

Diabetes Knowledge: Standards of Care and Diabetes Management



Presented by:

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ACKNOWLEDGEMENTS

RN.com acknowledges the valuable contributions of...

...**KAREN POPE, MSN, RN, CDE** the primary author of *Diabetes Knowledge: Standards of Care and Diabetes Management*. Karen began her nursing career with an associate degree from the University of Indianapolis. Subsequently, she has earned her BSN, and MSN. Her post graduate education is in community health nursing. Starting her nursing career in the operating room gave Karen her first exposure to the joys of educating her patients. Post operative teaching was a challenge and led to future challenges in education. One of the most rewarding educational experiences in Karen's career was becoming an effective Diabetes Educator. Diabetes is a progressive ongoing disease requiring patients to make major decision and changes in their lifestyles. Karen was instrumental in obtaining Recognition Status from the American Diabetes Association for her organization. As a Diabetes Educator for the past ten years, Karen has acquired vast knowledge in the management and treatment of Diabetes. Karen is currently an Assistant Professor in the School of Nursing for Anderson University. She participates actively in a variety of nursing organizations, currently she serves on the speaker's bureau for Nursing 2000, Hancock Memorial Hospital and Health Services, American Heart Association, and Eli Lilly's DIN program.

This article is provided to RN.com by Isprit, a Chronic Disease Management company dedicated to providing tools that improve healthcare. Learn how to easily integrate National Guidelines into your daily practice by visiting www.isprit.com.



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PURPOSE & OBJECTIVES

The purpose of this course is to review diagnosis criteria, pathophysiology, education, and standards of care in the patient with diabetes.

After successful completion of this course, the participant will be able to:

1. Identify the blood glucose levels used for the diagnosis of Diabetes.
2. Describe the pathophysiology of Diabetes.
3. Utilize teaching concepts of survival skills necessary for the discharge of a newly diagnosed (or uncontrolled) patient with diabetes to home.
4. Describe how communication between healthcare providers emphasizes the standards of care necessary for preventing complications from Diabetes.
5. Document critical information required for the patient diagnosed with Diabetes.

INTRODUCTION

Diabetes Mellitus, commonly referred to as Diabetes, is a chronic illness that requires continual medical attention and patient education to prevent acute complications and to reduce the risk of long-term complications. It is one of the oldest diseases known, described by the ancient Greeks as early as one hundred AD. The word “Diabetes” originates from the ancient Greek word for “flow-through,” since two of the most common symptoms are extreme thirst and a need to urinate frequently.

The magnitude of the problem exerts a tremendous strain on the economy:

- Greater than 30% of individuals aged 60 years or older have Diabetes Mellitus or impaired fasting glucose (IFG).
- 15.6 million Americans have the disease.
- 5.4 million are unaware they have the disease.
- Each year, more than 798,000 Americans develop Diabetes.
- One out of every seven healthcare dollars is spent on Diabetes.

Approximately one-third of all people with Diabetes may be undiagnosed.

In this course...

Criteria for various classifications of Diabetes will be from the American Diabetes Association. Other associations/labs/entities may differ somewhat.

CLASSIFICATIONS AND DIAGNOSIS

Diabetes can be classified into four major types:

- Type 1 Diabetes (approximately 10% of all patients with diabetes)
- Type 2 Diabetes (approximately 90% of all patients with diabetes)
- Other specific types of Diabetes (resulting from medication use, birth defects, and other disease conditions)
- Gestational Diabetes Mellitus (GDM) diagnosed during pregnancy

Diabetes Diagnosis

The following criteria are used by the ADA to diagnose DM:

- Symptoms of Diabetes plus a casual (anytime of day without regard to meals) plasma glucose concentration ≥ 200 mg/dL
- OR**
- Fasting (defined as no food for at least 8 hours) plasma glucose (FPG) of ≥ 126 mg/dL
- OR**
- Two-hour plasma glucose > 200 mg/dL during an oral glucose tolerance test (OGTT) with the use of a 75 g anhydrous glucose dissolved in water. (The OGTT is not usually recommended for routine clinical use.)

Normal blood glucose
70 – 110 mg/dL

The classic symptoms seen with Diabetes are:

- Polydipsia
- Polyuria
- Unexplained weight loss

Less common symptoms:

- Blurring vision
- Lethargy
- Increased appetite



Pre-Diabetes

With the attention of both healthcare providers and the public, more individuals are being diagnosed in the “pre-diabetic” phase. These patients are at risk for development of Type 2 Diabetes. Intervention at this phase may prevent some of these “pre-diabetics” from progressing to Diabetes.

The symptoms of Pre-Diabetes are:

- Impaired Fasting Glucose (IFG)
(IFG is fasting plasma glucose of 100 to 125mg/dL)

OR

- Impaired Glucose Tolerance (IGT) is a plasma glucose level of 140 mg/dL to 199 mg/dL 2 hours post 75g anhydrous glucose load (ADA Standards, 2004)

Normal Glycated Hgb
(HbA1c)
 $\leq 6.4\%$

Glycated Hemoglobin (HbA1c) is not recommended for use in diagnosis of Diabetes. It is used after diagnosis to measure an average blood glucose level (usually over 3 months).

≥ 9 = poor control
7-9 = average control
 < 7 = good control

TYPES OF DIABETES

As mentioned previously, there are 4 main types of DM. Three will be discussed here. The fourth type, due to medication use, birth defects, or other disease conditions usually mimics Type 1 or 2.

Type 1 Diabetes

“Type 1 Diabetes is defined as the presence of ketosis caused by complete or almost complete lack of insulin” (Edelman & Henry, 2002, p.29). Patients require daily therapy with exogenous insulin to prevent metabolic decompensation, ketosis, and death. Previously called Juvenile Onset Diabetes, the classification of “Type 1” now describes the characteristics of the disease, rather than its onset.

Characteristics of Type 1 Diabetes

- Previously called Juvenile Onset Diabetes
- Can occur at any age
- Often has an abrupt onset
- Signs and symptoms usually occur before age 20
- Positive urine ketone test with hyperglycemia
- Insulin therapy necessary to prevent ketoacidosis (an acute metabolic complication from a profound insulin deficiency)

Type 2 Diabetes

Formerly called “Adult Onset Diabetes,” the more correct title of Type 2 is now used. Insulin resistance, rather than a lack of production of insulin, distinguishes Type 1 from Type 2.

Characteristics for Type 2 Diabetes

- Formerly called Adult Onset Diabetes
- Diagnosis usually after the age of 30 (although more children are being diagnosed)
- Patient is often overweight or obese
- Exogenous insulin is usually not required to control hyperglycemia initially. However, insulin dependence may occur as the disease progresses

Gestational Diabetes

“Pregnant women who have never had Diabetes before but who have high blood sugar (glucose) levels during pregnancy are said to have Gestational Diabetes. Gestational Diabetes affects about 4% of all pregnant women - about 135,000 cases of Gestational Diabetes in the United States each year” (ADA, Standards, 2004).

Many patients who have Gestational Diabetes will develop Type 2 Diabetes later in life.

Characteristics of Gestational Diabetes:

- Abnormal blood sugar levels during pregnancy with no history of Diabetes
- Symptoms of Diabetes
- Family history of Diabetes is often present

To Classify or Not to Classify...

There are several problems with classification. It can be difficult to distinguish between Type 1 and Type 2 in some cases. An example would be a young Type 2 patient who is thin and taking insulin. This patient resembles Type 1.

Some patients have symptoms characteristic of Type 2 but may be taking insulin. The difference is the Type 2 patient with Diabetes is taking insulin to control hyperglycemia while the Type 1 patient needs insulin to sustain life.

Patient Involvement

“Diabetes is a chronic illness that requires continuing medical care and education to prevent acute complications and to reduce the risk of long-term complications” (ADA, 2004). Empowering individuals to take charge of their Diabetes can reduce risks of long-term complications. Standards of care provided by the American Diabetes Association should be provided to each patient and the patient should be encouraged to seek all of the recommendations for continued healthcare and support. Patients should be encouraged to ask questions of their primary care physician and insist on the right care needed for management of Diabetes. The role of the patient is the most important one. They are “responsible for daily self-management, including diet, exercise, blood glucose measurements, medication dosing, and costs of care” (Albisser, 1999).

Glasgow, Boles, Calder, Dreyer, & Bagdale, (1999) studied the quality and level of care provided to patients. Their findings showed a low level of care for even basic management and preventive services. One of their most alarming findings was that behavioral recommendations such as receiving self-management education, medical nutrition therapy, and smoking cessation, were achieved so seldom.

Can Diabetes Be Prevented?

Most of the effort related to Diabetes prevention is aimed at Type 2 Diabetes. Since this affects 90% of patients with Diabetes, and is related to lifestyle more than Type 1 or Gestational Diabetes, placing emphasis on Type 2 Diabetes prevention makes good sense.

Preventative measures involve the following lifestyle changes:

Losing weight: Is your patient more than 20% over their ideal body weight? Losing even a few pounds can help prevent Type 2 Diabetes.

Making healthy food choices: Following simple daily guidelines, like eating a variety of foods including fresh fruits and vegetables, limiting fat intake to 30% or less of daily calories, and watching portion size, can all decrease the risk of Type 2 Diabetes. Healthy eating habits can go a long way in preventing not only Diabetes but also other health problems.

Exercising: Regular exercise allows the body to use glucose without extra insulin. This helps combat insulin resistance, and is one of the keys to why regular exercise is helpful to people with Diabetes. Patients should never start an exercise program without checking with your doctor first (ADA Standards, 2004).



PATHOPHYSIOLOGY OF DIABETES

Pathophysiology of Type 1 Diabetes

The pathophysiology of Type 1 Diabetes is characterized by little or no insulin present in the body. Without the proper amount of insulin, the body cannot use the glucose and it accumulates in the blood stream causing hyperglycemia.

Diabetic ketoacidosis (DKA), resulting from severe insulin deficiency, accounts for most hospitalizations. It is the most common cause of death, most often due to cerebral edema in pediatric diabetic patients. Patients with acute infections, (i.e. kidney infection) are at a higher risk for DKA.

Diabetic Ketoacidosis (DKA)

Symptoms of DKA:

- Hyperglycemia
- Dehydration and thirst
- Acidosis
- Rapid deep respirations (Kussmaul Breathing)
- Coma
- Hyperosmolality

Care of the patient with DKA involves:

- IV insulin to maintain blood glucose at the levels ordered by the healthcare provider
- ECG monitoring
- Monitoring and correcting potassium levels
- Monitoring and correcting sodium levels
- Mannitol kept at bedside for 36 hours
- Slow, steady hydration
- Maintaining accurate flow sheet information

The goals of treatment are to:

- Stop ketogenesis (development of ketone bodies which can kill cells) by giving insulin, which will reverse proteolysis and lipolysis (protein and fat breakdown), and stimulate glucose uptake and processing. All these actions normalize blood glucose concentration.
- Restore perfusion, which will increase glucose use in the periphery and reverse the progressive acidosis.
- Correct electrolyte losses.
- Avoid the complications of treatment as much as possible, including intracerebral complications, hypoglycemia, and hypokalemia.

Pathophysiology of Type 2 Diabetes

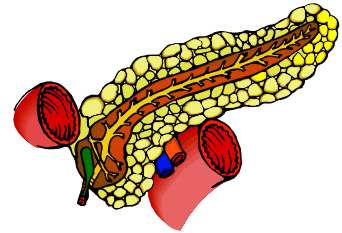
“Type 2 Diabetes is known to have a strong genetic component with contributing environmental determinants” (Edelman & Henry, 2002, p.19). In Type 2 Diabetes insulin resistance and abnormalities of pancreatic insulin secretion are initially manifested. The pancreas tries to compensate by secreting more insulin to maintain the pre-diabetic state. However, in time the pancreas fails to maintain equilibrium resulting in hyperglycemia.

Patients with Type 2 Diabetes and fasting hyperglycemia usually exhibit three common characteristics:

- Insulin resistance
- Impaired insulin secretion
- Increased hepatic glucose production

Genetic factors underlie the etiology of Type 2 Diabetes in most patients but acquired factors may also contribute to the diagnosis:

- Obesity (central or visceral obesity)
- Sedentary lifestyle
- High-fat diets



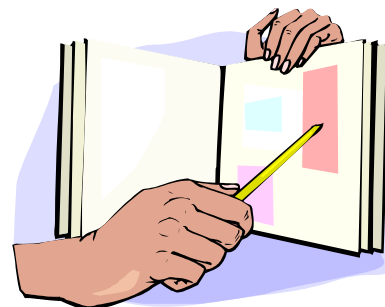
The Pancreas

PATIENT CARE ISSUES

Patient Teaching

Survival skills are the skills needed by your diabetic patients to manage Diabetes on their own. They include but are not limited to:

- Diet
- Medications
- Exercise
- Use of blood glucose monitor
- Knowledge of the signs/symptoms and management of hyper/hypoglycemia
- Foot and skin care
- When to call the doctor
- Sick day guidelines (discussed later in the course)



Appendix A is a sample of a Diabetes Education Flow Sheet that covers the basic areas that are followed for a patient with diabetes.

Diet

Newly diagnosed patients as well as those with uncontrolled Diabetes can benefit from seeing a dietician. Diet information can provide a basis for patients to begin controlling their disease. Generally a follow-up session is necessary to reinforce diet concepts. Carbohydrate counting and portion control should be emphasized.

Medications

Upon discharge, your patient should know what medications to take, the proper dose, when to take them, and what kind of side effects are involved. Generally, the nurse provides most or all of this information. Be certain that you document the education given per your facility standards. Patient comprehension is a key part of education and the tools you use for patient education will likely include some kind of acknowledgement for patient education.

Specifics of the oral hypoglycemics and insulin types are included in Appendices B and C.

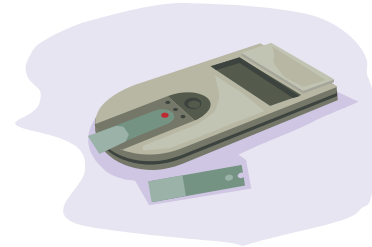
Exercise

Exercise reduces the amount of insulin necessary to lower the blood glucose. After consulting with their healthcare provider, patients with diabetes should be encouraged to exercise five times a week. Consistent exercise is important. A drastic change in exercise regimen may affect the dosage of your patient's medications and should be discouraged.



Blood Glucose Monitoring

There are a number of blood glucose monitors available today. Patients need to be able to demonstrate use of the monitor prescribed or provided. Patients cannot accurately or effectively monitor their blood glucoses if they are not competent in the use of the machine they are using.



Different patients may require different machines, whether due to personal preference or other complicating factors. Be certain to “fit the monitor to the patient.” Monitors are available with large type as well as voice-activated for the vision impaired. Financial hardship or insurance issues may impact the type of monitor available to your patient. You may have to work with other departments to find creative ways to make sure your patient has the necessary supplies needed for daily monitoring. Social services may be a great resource to assist in this effort.

Hypoglycemia

Inform the patient when to call the healthcare provider. Educate all patients with diabetes on the symptoms and treatment of hypoglycemia.

- Hypoglycemia (also called an insulin reaction) occurs when blood glucose is too low. Hypoglycemia can be caused by a number of factors: too much insulin, not enough food, too much exercise, eating late, or not eating enough carbohydrates. In short, it happens when insulin and blood glucose are out of balance.
- The clinical definition of hypoglycemia also implies that the patient has symptoms consistent with hypoglycemia, a documented low blood sugar reading, and that the symptoms resolve within minutes following the effective treatment of the hypoglycemia (Whipple's triad).
- Patients at risk for hypoglycemia should be provided with a glucagons kit. Instructions are included in the kit for administration but it is important for the nurse to emphasize to the patient/family the risk for vomiting after a glucagons injection. After injection place patient on his or her side to prevent aspiration.
- The whole blood glucose is 10 - 15% less than the serum/plasma glucose; most pediatric experts agree that children are hypoglycemic if the blood sugar < 40 mg/dL.

**The following information is a sample policy for hypoglycemic reactions:
(Always follow your individual healthcare facility's policy)**

In the event that a patient's serum glucose or capillary blood glucose falls below 70 mg/dL and the patient has an acute alteration in neurological state, therapy is usually initiated.

Healthcare facilities use different criteria for determining a hypoglycemic event.

Sample criteria:

- Serum or capillary glucose falls below 70 mg/dL
- Patient experiences a change in neurological status

Sample treatment:

- Initiate treatment per hospital protocol i.e. 10mL/minute of 50% Dextrose IVP for a total of 50 ml
- Contact on-call healthcare provider
- Recheck capillary blood glucose within 15 minutes
- Do not offer orange juice or other food source until patient is able to swallow and is alert

Hyperglycemia

Hyperglycemia occurs when blood glucose levels are too high. Increased glucose in the blood, which can lead to DKA, is caused by any of these factors or a combination of:

- Not enough insulin in the body
- Too much food
- Not enough activity
- Stress
- Illness

The symptoms hyperglycemia include:

- Blurred vision
- Fatigue dry mouth
- Polydipsia (thirsty)
- Polyuria (frequent urination)
- Polyphagia (hunger)
- Dehydration
- Vomiting
- Abdominal pain

(Diabetic ketoacidosis, which was discussed previously in this article, occurs when hyperglycemia leads to the development of lactic acidosis with ketones present in the urine.)

Hyperosmolar Hyperglycemic Nonketotic Syndrome

Hyperosmolar Hyperglycemic Nonketotic Syndrome occurs when blood glucose rises to dangerously high levels without ketones in the urine. This is the key difference between HHNS and DKA. HHNS is usually seen in older patients. Excessive urine output, due to the extremely high glucose level, leads to dehydration, hypotension, and fever. Neurological symptoms range from dizziness to hallucinations. The patient is extremely dry and parched and blood glucose levels can be over 600 mg/dL. HHNS is a crisis and if not quickly treated can lead to irreversible coma and death.

Hypo-or Hyperglycemia Which is it?

When you have an unconscious or incoherent diabetic patient, how do you determine if you are treating hyper- or hypoglycemia? With the advent of fingerstick blood glucose monitoring with almost instantaneous results, this issue is less critical than in the past. However, the symptoms do differ and by evaluating the symptoms of a patient, you can make a “best guess” as to whether you are dealing with hyper- or hypoglycemia.

- Hypoglycemic patients present with cool, clammy skin, and rapid pulse
- Hyperglycemic patients present with ketone breath (sweet fruity smell), rapid breathing, sunken eyeballs, and rapid pulse.

LONG TERM COMPLICATIONS OF DIABETES

Long-term complications of Diabetes are generally due to macrovascular disease or microvascular disease.

Macrovascular Complications:

- Coronary artery disease
- Cerebrovascular
- Peripheral vascular

Microvascular Complications:

- Neuropathy-neuropathies most often occur in the lower extremities, causing numbness and tingling.
- Retinopathy – no symptoms are detected early in the stages of retinopathy. It is imperative for patients to have frequent evaluations (yearly eye exams).
- Nephropathy – structural and functional disease of the kidneys occurs in poorly controlled Diabetes. Nephropathy can eventually lead to end stage renal disease. (Yearly kidney function should be evaluated.)
- Foot disorders: more than half of all nontraumatic amputations occur in individuals with diabetes and could have been prevented with proper foot care (Edelman & Henry, 2002).

Nurses Make a Difference

Appendix D contains information and guidelines on foot care. The ADA (www.ada.gov) has similar guidelines for the professional and the patient in a number of different areas. The example provided not only gives you specific information on foot care, but also shows you the type of information available on the ADA website. We selected foot care because it is a key area that good nursing care and patient education impact.

Sick Day Guidelines

Managing Diabetes when sick is always a challenge. Much work has been done to standardize “Sick Day Guidelines” for patients and healthcare providers. The following Sick Day Guidelines is one such example. One of the keys to the management of the ill diabetic is to maintain a healthy blood sugar level. This usually involves taking the usual diabetic medications and close monitoring of blood glucose.

Always follow your individual healthcare facility’s policy

Sick Day Guidelines

Always remind your patients to take their medications even when they cannot eat. In many cases additional medication will be needed due to illness increasing stress and blood glucose levels. Check with your healthcare provider or Diabetes educator.

1. Have your patients check their blood sugar and ketones. Take blood glucoses more often. Any time blood glucose levels are over 250 check urine for ketones. Keep records to provide for the healthcare provider.
2. Be sure and have your patient drink plenty of fluids — about 6 to 8 ounces every hour.
3. Have your patient rest and stay warm.
4. Have your patient call their healthcare provider for any of the following reasons:
 - a. Vomiting or diarrhea.
 - b. Blood sugar values that remain above 250 for at least two blood sugar checks or do not decrease with extra insulin. Do this whether you have ketones or not.
 - c. If you have moderate or large ketones.
 - d. If you have questions or concerns (Joslin, 2004).

PREVENTION OF COMPLICATIONS

Albisser (1999) and his colleagues were quick to point out that “self-monitoring of blood glucose should be the cornerstone of Diabetes disease management programs” (Albisser, 1999, p. 966). The American Diabetes Association stated “Diabetes self-management education (DSME) is the cornerstone of care for all individuals with Diabetes who want to achieve successful health-related outcomes. The National Standards for DSME are designed to define quality Diabetes self-management education that can be implemented in diverse settings and will facilitate improvement in healthcare outcomes” (ADA Standards, 2004). Both articles stressed the importance of self-management of the disease.

The frequency in which the patient needs to be seen depends on many factors. At every visit the patient’s progress in achieving treatment goals is evaluated. If the goals are not being met, the plan is revised or the goals reassessed. Some factors that determine how often the patient needs to be seen are:

- Type of Diabetes
- Blood glucose goals
- Changes in treatment
- Presence of complications
- Other medical conditions

At each visit, obtain history of frequency of hyperglycemia or hypoglycemia, results of self-monitoring, adjustments made by the patient to the planned regimen, problems with adherence, symptoms of complications, other illnesses, current medications, psychosocial issues, lifestyle changes, and tobacco and alcohol use (ADA Standards, 2004). In addition to these issues, knowledge of Diabetes and self-management skills should be reassessed at least annually. Continuing education should be provided or encouraged. A firm educational basis is the foundation that allows the individual and the family to be more independent.

Disease Management

Disease management is “the application of systems necessary to minimize healthcare expenditures, or a systematic proactive case management model that uses an organized approach to provide early intervention along a continuum of care, and that includes active patient self care participation in maintaining their optimum state of health” (Koch, 1998). Beyerman (2000) informed us of ways to find patients with Diabetes that need to be in the self-management programs. The goals are defined for the patients who are “at risk” for Diabetes, undiagnosed with Diabetes, and diagnosed but not maintaining control.

CONCLUSION

Cohen and Deback (1999) stated that there are four principles required for “a foundation in the creation of the future healthcare system. Nurses’ roles must now move from protecting and advocating for the patients in a sickness-based system to advocating and representing the community in creating a much more comprehensive, consonant, and integrated health-based delivery system” (Cohen, 1999, p. 11).

The guidelines that need to be examined to verify that the patient has met their goals are outlined in the article Standards of Medical Care for Patients with Diabetes Mellitus provided by the American Diabetes Association (ADA, 2004).

Outcomes are important in the evaluation of any type of program whether it is in the healthcare field or in other work-related areas. Nursing care provided, either in the form of direct care, direction of care by others, or education, is part of a program’s measurement of success. Over the past ten years there has been an increasing demand to demonstrate value for the nursing care services provided. Hospitals are relying more and more on surveys and benchmarking against other like facilities.

Diabetes is a highly manageable disease and with proper awareness by patients of the benefits of Diabetes education, access to education, and barriers to follow up we can get better outcomes, better management, and a higher quality of life while saving the nation healthcare dollars.

Diabetes management increases caregiver and patient awareness, improves patient education, allows greater access to education, and breaks down the barriers to follow up care. Through Diabetes management we can achieve improved quality of life for patients with diabetes while saving healthcare dollars.

APPENDIX A

Diabetes Education Flow Sheet:

Attachment 1

DATE: _____ NAME: _____ AGE: _____ MD _____

Use of ASA _____ Depression _____ Driving precautions _____ Wears ID _____ Carries Glucose Source _____

Follow up visits: _____

MEDS: _____

DIET/CALORIES _____

INSULIN DOSAGES AND CHANGES: _____

INDICATOR	Frequency/goal	Date:	Date:	Date:	Date:
SMBG LOG	Every visit				
Weight	Every visit				
Blood Pressure	Every visit				
Foot check	Every visit				
HbA1c	Every 3 months				
Planned Goals	Initial visit				
Goals Met	Check with each visit				
Vaccinations	Flu annually, pneumococcal				
Cholesterol	Annually				
LDL	Annually				
HDL	Annually				
Triglycerides	Annually				
Microalbuminuria	Annually				
Dilated eye exam	Annually				
Medication change					
Drug:					
Dose:					
Drug:					
Dose:					
Drug:					
Dose:					
Dental Exams	Twice yearly				
Exercise program	Every visit				
Smoking Cessation	Periodically				
Nutritional review	Periodically				

Comments/Problem: _____

APPENDIX B

Oral Medications

Class	Generic Name	Brand Name	Dose	Comments
Sulfonylureas	Actohexamide	Generic only	1–2 times a day	
	Chlorpropamide	Diabinese	Once a day	Alcohol will cause tingling in neck and arms, red eyes, and flushed face. May cause hypoglycemia.
	Glimepiride	Amaryl	Once a day	
	Glyburide	DiaBeta, Glynase, PresTab, Micronase	1-2 times a day	Intermediate acting but effects may last entire day.
	Glipizide	Glucotrol, Glucotrol XL	1-2 times a day	Appears to be more effective when taken before meals
	Tolazamide	Tolinase	1-2 times a day	
Biquanides	Metformin	Glucophage	2-3 times a day	Doesn't promote weight gain, rarely produces hypoglycemia, side effects: nausea, diarrhea, loss of appetite. Take with food and start with low dose.
Sulfonylurea/Biguanide combination	Metformin/ Glyburide	Glucovance	2-3 times a day	Combination of metformin and glyburide. May cause some hypoglycemia.
Alpha-Glucosidase Inhibitors	Acarbose	Precose	Take with first bite of meal	Acarbose and igitol don't cause hypoglycemia. Side effects: gas, bloating, and diarrhea. Start with low dose.
Thiazolidinediones	Rosiglitazone	Avandia	1-2 times a day	More often used with other meds but may be used alone. Serious liver damage can occur and blood tests should be done before starting treatment and every two months after for one year.
	Pioglitazone	Actos	Once a day	Same as above
Meglitinides	Nateglinide	Starlix	Take before meals	Skip if not eating, take with glass of water
	Repaglinide	Prandin	Take right before meals	Don't take if skipping meals, may cause hypoglycemia

APPENDIX C

Insulin Action Chart

Type	Onset Hours	Peak	Duration	Variability in Absorption	Miscibility with Lispro or Regular
LISPRO/Humalog	0.10 - 0.25	0.75 - 2.0	4.0 - 5.0	Minimal	
Regular	0.10 - 1.0	1.0 - 4.0	4.0 - 10	Moderate	
NPH	1.0 - 3.0	5.0 - 7.0	13 - 18	High	Yes w/regular and w/humalog
Pre-mixed (70/30, lispro mix 75/25 equivalent to sum of above components)					
LENTE	1.5 - 4.0	4.0 - 8.0	13 - 20	High	Yes w/regular and w/humalog
ULTRALENTE	2 - 6	8.0 - 12	18 - 30	Very High	Yes w/regular and w/humalog
GLARGINE/Lantus (dosing guidelines: type 2: 10U type 1 on single dose, start with current insulin dose, type 1 on twice-daily insulin, start approx. 20% < total daily dose of NPH)	2 - 4	NONE	24	Moderate to High	NO!!!! PRECIPITATES

APPENDIX D

Footcare and Footcare Guidelines

Footcare: Amputation and foot ulceration are the most common consequences of diabetic neuropathy and major causes of morbidity and disability in people with Diabetes. Early recognition and management of independent risk factors can prevent or delay adverse outcomes.

The risk of ulcers or amputations is increased in people who have had Diabetes >10 years, are male, have poor glucose control, or have cardiovascular, retinal, or renal complications. The following foot-related risk conditions are associated with an increased risk of amputation:

- Peripheral neuropathy with loss of protective sensation
- Altered biomechanics (in the presence of neuropathy)
- Evidence of increased pressure (erythema, hemorrhage under a callus)
- Bony deformity
- Peripheral vascular disease (decreased or absent pedal pulses)
- A history of ulcers or amputation
- Severe nail pathology

All individuals with Diabetes should receive an annual foot examination to identify high-risk foot conditions. This examination should include assessment of protective sensation, foot structure and biomechanics, vascular status, and skin integrity. People with one or more high-risk foot conditions should be evaluated more frequently for the development of additional risk factors. People with neuropathy should have a visual inspection of their feet at every visit with a healthcare professional. Evaluation of neurological status in the low-risk foot should include a quantitative somatosensory threshold test, using the Semmes-Weinstein 5.07 (10-g) monofilament. The skin should be assessed for integrity, especially between the toes and under the metatarsal heads. The presence of erythema, warmth, or callus formation may indicate areas of tissue damage with impending breakdown. Bony deformities, limitation in joint mobility, and problems with gait and balance should be assessed.

People with neuropathy or evidence of increased plantar pressure may be adequately managed with well-fitted walking shoes or athletic shoes. Patients should be educated on the implications of sensory loss and the ways to substitute other sensory modalities (hand palpation, visual inspection) for surveillance of early problems. People with evidence of increased plantar pressure (e.g., erythema, warmth, callus, or measured pressure) should use footwear that cushions and redistributes the pressure. Callus can be debrided with a scalpel by a foot care specialist or other health professional with experience and training in foot care. People with bony deformities (e.g., hammertoes, prominent metatarsal heads, bunions) may need extra-wide shoes or depth shoes. People with extreme bony deformities (e.g., Charcot foot) that cannot be accommodated with commercial therapeutic footwear may need custom-molded shoes.

Initial screening for peripheral arterial disease (PAD) should include a history for claudication and an assessment of the pedal pulses. Consider obtaining an ankle-brachial index (ABI), as many patients with PAD are asymptomatic. Refer patients with significant or a positive ABI for further vascular assessment and consider exercise, medications, and surgical options.

Patients with diabetes and high-risk foot conditions should be educated regarding their risk factors and appropriate management. Patients at risk should understand the implications of the loss of protective sensation, the importance of foot monitoring on a daily basis, the proper care of the foot, including nail and skin care, and the selection of appropriate footwear. The patient's understanding of these issues and their physical ability to conduct proper foot surveillance and care should be assessed. Patients with visual difficulties, physical constraints preventing movement, or cognitive problems that impair their ability to assess the condition of the foot and to institute appropriate responses will need other people, such as family members, to assist in their care. Patients at low risk may benefit from education on foot care and footwear.

Problems involving the feet, especially ulcers and wound care, may require care by a podiatrist, orthopedic surgeon, or rehabilitation specialist experienced in the management of persons with diabetes. For a complete discussion on wound care, see the ADA's consensus statement on diabetic foot wound care.

A multidisciplinary approach is recommended for persons with foot ulcers and high-risk feet, especially those with a history of prior ulcer or amputation.

(A)*

- The foot examination can be accomplished in a primary care setting and should include the use of a Semmes-Weinstein monofilament, tuning fork, palpation, and a visual examination. (B)
- Educate all patients, especially those with risk factors, including smoking, or prior lower-extremity complications, about the risk and prevention of foot problems and reinforce self-care behavior. (B)
- Refer high-risk patients to foot care specialists for ongoing preventive care and life-long surveillance. (C)
- Initial screening for PAD should include a history for claudication and an assessment of the pedal pulses. Consider obtaining an ABI, as many patients with PAD are asymptomatic. (C)
- Refer patients with significant claudication or a positive ABI for further vascular assessment and consider exercise, medications, and surgical options. (C)
- Perform a comprehensive foot examination annually on patients with diabetes to identify risk factors predictive of ulcers and amputations. Perform a visual inspection of patients' feet at each routine visit. (E)

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Table 1— ADA evidence grading system for clinical practice recommendations

Level of evidence	Description
A	Clear evidence from well-conducted, generalizable, randomized controlled trials that are adequately powered including: <ul style="list-style-type: none"> • Evidence from a well-conducted multicenter trial • Evidence from a meta-analysis that incorporated quality ratings in the analysis • Compelling nonexperimental evidence, i.e., "all or none" rule developed by Center for Evidence Based Medicine at Oxford
	Supportive evidence from well-conducted randomized controlled trials that are adequately powered including: <ul style="list-style-type: none"> • Evidence from a well-conducted trial at one or more institutions • Evidence from a meta-analysis that incorporated quality ratings in the analysis
B	Supportive evidence from well-conducted cohort studies <ul style="list-style-type: none"> • Evidence from a well-conducted prospective cohort study or registry • Evidence from a well-conducted prospective cohort study • Evidence from a well-conducted meta-analysis of cohort studies
	Supportive evidence from a well-conducted case-control study
C	Supportive evidence from poorly controlled or uncontrolled studies <ul style="list-style-type: none"> • Evidence from randomized clinical trials with one or more major or three or more minor methodological flaws that could invalidate the results • Evidence from observational studies with high potential for bias (such as case series with comparison to historical controls) • Evidence from case series or case reports
	Conflicting evidence with the weight of evidence supporting the recommendation
D	Expert consensus or clinical experience*

*ADA Standards of Medical Care 2004

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