDA (Class B). For more information see: http://www.accessdata.fda.gov/drugsatfda_docs/label/2012/021536s037lbl.pdf

Gestational Diabetes

Gestational diabetes mellitus (GDM) is defined as any degree of glucose intolerance with onset first recognized during pregnancy and commonly recognized after 20 weeks gestational age. The prevalence of GDM among U.S. women is approximately 7% but varies between 1-14% depending on the population and the diagnostic criteria used. GDM is more likely to occur with advanced age, overweight and obesity, a family history of diabetes, a personal history of abnormal glucose tolerance, a prior macrosomic infant, prior poor obstetric outcome, and in populations with a high risk of type 2 diabetes (e.g., American Indians, African Americans, Hispanic/Latino Americans, and Asian Americans). Women with GDM who required insulin during pregnancy have a greater risk of developing type 2 diabetes within a five-year period of time. After having GDM, a woman's lifetime risk for developing type 2 diabetes is 70%. Uncontrolled GDM carries many risks to both the mother and the fetus. Table 12-3 provides a listing of some of these risks.

Table 12-3: Risks of Uncontrolled Gestational Diabetes to the Mother and Fetus/Infant

Risks to the Mother	Risks to the Fetus/Infant
▪ Hypertensive disorders such as pre-eclampsia during pregnancy ▪ Delivery risks associated with macrosomia ▪ Increased potential for cesarean delivery ▪ Development of GDM in subsequent pregnancies ▪ Development of metabolic disorders later in life including: hypertension, dyslipidemia, arteriosclerotic cardiovascular disease, and type 2 diabetes	▪ Macrosomia and associated delivery risks ▪ Polyhydramnios ▪ Hypoglycemia ▪ Seizures ▪ Hypocalcemia ▪ Polycythemia ▪ Jaundice ▪ Increased risk of developing type 2 diabetes later in life ▪ Increased risk of overweight/obesity later in life

Screening and Diagnosis

Currently there is no universally accepted recommendation for the screening and diagnoses of GDM which creates confusion for both women and providers. The results of the 2008 Hyperglycemia and Adverse Pregnancy Outcomes (HAPO) study highlighted the importance of GDM screening by demonstrating that blood glucose levels that are only one standard deviation away from normal glucose can be detrimental to maternal and fetal health outcomes. Universal screening and diagnostic and treatment criteria will be the topic of an NIH sponsored Consensus Development Conference to occur in October 2012.

Current guidelines recommend screening pregnant women with risk factors for diabetes at their first prenatal visit using standard diagnostic criteria. A positive test using the standard criteria indicates a diagnosis of diabetes. This is especially important given the increase in undiagnosed, obesity-related type 2 diabetes among women of childbearing age. Standard diabetes diagnostic criteria from the ADA include:

- A1C ≥ 6.5%
- Fasting plasma glucose ≥ 126 mg/dL
- 2-hour plasma glucose ≥ 200 mg/dL during an OGTT using a 75-gram glucose load
- Classic symptoms of hyperglycemia with random plasma glucose ≥ 200 mg/dL

For more detailed information on testing for diabetes see the Quick Reference sheet "Tests to Diagnose Diabetes" in the Quick References section.

Women not diagnosed with diabetes previously should be screened at 24 –28 weeks of gestation using accepted screening recommendations:

ACOG 2011 recommendations see: http://www.acog.org/Resources_And_Publications/Committee_Opinions/Committee_on_Obstetric_Practice/Screening_and_Diagnosis_of_Gestational_Diabetes_Mellitus

ADA 2012 recommendations see: http://care.diabetesjournals.org/content/35/Supplement_1/S11.full#sec-11

Table 12-4 provides a guide for applying current criteria for diagnosis of GDM from two agencies identifying standards for GDM screening and diagnoses.

Table 12-4: Testing and Threshold Values for Diagnosis of Gestational Diabetes

Organization	Amount of Glucose	Fasting	1 Hour	2 Hour	3 Hour
American College of Obstetrics and Gynecology[1]	100 grams	95 mg/dL	180 mg/dL	155 mg/dL	140 mg/dL
American Diabetes Association[2]	75 grams	92 mg/dL	180 mg/dL	153 mg/dL	

[1] A positive diagnosis requires that two or more thresholds be met or exceeded ACOG Committee Opinion 504, Sept. 2011

[2] One abnormal glucose value that exceeds the values is sufficient to diagnosis GDM American Diabetes Association Clinical Guidelines, Diabetes Care, 2012

Care of Women with Gestational Diabetes

Once a diagnosis of GDM is made, it is important to provide support and education. Referral to a registered dietitian, a certified diabetes educator, or other specialist is recommended. Medical nutrition therapy is essential for providing healthy eating recommendations and ensuring that nutritional needs of pregnancy are being met. Individualized meal planning is important. A diabetes educator can educate regarding diagnosis, initiate self-blood glucose monitoring, order supplies, and provide initial monitoring guidelines. Intensive self-monitoring of blood glucose is recommended. Optimal testing times and results are as follows:

American College of Obstetrics and Gynecology (ACOG)

- Fasting < 95 mg/dL
- 1-hour post-prandial < 130-140 mg/dL
- 2-hour post-prandial < 120 mg/dL

Fifth International Workshop-Conference on Gestational Diabetes Mellitus

- Fasting < 95 mg/dL
- 1-hour post-prandial < 140 mg/dL
- 2-hour post-prandial < 120 mg/dL

There is evidence suggesting a 1-hour post-prandial blood glucose goal of 100-129 mg/dL, if it can be achieved without excessive hypoglycemia, may lower fetal risk more than the previous 2-hour post-prandial recommendation. At this time, due to accumulating evidence, the 1-hour or 2-hour post-prandial test is recommended. Care should be individualized and based on clinical judgment. Research and evidence related

to care of women with diabetes during pregnancy continues to surface. It is important for health care providers caring for pregnant women with diabetes to continually stay apprised of evolving research in this area.

Women should document blood glucose values in a logbook to be reviewed by health care provider(s). The majority of women can control their blood glucose levels during pregnancy through healthy eating and physical activity. Insulin should be used to control elevated glucose levels that are not controlled by diet and physical activity alone. All available types of insulin are not routinely used during pregnancy due to lack of research or history of use. For more information, please refer to the tool titled "Insulin Therapy 2012" in the Tools Section.

Metformin is being studied in pregnancy for the treatment for GDM. The Metformin in Gestational Diabetes (MiG) trial is a prospective randomized multicenter trial in women with gestational diabetes mellitus (GDM) that is testing the hypothesis that metformin treatment, compared with insulin, is associated with similar perinatal outcomes, improved markers of insulin sensitivity in the mother and baby, and improved treatment acceptability. Two year follow-up of these offspring showed them having the overall same level of body fat, but favorably more subcutaneous versus visceral body fat. Providers using metformin must be aware that studies show a 34.7%- 46.3% failure rate (Moore et. al, & Rowan et. al) and women receiving metformin may require supplemental insulin to achieve adequate blood glucose control.

Providers are using glyburide for GDM treatment based on studies available over the last 10 years. A randomized controlled trial in 2000 (Langer, 2000) indicated that glyburide treatment provides a safe alternative to insulin therapy. Subsequent retrospective trials have demonstrated that glyburide treatment, compared with insulin, resulted in lower mean glucose values, a higher percentage of women with "excellent glycemic control," and fewer hypoglycemic episodes. There is an emerging view that glyburide treatment, compared with insulin, improves glycemic profiles; however, providers not familiar with this therapy should refer women with GDM to clinical programs that specialize in this care. More recent evidence indicates that the half-life of glyburide during pregnancy is 2-4 hours versus the usual 12 hours in women who are not pregnant. Therefore, providers choosing to use glyburide should consider recommending glyburide one hour prior to a meal to optimize post-prandial glucose excursions. Due to the shorter half-life, glyburide can be dosed multiple times per day.

There is a subset of pregnant women who are more likley to fail treatment with use of glyburide. These women are older, have higher BMIs, or are multiparous with higher fasting blood glucose values. This treatment failure is due to more advanced insulin resistance. These women will likely require insulin to achieve adequate blood glucose control (Kahn et al. & Jacobson et al.).

Fetal well-being should be monitored through growth ultrasounds, biophysical profiles, and non-stress testing for any woman on insulin or other therapy for GDM or pre-existing diabetes.

Gestational Diabetes: Postpartum Care

Almost all women with GDM revert to normal glycemia postpartum. After delivery, insulin or other therapy is usually discontinued. A two-hour 75-gram oral glucose tolerance test (OGTT) is recommended at the six- to twelve-week postpartum check and at least every three years thereafter. Women with GDM are at increased risk for developing type 2 diabetes and its associated metabolic abnormalities, including hypertension, dyslipidemia, and atherosclerotic cardiovascular disease. Approximately 35-65% of women go on to develop type 2 diabetes within 10 years.

Because of this increased risk, it is essential to provide women with prevention information and tools to facilitate lifestyle changes. Physical activity, healthy eating, and weight control are important prevention measures. It is proven that regular physical activity improves blood glucose control, reduces cardiovascular risk factors, contributes to weight loss, and improves overall well-being. For additional information, see *Section 13: Assessing Risk and Prevention of Type 2 Diabetes*.

Discuss and offer postpartum contraception to avoid the possibility of pregnancy immediately following recovery from delivery. Early screening and preconception counseling/education should also be provided prior to subsequent pregnancies.

Pre-Existing Diabetes: Postpartum Care

Women with pre-existing diabetes experience a marked decrease in insulin needs immediately following delivery. Postpartum insulin needs are slightly lower than those prior to pregnancy. Insulin may be recalculated and distributed as appropriate throughout the day at 0.6 units/kg or reducing the pre-delivery total daily dose of insulin by 50%. For women who breastfeed, nocturnal hypoglycemia is a concern due to the drop of insulin requirements during the night with glucose siphoning into the breast milk. As a result, the majority of insulin is needed during the day. If glycemic control is successful in the postpartum period, metformin and/or glyburide can be restarted for women with type 2 diabetes in certain circumstances. Past information, such as pre-pregnancy insulin regimen and glycemic control, along with a review of insulin changes required for increasing insulin needs during pre-pregnancy, can help determine a more individualized medication/insulin plan postpartum for the experienced provider.

Breastfeeding and Lactation

Breast milk provides the best nutrition for babies and breastfeeding is recommended for all mothers with either pre-existing diabetes or gestational diabetes.

Research shows that breastfed infants are less likely to become overweight or obese, even if the mother is overweight, obese, or has diabetes. For children at higher risk for type 2 diabetes or obesity because of family history, breastfeeding may play a critical role in helping to lower the risk of obesity throughout the child's lifetime. Although the exact relationship is not known, it appears that breastfeeding may reduce the risk for developing type 2 diabetes by as much as 39%. Other health benefits of breastfeeding for the infant include fewer problems with infectious and non-infectious diseases and milder cases of respiratory infections, ear infections, and diarrhea.

Attention to nutrition is vital for breastfeeding mothers with diabetes to assure optimal nutrition for their infants while controlling their own blood glucose levels. Breastfeeding can cause low blood sugar, especially for women using insulin. Eating a snack containing carbohydrate either before or during breastfeeding can help reduce the risk for low blood sugar. Energy requirements during the first six months of lactation require an additional 200 calories above the pregnancy meal plan or about 500 calories above the pre-pregnancy meal plan. Attempting to lose weight through a strict weight loss regimen is not recommended while breastfeeding. However, with a minimum energy intake of 1,800 calories/day, most women can meet the nutritional requirements for lactation, and depending upon energy expenditure, gradually lose weight.

As in pregnancy, the need for certain nutrients increases while breastfeeding. It is important to assure adequate intakes of protein, calcium, magnesium, zinc, vitamin B12, vitamin D, foliate, and vitamin B6. Fluid intake can affect breast milk production, so mothers are encouraged to drink at least 8 cups of fluids daily. Remind breastfeeding mothers that alcohol and nicotine can pass into breast milk and affect the baby, so drinking alcohol and smoking are not advised during breastfeeding.

Consider the risks and benefits during lactation of any medication prior to starting it. The benefits of breastfeeding are an important consideration in determining treatment. If oral hyperglycemic agents are used, close monitoring of infant for signs of hypoglycemia is important. Signs of hypoglycemia for the infant include irritability, tremors, jitteriness, lethargy, high pitched or weak cry, apnea or irregular breathing, convulsions, or localized seizures.

Providers are choosing to use some oral agents during lactation. These oral agents are summarized below in Table 12-5. When studies about diabetes medication use during lactation are not available, providers could consider choosing medications with:

- low oral bioavailability
- high protein binding (Above 90%)
- large molecular weight

Table 12-5: Type 2 Diabetes Oral Medications with Breastfeeding

Glipizide	Pregnancy category C, Lactation category L3, Pediatric concerns none but observe for hypoglycemia
Glyburide	Pregnancy category C, Lactation category L3, Pediatric concerns none but observe for hypoglycemia
Metformin	Pregnancy category B, Lactation category L1, Pediatric concerns none reported via milk (Plasma levels undetectable in infant)

Additional Resources

1. Becoming a Parent: Preconception Checklist, developed by the Wisconsin Association for Perinatal Care, Madison, WI: http://www.perinatalweb.org/images/stories/PDFs/Materials%20and%20Publication/becoming%20a%20parent_preconception_checklist.pdf.
2. Health Care Provider Reference to Becoming a Parent: Preconception Checklist, developed by the Wisconsin Association for Perinatal Care: http://www.perinatalweb.org/images/stories/PDFs/Materials%20and%20Publication/becoming_parent_provider_reference.pdf.
3. Small Steps, Big Rewards. Prevent Type 2 Diabetes. National Diabetes Education Program (NDEP) Campaign. Information and materials available: http://www.ndep.nih.gov/campaigns/SmallSteps/SmallSteps_index.htm.
4. Gestational Diabetes: What You Need To Know. National Institute of Diabetes and Digestive and Kidney Disease (NIDDK) Information and materials available: http://diabetes.niddk.nih.gov/dm/pubs/gestational_ES/index.htm.
5. For Women With Diabetes: Your Guide to Pregnancy. National Institute of Diabetes and Digestive and Kidney Disease (NIDDK) Information and materials available: http://diabetes.niddk.nih.gov/dm/pubs/pregnancy/.
6. Managing Gestational Diabetes: A Patient's Guide to a Healthy Pregnancy [NIH Pub. No. 04-2788] National Institute of Child Health and Human Development To order copies call 1-800-370-2943 or go to the following and search for Keyword = "Gestational Diabetes" and Type = "Health Publications" http://www.nichd.nih.gov/publications/pubs.cfm?from=.
7. Am I at Risk for Gestational Diabetes [NIH Pub. No. 00-4818] National Institute of Child Health and Human Development To order copies call 1-800-370-2943 or go to the following and search for Keyword = "Gestational Diabetes" and Type = "Health Publications" http://www.nichd.nih.gov/publications/pubs.cfm?from=.

References

American College of Obstetricians and Gynecologists. (2011). Committee Opinion 504 Screening and diagnosis of gestational diabetes mellitus.

American College of Obstetricians and Gynecologists. (2001). Practice Bulletin: Clinical Management Guidelines for Obstetrician-Gynecologists. Technical Bulletin No. 30 Gestational Diabetes [replaces Technical Bulletin No. 200 (1994)].

American Diabetes Association. (2012). Gestational Diabetes Mellitus. *Diabetes Care*, 35 S15-S16,.

American Diabetes Association. (2012). Preconception Care of Women with Diabetes. *Diabetes Care*, 35, S42-S43.

American Diabetes Association. (2012). Standards of Medical Care in Diabetes - 2012.Diabetes Care, 2012 35 (supp 1), S11-S63.

Blatt, A. J., Nakamoto, J. M., & Kaufman, H. W. (2011). Gaps in Diabetes Screening During Pregnancy and Postpartum. *Obstetrics and Gynecology*, 117(1), 61-8.

Hale, T. W. (2006). *Medications and Mother's Milk* (12th ed.). Richmond, VA: Hale Publishing.

HAPO Study Cooperative Research Group. (2008). Hyperglycemia and Adverse Pregnancy Outcomes. *NEJM*, 358, 1991-2002.

Hawkins, J. S., Lo, J. Y., Casey, B. M., McIntire, D. D., & Leveno, K. J. (2008). Diet-Treated Gestational Diabetes Mellitus: Comparison of Early vs Routine Diagnosis. *Am J Obstet Gynecol*, 198(3), 287. e1-6.

Hillier, T. A., Vesco, K. K., Pedula, K. L., Beil, T. L., Whitlock, E. P., & Pettitt, D. J. (2008). Screening for Gestational Diabetes Mellitus: A Systematic Review for the U. S. Preventive Services Task Force. *Ann Intern Med*, 148(10), 766-775.

Jacobson, G. F., Ramos, G. A., Ching, J. Y., Kirby, R. S., Ferrara, A., & Field, D. R. (2005). Comparison of glyburide and insulin for the management of gestational diabetes in a large managed care organization. *American Journal of Obstetrics and Gynecology*, 193, 118–24.

Johnson, K., Posner, S. F., Biermann, J., et al. (2006). Recommendations to Improve Preconception Health and Health Care - United States. A Report of the CDC/ATSDR Preconception Care Work Group and the Select Panel on Preconception Care. *MMWR*, 55(RR-6),1-23.

Kahn, B. F., Davies, J. K., Lynch, A. M., Reynolds, R. M., & Barbour, L. A. (2006). Predictors of Glyburide Failure in the Treatment of Gestational Diabetes. *Obstetrics and Gynecology*, 107(6), 1303-1309.

Kashanian, M., Fazy, Z., & Pirak, A. (2008). Evaluation of the Relationship between Gestational Diabetes and a History of Polycystic Ovarian Syndrome. *Diabetes Res Clin Pract*, 80, 289-292.

Kim, C., Cheng, Y. J., & Beckles, G. L. (2008). Inflammation among Women with Histories of Gestational Diabetes and Diagnosed Diabetes in the National Health and Nutrition Examination Survey. *Diabetes Care*, 31, 1386-8.

Kitzmiller, J. L., Block, J. M., Brown, F. M., et al. (2008). Managing Pre-Existing Diabetes for Pregnancy: Summary of Evidence and Consensus Recommendations for Care. *Diabetes Care*, 31, 1060-1079.

Landon, M., & Gabbe, S. (2000). *Diabetes Mellitus in Medical Disorders during Pregnancy*, 71-100 (W.M. Barron & M.D. Lindheimer, eds.). St. Louis, MO: Mosby Inc.

Langer, O., Conway, D. L., Berkus, M. D., Xenakis, E. M., & Gonzales, O. (2000). A Comparison of Glyburide and Insulin in Women with Gestational Diabetes Mellitus. *NEJM*, 343, 1134-1138.

Leahy, J., & Cefalu, W. (2002). *Insulin Therapy*. New York, NY: Marcel Dekker, Inc.

Lindsay, R. S., Hanson, R. L., Bennett, P. H., & Knowler, W. C. (2000). Secular Trends in Birth Weight, BMI, and Diabetes in Offspring of Diabetic Mothers. *Diabetes Care*, 23, 1249-1254.

Menato, G., Bo, S., Signorile, A., Gallo, M., Cotrino, I., Botto Poala, C., & Massobrio, M. (2008). Current Management of Gestational Diabetes Mellitus. *Expert Rev of Obstet Gynecol*, 3(1), 73-91.

Metzger, B. E. (2007). Long-Term Outcomes in Mothers Diagnosed with Gestational Diabetes Mellitus and Their Offspring. *Clin Obstet Gynecol*, 50, 972-979.

Metzger, B. E., Buchanan, T. A., Coustan, D. R., et al. (2007). Summary and Recommendations of the Fifth International Workshop-Conference on Gestational Diabetes Mellitus. *Diabetes Care*, 30(supp 2), S251-260.

Moore, L. E., Clokey, D., Rappaport, V. J. & Curet, L. B. (2010). Metformin Compared With Glyburide in Gestational Diabetes: A Randomized Controlled Trial. *Obstetrics and Gynecology*, 115(1), 55-59.

Moore, T. R. (2007). Glyburide for the Treatment of Gestational Diabetes. *Diabetes Care*, 30(supp2), S209-213.

Pridjian, G. & Benjamin, T. D. (2010). Updates on Gestational Diabetes. *Obstet Gynecol Clin N Am*, 37(2), 255–267.

Rowan, J. A., Hague, W. M., Wanzhen, G., Battin, M. R., & More, M. P. for the MiG Trial Investigators. (2008). Metformin versus Insulin for the Treatment of Gestational Diabetes. *NEJM*, 358, 2003-2015.

Stuebe, A., Ecker, J., Bates, D. W., Zera, C., Bentley-Lewis, R., & Seely, E. (2010). Barriers to Follow-up for Women with a History of Gestational Diabetes. *American Journal of Perinatology*, 27(9), 705-10.

Vaarasmaki, M. S., Hartikainen, A., Anttila, M., Pramila, S., & Koivisto, M. (2000). Factors Predicting Peri- and Neonatal Outcome in Diabetic Pregnancy. *Early Hum Dev*, 59, 61-70.

Valika, B. Urban, R. (2009). Preconception Care for the Type 2 Diabetic Mother: A Review on Current Care Guidelines. *Current Women's Health Reviews* 2009 (5), 109-116

van Leeuwen, M., Zweers, E. J., Opmeer, B. C., et al. (2007). Comparison of Accuracy Measures of Two Screening Tests for Gestational Diabetes Mellitus. *Diabetes Care*, 30, 2779-84.

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Section 13: Assessing Risk and Prevention of Type 2 Diabetes

Concern	Care/Test	Frequency
Assessing Risk and Prevention of Type 2 Diabetes	▪ Perform A1C test, fasting plasma glucose test, or oral glucose tolerance test	Test all adults ≥ age 45 yrs or with BMI ≥ 25 kg/m^2 and one other risk factor. If normal, retest in 3 years or less. (See full *Guidelines* for testing of type 2 diabetes in children and adolescents)
	▪ Assess lifestyle management and diabetes risk status	At each visit; refer to evidenced-based prevention resources as indicated

MAIN TOPICS INCLUDED IN THIS SECTION:

- Pre-Diabetes and Categories of Increased Risk for Developing Diabetes
- Type 2 Diabetes Risk Factors
- Other Factors Influencing Risk for Type 2 Diabetes
- Prevention of Type 2 Diabetes
- The National Diabetes Prevention Program
- Community Coalitions in Wisconsin
- Assessing Risk for Pre-Diabetes and Type 2 Diabetes in Adults
- Opportunistic and Community Screening for Type 2 Diabetes
- Tests to Diagnose Increased Risk for Type 2 Diabetes
- Children and Adolescents at Risk for Type 2 Diabetes
- Reducing Risk for Metabolic Syndrome, Pre-Diabetes, and Type 2 Diabetes
- Additional Resources
- References

Pre-Diabetes and Categories of Increased Risk for Developing Type 2 Diabetes

Pre-diabetes is a condition where blood glucose levels are found to be higher than normal, but not high enough for diagnosis of type 2 diabetes. The American Diabetes Association (ADA) uses both the terms "pre-diabetes" and "increased risk for developing diabetes" for individuals with multiple risk factors associated with the development of type 2 diabetes (ADA, 2012). The term "pre-diabetes" will be used in this section.

In Wisconsin, an estimated 1.46 million people age 20 years and older have pre-diabetes (WDPCP, 2011). These individuals are considered to be at increased risk for developing type 2 diabetes. Lifestyle modifications, such as dietary changes, a 7% weight loss, and increased physical activity (150 minutes at least 3 days per week of moderate activity help reduce the risk for type 2 diabetes (ADA, 2012) (Knowler, 2002). When referring to diabetes prevention in this section, the prevention of type 2 diabetes is implied. Currently, type 1 diabetes is not preventable, but it is being studied in clinical trials.

Type 2 Diabetes Risk Factors

A person with one or more of the following risk factors has a higher chance of developing type 2 diabetes:

- Family history of diabetes: If a parent or sibling in the family has diabetes, risk of developing type 2 diabetes increases
- Age ≥ 45: Risk for type 2 diabetes increases with age
- Race or ethnic background: Risk for type 2 diabetes is greater in Hispanics/Latinos, African Americans, Native Americans, Pacific Islanders, and Asian Americans (Prussian, 2007) (Knowler, 2002)
- Being overweight or obese: Being overweight or obese, defined as a body mass index (BMI) ≥ 25 kg/m2 increases the risk for type 2 diabetes
- Physical inactivity: Recommended level of activity is 150 minutes of moderate physical activity 3 or more days a week (150 minutes per week)
- History of gestational diabetes: Developing diabetes during pregnancy or delivering a baby over nine pounds can increase the risk of type 2 diabetes in women (Sherwin, 2004)

Other Factors Influencing Risk for Type 2 Diabetes

Insulin Resistance

Insulin resistance is an impaired biological response to insulin and is often an underlying factor that increases the risk for type 2 diabetes. Some individuals have a genetic predisposition to insulin resistance. Decreased insulin sensitivity interferes with the following activities: 1) removal of glucose from plasma, 2) glucose utilization in muscle and fat tissue, and 3) suppression of glucose production in the liver.

Insulin resistance presents with clinical markers, such as increased waist circumference (central obesity), acanthosis nigricans (velvety hyper-pigmented areas on neck and/or axillae), and biochemical markers, such as abnormal lipid levels and abnormal glucose tolerance test results. Insulin resistance causes the pancreas to produce more insulin in an effort to maintain normal blood sugar levels, resulting in hyperinsulinemia. However, obtaining an insulin level is not useful. Most commercial insulin assays are not standardized making it difficult to interpret the test results. Insulin resistance increases risk for vascular disease. Risk factors associated with the development of insulin resistance include:

- Physical inactivity (< 30 minutes per day at least 5 days a week)
- Overweight and obesity
- Hypertension (USPSTF, 2008)
- Hypertriglyceridemia
- Decreased HDL cholesterol
- Advancing age
- Abdominal obesity independent of body weight

Metabolic Syndrome

Metabolic syndrome represents a constellation of lipid and non-lipid risk factors of metabolic origin. In the past, this syndrome has been called Syndrome X, Insulin Resistance, Dysmetabolic Syndrome, and /or Cardiac Dysmetabolic Syndrome. Although metabolic syndrome and pre-diabetes may be present at the same time, not all people with metabolic syndrome have abnormal IFG or IGT results and not all people with increased risk for developing type 2 diabetes have metabolic syndrome. It is estimated that approximately 40% of people with an IGT and 70% of people with type 2 diabetes also have metabolic syndrome (Groop, 2001).

Also, because of altered glucose metabolism (e.g., glucose intolerance, insulin resistance), obstructive sleep apnea (OSA) may be related to metabolic syndrome, but more evidence is needed. For additional information on OSA, see *Section 1: General Recommendations for Care*.

Using the National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) criteria (Ford, 2004) (Grundy et al, 2005), metabolic syndrome is diagnosed when three or more of the following risk factors are present:

- Abdominal obesity (assessed by waist circumference): men > 40 inches, women > 35 inches (Asian men > 35 inches, Asian women > 31 inches)
- Triglycerides ≥ 150 mg/dL or on drug treatment for reducing triglycerides
- HDL cholesterol: men < 40 mg/dL, women < 50 mg/dL, or on drug treatment for increasing HDL cholesterol
- Blood pressure ≥ 130/85 mmHg or on drug treatment for hypertension
- Fasting glucose ≥ 100 mg/dL or on drug treatment for elevated blood glucose

Polycystic Ovary Syndrome

Insulin resistance may be an underlying cause of polycystic ovary syndrome (PCOS), an endocrine (hormonal) disorder affecting 5-10% of all women (Ben-Haroush, 2004) (Biyasheva, 2009). For some women, symptoms first appear during the teen years, while others do not develop symptoms until they are in their twenties. PCOS may continue through menopause. Diagnosis is generally made through physical exam and blood tests. Signs and symptoms of PCOS include hirsutism (excessive hair growth), acne, overweight or obesity, infertility, and irregular menstrual periods or oligomenorrhea. The exact cause of PCOS is unknown. Metformin is the current drug of choice used to treat PCOS and associated insulin resistance.

Cardiovascular Risk

The Framingham Heart Study found people with diabetes have the same risk of a cardiac event as people who have a diagnosis of coronary heart disease (CHD). The NCEP ATP III considers a diagnosis of diabetes a CHD risk equivalent, but does not consider pre-diabetes a CHD risk-equivalent. Individuals who have a history of vascular disease (i.e., stroke) have also been shown to have a higher risk for type 2 diabetes. The NCEP ATP III identifies an elevated risk for developing type 2 diabetes as one component of metabolic syndrome, signifying the need for intensive lifestyle change and careful screening of all other cardiovascular risk factors. For additional information, see *Section 5: Cardiovascular Care*.

Analysis from the Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT) shows that for individuals with metabolic syndrome and for both black and non-black (Caucasian, Hispanic/Latino, Asian American/Pacific Islander, and American Indian/Alaskan Native) participants, the less costly diuretics consistently controlled blood pressure and are equally beneficial in preventing heart attacks and coronary heart disease death. They are also more beneficial than newer antihypertensive medications in preventing one or more other forms of cardiovascular disease, including heart failure and stroke.

Prevention of Type 2 Diabetes

People at risk of developing pre-diabetes and/or type 2 diabetes can make lifestyle changes to prevent or delay progression of the disease. The Diabetes Prevention Program (DPP) studied the effects of lifestyle changes (healthy eating and a physical activity program) and the drug metformin in participants who had pre-diabetes. Results showed that lifestyle modification reduced the study participant's risk of developing type 2 diabetes by 58%. Average weight loss in the first year of the study was 15 pounds. Lifestyle modification was even more effective in those 60 years and older, reducing risk by 71%. Participants receiving metformin reduced their risk of developing type 2 diabetes by only 31% compared to a placebo group. Metformin was most effective in younger, more obese people.

The DPP provided substantial evidence that interventions, specifically modest weight loss (5-10%) and increased physical activity, can help delay or prevent progression of type 2 diabetes (Knowler, 2002). Implementing and maintaining lifestyle change is difficult. Research demonstrates that evidence-based and structured programs are effective for supporting self-empowerment and maintaining behavior change. People who track and monitor lifestyle behavior (daily or weekly weigh-ins, food or physical activity records, etc.) are more likely to maintain weight loss. Health care providers can be instrumental in referring people with increased risk to evidence-based and structured programs like Chronic Disease Self-Management Program or the YMCA Diabetes Prevention Program. Medical nutrition therapy (MNT) is extremely beneficial in assisting people with weight loss and healthy eating. MNT may not be a covered benefit for pre-diabetes; however, some insurance plans do provide this benefit.

The National Diabetes Prevention Program

The National Diabetes Prevention Program is designed to bring evidence-based lifestyle interventions for preventing type 2 diabetes to communities. It is based on the NIH-led Diabetes Prevention Program (DPP) research study and subsequent translation (real-world) studies. The intervention in these studies emphasizes improving dietary choices, increasing physical activity, coping skills, and group support to help participants lose 5% to 7% of their body weight and get at least 150 minutes per week of moderate physical activity. This intervention shows these measures can reduce the risk of developing type 2 diabetes by 58% in people at high risk of the disease.

In March 2010, Congress passed legislation that specifically addresses diabetes prevention through H.R. 3590 — the Patient Protection and Affordable Care Act, SEC. 399V-3, National Diabetes Prevention Program. The legislation authorizes CDC to manage the National Diabetes Prevention Program and establish a network of evidence-based lifestyle intervention programs for those at high risk of developing type 2 diabetes.

CDC's Division of Diabetes Translation is taking a strategic approach to creating the National Diabetes Prevention Program. This approach includes the core elements of:

- **Training:** CDC is helping train the work force that can implement the program cost effectively. To help do this, CDC has established the Diabetes Training and Technical Assistance Center at Emory University
- **Program recognition:** Setting standards that will help ensure program quality and consistency which are necessary components for effectiveness and reimbursement
- **Intervention sites:** Implementing sites that will deliver the intervention to reduce new cases of type 2 diabetes
- **Health marketing:** Raising awareness among both health care providers and high-risk populations to increase referral and use of the program

The National Diabetes Prevention Program provides a critical opportunity for collaboration among federal agencies, community-based organizations, health payers, health care professionals, academia, and others to reduce new cases of type 2 diabetes in the United States. The inaugural partners of the National Diabetes Prevention Program are the Y (also known as YMCA of the USA) and UnitedHealth Group. As the recognition program is implemented, more organizations will become involved in delivering the program intervention.

Programs are currently being offered at YMCA locations in La Crosse, Milwaukee, and Stevens Point (Beginning 2012)-Wisconsin.

Community Coalitions in Wisconsin

Addressing diabetes at a community level is important in terms of creating a supportive environment for residents where they live, work, play, worship, and learn. Many studies suggest improved health behaviors are linked to healthy environments, which indicates a promising future for community intervention work. Many communities in Wisconsin are forming local coalitions to improve physical activity levels and nutrition in their schools, worksites and with other community partners. The Wisconsin Nutrition and Physical Activity Program support these local efforts. A list of local nutrition and physical activity coalitions in the state is available at: http://www.dhs.wisconsin.gov/health/physicalactivity/coalitionwebs.htm.

Assessing Risk for Pre-Diabetes and Type 2 Diabetes in Adults

It is estimated that almost 30% of people with diabetes in Wisconsin are undiagnosed. There is still uncertainty whether the most effective strategy for identifying people with diabetes is screening people at high-risk or population-wide screening. The impact of diabetes on cardiovascular health and the high comorbidity between diabetes and cardiovascular risk factors (e.g., high blood pressure and high cholesterol) support the urgency of identifying people at high risk for developing type 2 diabetes through screening. In Wisconsin, the prevalence of high blood pressure in people with diabetes is 43% higher and the prevalence of high cholesterol is 29% higher than in the non-diabetic population. It is not yet proven that earlier detection improves outcomes for people with type 2 diabetes, but it is logical to suggest that it may help.

For additional information, see the tool "Assessing Risk and Testing for Type 2 Diabetes Pathway" found in the Tools Section.

Opportunistic and Community Screening for Type 2 Diabetes

Neither opportunistic or community screening is shown to be reliably effective. Three problems exist with community screening: 1) follow-up of abnormal results are often not provided or are inconsistent; 2) community screening is not frequently targeted specifically at high-risk populations; and, 3) community screening is not a cost-effective approach to early detection based on U.S. research studies. Since many health care systems do provide community screening at health fairs and other community sites, it is important to emphasize that individuals identified as being at risk for type 2 diabetes through community screening (either through a risk questionnaire or from a random blood glucose test result) receive referral to a health care provider for comprehensive diabetes testing, follow up, and education.

The ADA developed a Diabetes Risk Test which is one tool that can be used for diabetes risk assessment during community screenings or at any other time. The ADA Diabetes Risk Test Tool can be found at (http://www.diabetes.org/risk-test.jsp) or in the Tools Section.

Another community screening option is a program offered by the National Kidney Foundation (NKF). This program offers free health screenings for individuals at increased risk of developing kidney disease, including people with or at risk of developing type 2 diabetes. For more information about the Kidney Early Evaluation Program (KEEP), contact the National Kidney Foundation of Wisconsin at 1-800-543-6393 or at http://www.kidney.org/news/keep/index.cfm.

Tests to Diagnose Increased Risk for Type 2 Diabetes

Four tests can be used to detect those at high risk for type 2 diabetes:

- A1C
- Fasting plasma glucose (FPG)
- Oral glucose tolerance test (OGTT)
- Random plasma glucose

The A1C test was recently identified as an accepted test to predict progression and diagnose type 2 diabetes (ADA, 2012). The FPG test does not always detect impaired glucose tolerance (IGT) and the 2-hour plasma glucose value in the OGTT does not always detect impaired fasting glucose (IFG). A "random" or "casual blood test" is also used to diagnose diabetes. Although the random test is the most convenient, it is not as reliable, sensitive, or effective as the FPG and OGTT tests (Santaguida, 2005). Table 13–1 provides information on the four different test used.

Table 13-1: Tests to Diagnose Increased Diabetes Risk and Diabetes (2012 Criteria)

Test	A1C ♦❖	Fasting Plasma Glucose (FPG) ❖	Oral Glucose Tolerance Test (OGTT) ❖	Random/Casual Plasma Glucose (with symptoms) ⌘
How Performed	Can be measured at any time regardless of eating	Blood glucose is measured after at least an 8 hour fast	75-gram glucose load (drink) is ingested after at least an 8 hour fast; blood glucose is measured at 2 hours	Blood glucose is measured at any time regardless of eating
Normal	≤5.6%	Impaired fasting glucose (IFG) < 100 mg/dL (< 5.6 mmol/L)	Impaired glucose tolerance (IGT) < 140 mg/dL (< 7.8 mmol/L)	
Increased diabetes risk	5.7%-6.4%	100 – 125 mg/dL (5.6 – 6.9 mmol/L)	140 – 199 mg/dL (7.8 – 11.0 mmol/L)	
Diabetes Mellitus	≥ 6.5%❖	≥ 126 mg/dL❖ 7.0 mmol/L	≥ 200 mg/dL❖ (≥ 11.1 mmol/L)	≥ 200 mg/dL (≥ 11.1 mmol/L) (with symptoms)

Adapted from: ADA Clinical Practice Recommendations, 2012

♦ A1C levels when performed using the National Glycohemoglobin Standardization Program (NGSP) method and standardized to the Diabetes Control and Complications Trial (DCCT) reference assay, not point-of-care testing

❖ In the absence of high blood glucose signs and symptoms test should be repeated to confirm diagnosis, preferable using same test

⌘ it is not appropriate to have a person eat a meal and then draw a random glucose two hours after

Also, see the tool "Assessing Risk and Testing for Type 2 Diabetes Pathway" found in the Tools Section.

Children and Adolescents at Risk for Type 2 Diabetes

The incidence of type 2 diabetes in children and adolescents has increased dramatically in the last decade. As with adults, only test children and adolescents at increased risk for the presence of or the development of type 2 diabetes. See the Quick Reference sheet: Test Criteria Type 2 Diabetes in Asymptomatic Children and Adolescents in the Quick References section.

Reducing Risk for Metabolic Syndrome, Pre-Diabetes, and Type 2 Diabetes

Individuals found to be at high risk for diabetes may benefit from education and support that addresses lifestyle changes such as such as weight control, increased physical activity, and moderation of alcohol intake. A Mediterranean-type diet is one option that can reduce cardiovascular disease and diabetes risk (e.g., decrease in inflammation and endothelial dysfunction) and may prove especially beneficial for those with metabolic syndrome or pre-diabetes.

Goals for reducing risk for type 2 diabetes and metabolic syndrome include maintaining a healthy weight and increasing physical activity (Nathan, 2007) to address the two most common underlying causes: insulin resistance and sedentary lifestyle (Grundy et al, 2005). Healthy eating to reduce risk of type 2 diabetes and address metabolic disturbances includes:

- An abundance of fiber, whole grains, fruits, and vegetables
- Legumes (dried beans, split peas, lentils, nuts), low-fat dairy products, fish, poultry, and soy products as primary protein sources
- Moderate amounts of fat from canola or olive oils and nuts
- Reduced amounts of red meats and refined carbohydrates, especially sweets and high-sugar beverages
- Reduced sodium intake and the intake of processed foods

Metformin is considered as one treatment option for individuals at very high risk for developing type 2 diabetes. Studies have provided evidence that metformin is beneficial for preventing or delaying the onset of type 2 diabetes for people with elevated IFG and IGT plus other risk factors such as A1C > 6%, hypertension, low HDL cholesterol, elevated triglycerides or family history of diabetes in a first degree relative. Metformin should only be used in patients with pre-diabetes who are obese and under 60 years of age.

Refer to Table 13-2 for diet and physical activity considerations to assist with reducing risk for type 2 diabetes and other metabolic disturbances. For additional information for reducing risk see the tool titled "50+ Tips to Prevent Type 2 Diabetes" in the Tools Section.

Table 13-2: Diet and Physical Activity Considerations for Reducing Risk for Type 2 Diabetes and Metabolic Syndrome

Goal	Specific Recommendations
Increase physical activity	Minimum of 150 minutes per week at least 3 days a week
Maintain a healthy weight	Weight loss of 5-10% of initial body weight (if BMI ≥ 25.0 kg/m^2) or more (IDF, 2006) (Nathan, 2007)
Decrease total fat and saturated fat	Total fat not greater than 25-35% of calories; saturated fat less than 7% of calories and minimize trans fats
Emphasize monounsaturated fat	Up to 20% of total calories
Carbohydrate intake	Not greater than 50-60% of total calories
Decrease sugar and excess starch	Not greater than 50-60% calories from carbohydrates, with emphasis on whole grains, fruits, and vegetables
Decrease sodium	Not greater than 2300 mg/day; not greater than 1500 mg/day if >51 years old, African American, or if person has hypertension, diabetes, or chronic kidney disease
Increase fiber	Up to 25-30 g/day or 14g fiber/1,000 kcal
Increase antioxidants	Up to 9 servings of fruits and vegetables per day
Increase dietary Magnesium, Calcium, Potassium	Per 2000 calories: Mg – 500 mg Ca – 1200 mg K – 4700 mg

Lifestyle change is important but is difficult for many people. Resources exist to assist people in moving forward with their positive lifestyle change goals. A referral to a registered dietician and/or a diabetes educator are two options if coverage for such is available. If coverage is not available, community resources such as free educational classes, support groups for healthy lifestyle changes, nutrition classes, Medical Nutrition Therapy, telephone support/counseling, and various online resources are other options for consumers. For more information on behavior and lifestyle change specifically for diabetes self-management and medical nutrition therapy see Section 2: *Self-Management Education* and Section 3: *Medical Nutrition Therapy*.

Additional Resources

1. Small Steps, Big Rewards. Prevent Type 2 Diabetes. National Diabetes Education Program (NDEP) Campaign. Information and materials available: http://www.ndep.nih.gov/campaigns/SmallSteps/SmallSteps_index.htm.
2. Assessment and Management of Adult Obesity: A Primer for Physicians. Case Studies in Disease Prevention and Health Promotion. Consists of ten booklets that offer practical recommendations for addressing adult obesity in the primary care setting: http://www.ama-assn.org/ama/pub/category/10931.html.
3. Transtheoretical Model: Stages of Change: http://www.uri.edu/research/cprc/TTM/detailedoverview.htm.
4. Diabetes Prevention Program Lifestyle Materials: http://www.bsc.gwu.edu/dpp/lifestyle/dpp_dcor.html.
5. National Kidney Foundation: Kidney Early Evaluation Program (KEEP): http://www.kidney.org/news/keep/index.cfm.
6. American Diabetes Association (ADA) Risk Test: http://www.diabetes.org/risk-test.jsp.

References

American Diabetes Association. (2012). Standards of Medical Care in Diabetes - 2012.*Diabetes Care*, 2012 35 (supp 1), S11-S63.

Ben-Haroush, A., Yogev, Y., & Fisch,(2004). Insulin resistance and metformin in polycystic ovary syndrome. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 115, 125-133

Biyasheva, A., Legro, R., Dunaif, A., & Urbanek, M.(2009). Evidence for association between polycystic ovary syndrome (PCOS) and TCF7L2 and glucose intolerance in women with PCOS and TCF7L2. *Journal of Clinical Endocrinology Metabolism*, 94, 2617-2625.

Ford, E. S., Giles, W. H., & Mokdad, A. H. (2004). Increasing Prevalence of the Metabolic Syndrome among U. S. Adults. *Diabetes Care*, 27, 2444-2449.

Groop, L., & Orho-Melander, M. (2001). The Dysmetabolic Syndrome. *J Intern Med*, 250, 105-120.

Grundy, S. M., Cleeman, J. I., Daniels, S. R., Donato, K. A., Eckel, R. H., Franklin, B. A., et al. for the American Heart Association and National Heart, Lung, and Blood Institute. (2005). Diagnosis and Management of the Metabolic Syndrome: An American Heart Association/National Heart, Lung, and Blood Institute *Scientific Statement. Circulation*, 112, 2735-2752.

International Diabetes Federation. (2006). The IDF Consensus Worldwide Definition of the Metabolic Syndrome. Retrieved from http://www.idf.org/webdata/docs/IDF_Meta_def_final.pdf.

Knowler, W. C., Barrett-Connor, E., Fowler, S. E., Hamman, R. F., Lachin, J. M., Walker, E. A., et al. for the Diabetes Prevention Program Research Group. (2002). Reduction in the Incidence of type 2 Diabetes with Lifestyle Intervention or Metformin. *NEJM*, 346, 393-403.

Nathan, D. M., Davidson, M. B., DeFronzo, R. A., Heine, R. J., Henry, R. R., Pratley, R., et al. for the American Diabetes Association. (2007). Impaired Fasting Glucose and Impaired Glucose Tolerance: Implications for Care. *Diabetes Care*, 30, 753-759.

National Institute of Health. (2002). Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). *Circulation*, 106(25), 3143-3421.

Prussian, K. H., Barksdale, D. J., & Dieckmann, J. (2007). Racial and Ethnic Differences in the Presentation of Metabolic Syndrome. *J Nurse Pract*, 3, 229-239.

Rendell, M., & Gurwitz, D. (2006). Metabolic Syndrome: A Wake-Up Call. Drug Dev Res, 67, 535-538.

Santaguida, P. L., Balion, C., Hunt, D., Morrison, K., Gerstein, H., Raina, P., et al. (2005). Diagnosis, Prognosis, and Treatment of Impaired Glucose Tolerance and Impaired Fasting Glucose. *Evid Rep Technol Assess*, 128, 1-11.

Sherwin, R. S., Anderson, R. M., Buse, J. B., et al. for the American Diabetes Association. (2004). Prevention or Delay of Type 2 Diabetes. *Diabetes Care*, 27, S47-S54.

Tuomilehto, J., Lindström, J., Eriksson, J. G., Valle, T. T., Hämäläinen, H., Ilanne-Parikka, P., et al. for the Finnish Diabetes Prevention Study Group. (2001). Prevention of Type 2 Diabetes Mellitus by Changes in Lifestyle among Subjects with Impaired Glucose Tolerance. *NEJM*, 344, 1343-1350.

U. S. Preventive Services Task Force. (2008). Screening for Type 2 Diabetes Mellitus in Adults: U. S. Preventive Services Task Force Recommendation Statement. *Ann Intern Med*, 148, 846-854.

Wisconsin Diabetes Prevention and Control Program, Division of Public Health, Department of Health Services (2011). The 2011 Burden of Diabetes in Wisconsin, Available at http://www.dhs.wisconsin.gov/diabetes.

Guidelines for Interpreting Important Research in Diabetes

Landmark national and international research studies provide the scientific evidence, clinical trials, accepted science, and expert opinion that document the:

- Reduction of diabetes-related complications with improved diabetes management
- Importance of optimal diabetes management
- Importance of individualizing management strategies

It is important to review diabetes research with a critical eye. This can assist with ensuring new information is used to direct and improve diabetes care. Factors to consider when reading research include:

Type of research

From strongest to weakest, look for these types of research:

- Randomized, controlled study
- Clinical trial
- Prospective cohort study
- Meta-analysis that incorporates quality ratings in the analysis
- Case control study
- Observational study
- Case series or case report

Size of the study

Larger studies provide more power and multicenter trials or studies will provide more strength to the conclusions than a single institution study.

Research funding

Research can be funded from a variety of organizations from national organizations such as the National Institutes of Health (NIH) to studies funded by a commercial entity.

Conductor of the research

Evaluate the existence of research participants among industry, institutes, and university-based researchers.

Research publications

Look for studies published in major, peer-reviewed medical journals.

Research participants

In addition to the number of research participants, identify their characteristics about age, gender, overall health status, race, and ethnic-cultural background.

Research replication

Confidence is increased if the research has been repeated with similar findings.

Reference

Nadeau, J. & Camp, S. (2006). *Interpreting Research Studies* (2nd ed.). Washington, DC: Guttmacher Institute.

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Wisconsin Diabetes Mellitus Essential Care Guidelines 2012