

Standards of Medical Care for Patients With Diabetes Mellitus

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. People with diabetes should receive their treatment and care from physicians with expertise and a special interest in diabetes. The following standards define basic (minimum) medical care for people with diabetes. These standards are not intended to preclude more extensive evaluation and management of the patient. For more detailed information refer to *Physician's Guide to Insulin-Dependent (Type I) Diabetes: Diagnosis and Treatment* and *Physician's Guide to Non-Insulin-Dependent (Type II) Diabetes: Diagnosis and Treatment*.

INITIAL VISIT

Medical history

The comprehensive medical history can uncover symptoms that will help establish the diagnosis in the patient with previously unrecognized diabetes. If the diagnosis of diabetes has already been made, the history should confirm the diagnosis, review the previous treatment, help evaluate the present degree of glycemic control, determine the presence or absence of the chronic complications of diabetes, assist in formulating a management plan, and provide a basis for continuing care. Elements of the medical history of particular concern in patients with diabetes include:

- Symptoms and laboratory test results related to the diagnosis of diabetes

- Dietary habits, nutritional status, and weight history; growth and development in children
- Details of previous treatment programs, including diabetes education
- Current treatment of diabetes, including medications, diet, and results of glucose monitoring
- Exercise history
- Frequency, severity, and cause of acute complications such as ketoacidosis and hypoglycemia
- Prior or current infections, particularly skin, foot, dental, and genitourinary
- Symptoms and treatment of chronic complications associated with diabetes: eye, heart, kidney, nerve, sexual function, peripheral vascular, and cerebral vascular
- Other medications that may affect blood glucose concentration
- Risk factors for atherosclerosis: smoking, hypertension, obesity, hyperlipidemia, and family history
- Psychosocial and economic factors that might influence the management of diabetes
- Family history of diabetes and other endocrine disorders
- Gestational history: hyperglycemia, delivery of an infant weighing >9 lb, toxemia, stillbirth, polyhydramnios, or other complications of pregnancy

Physical examination

A complete physical examination should be performed during the initial evaluation. Individuals with diabetes are at high risk of developing eye, kidney, nerve, cardiac, and vascular complications. Patients with type I (insulin-dependent) diabetes also have an in-

creased frequency of thyroid disease, and all individuals with diabetes are at increased risk of infections. Children may have delayed growth and maturation. Therefore, certain aspects of the physical examination require *special* attention. These include:

- Height and weight measurement (and comparison to norms in children)
- Sexual maturation staging
- Blood pressure determination (with orthostatic measurements)
- Ophthalmoscopic examination, if possible with dilation
- Thyroid palpation
- Cardiac examination
- Evaluation of pulses (with auscultation)
- Foot examination
- Skin examination (including insulin-injection sites)
- Neurological examination
- Dental and periodontal examination

The examiner should also be alert for signs of diseases that can cause secondary diabetes, e.g., hemochromatosis, pancreatic disease, and endocrine disorders such as acromegaly and Cushing's syndrome.

Laboratory evaluation

Each patient should undergo laboratory tests that are appropriate to the evaluation of the individual's general medical condition. In addition, certain tests should be obtained to establish the diagnosis of diabetes, determine the degree of glycemic control, and define associated complications and risk factors. These include:

- Fasting plasma glucose: a random plasma glucose may be obtained in an undiagnosed symptomatic patient for diagnostic purposes
- Glycosylated hemoglobin (HbA_{1c} or HbA_{1c})
- Fasting lipid profile: total cholesterol, high-density lipoprotein (HDL) cholesterol, low-density lipoprotein (LDL) cholesterol, and triglycerides
- Serum creatinine in adults or if proteinuria is present

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- Urinalysis: ketones, glucose, protein, microscopic if indicated; after 5 yr of diabetes or after puberty, total urinary protein excretion should be measured by a microalbuminuria method if available
- Urine culture: if microscopic is abnormal or symptoms are present
- Thyroid function tests (T4 or thyroid-stimulating hormone)
- ECG (in adults)

Management plan

The management plan should be formulated as an individualized therapeutic alliance between the patient/family, the physician, and other members of the health-care team (e.g., RN, RD) to achieve the desired level of diabetes control. Consideration must be given to the age of the patient, school or work schedules and conditions, physical activity, eating habits, social situation and personality, and presence of complications of diabetes or other medical conditions.

Implementation of the management plan requires that each aspect be understood by the patient and the care provider and that the goals and means be considered realistic. Instructions and plans should be reinforced by providing written material appropriate to the patient/family educational level. The management plan should include:

- Statement of goals
- Medications: insulin, oral glucose-lowering agents, antihypertensive, lipid-lowering agents, or other medications as needed
- Individualized nutrition recommendations and instructions, preferably by a dietitian
- Recommendations for life-style changes (e.g., exercise, smoking cessation)
- Patient and family education: assessment of knowledge and understanding of diabetes and diabetes management skills; plan for education consistent with the National Standards for Diabetes Patient Education of the American Diabetes Association
- Monitoring instructions: self-monitoring of blood and/or urine glucose,

urine ketones, and use of a record system

- Referral to an eye doctor for a comprehensive eye and visual examination: all patients aged 12–30 yr with a diagnosis of diabetes of at least 5 yr duration or over age 30 yr at time of diagnosis or any patient with visual symptoms and/or abnormalities
- Consultation for specialized services as indicated
- Agreement on ongoing support and follow-up: return appointment and when and how to contact the physician or other members of the health-care team for problem-solving and crisis management
- For women of childbearing age: discussion of contraception and review of program of diabetes care before and during pregnancy

CONTINUING CARE—A continuing-care plan is an essential feature in the management plan of every patient with diabetes. At each visit, the patient's progress in achieving treatment goals should be evaluated, and problems that have occurred should be reviewed. If goals are not being met, both the goals and the treatment plan need to be reassessed.

Visit frequency

The frequency of patient visits depends on the type of diabetes, degree of blood glucose control achieved, changes in the treatment regimen, and presence of complications of diabetes or other medical conditions.

Patients starting insulin or having a major change in their insulin program may need to be in contact with their care provider as often as daily until glucose control is achieved, the risk of hypoglycemia is low, and the patient is competent to conduct the treatment program. Some patients may require hospitalization for initiation or change of therapy. Contact with the patient after a major modification of the treatment plan should not be delayed >1 wk.

Patients beginning treatment by diet or oral glucose-lowering agents may need to be contacted weekly until rea-

sonable glucose control is achieved and the patient is competent to conduct the treatment program. Contact with these patients after a major modification of the treatment plan should be no more than 1 mo later.

Regular visits should be scheduled for insulin-treated patients at least quarterly and for other patients at least semiannually. All patients must be taught some method of monitoring glycemic control. In insulin-treated patients, and in non-insulin-treated patients with poor metabolic control, this should be blood glucose testing; in other patients, blood glucose testing may be useful. Patients must be taught to recognize problems with their glucose control and to report problems to the health-care team. They also should be taught to recognize early signs and symptoms of acute and chronic complications and to report these promptly.

Elements of continuing care

Medical history. An interim history should assess 1) frequency, causes, and severity of hypoglycemia or hyperglycemia; 2) results of regular glucose monitoring; 3) adjustments by the patient of the therapeutic regimen; 4) problems with adherence; 5) symptoms suggesting development of the complications of diabetes; 6) psychosocial status; 7) other medical illnesses; and 8) current medications.

Physical exam

A comprehensive physical examination should be performed annually. A complete eye and visual examination by an eye doctor should be performed at least annually in all patients >30 yr old and in patients between 12 and 30 yr of age with a diagnosis of diabetes of at least 5 yr duration.

At every regular visit, the following should be measured: height (until maturity), weight, sexual maturation in adolescents, and blood pressure. Portions of the physical examination that were found to be abnormal on previous

visits should be repeated. The feet should be examined routinely. The examination should also be extended to include areas indicated by the interim history.

Laboratory

A glycosylated hemoglobin determination should be performed at least semi-annually in all patients and preferably quarterly in insulin-treated patients and in non-insulin-treated patients with poor metabolic control. A fasting plasma glucose test may be useful to judge glycemic control in patients with type II (non-insulin-dependent) diabetes. The value obtained from a random plasma glucose test may be useful for comparison with the value obtained simultaneously by the patient using his/her own monitoring systems.

Triglycerides, total cholesterol, and HDL cholesterol should be tested annually in adults and every 2 yr in children.

Routine urinalysis should be performed yearly. After 5 yr duration of diabetes, or after puberty, total urinary protein excretion should be measured yearly, by a microalbuminuria method if possible. If proteinuria is detected, serum creatinine or urea nitrogen concentrations should be measured and glomerular filtration assessed.

Management plan

The plan should be reviewed at each regular visit to determine progress in meeting goals and to identify problems. This review should include nutritional evaluation and weight control, the exercise regimen, the control of blood glucose and desired lipid levels, frequency of hypoglycemia, adherence to all aspects of self-care, assessment of complications, follow-up of referrals, and psychological adjustment. In addition, knowledge of diabetes and self-management skills should be reassessed at least annually.

INTERCURRENT ILLNESS — The stress of illness frequently aggravates the

hyperglycemia of diabetes, and during such illness, blood glucose and urine ketones should be monitored frequently. Marked hyperglycemia requires temporary adjustment of the treatment program, and the patient treated with oral hypoglycemic agents or diet alone may temporarily require insulin. Infection or dehydration is more likely to necessitate hospitalization in the person with diabetes than in the person without diabetes. If possible, the hospitalized patient should be treated by a physician with expertise in the management of diabetes.

SPECIAL CONSIDERATIONS

Diabetic ketoacidosis and hyperosmolar coma

These conditions represent decompensation in diabetic control and require immediate treatment. Depending on the severity of the illness and available resources, treatment can be undertaken in the physician's office, emergency room, hospital room, or medical intensive-care unit. Recurrence demands a detailed psychosocial and educational evaluation by a diabetes specialist.

Severe or frequent hypoglycemia

The occurrence of severe, frequent, or unexplained episodes of hypoglycemia requires evaluation of both the management plan and its execution by the patient and may indicate a need to revise the plan or reeducate the patient. The accomplishment of these goals generally requires more frequent patient visits during adjustment of the treatment program.

Pregnancy

To reduce the risk of fetal malformations and maternal and fetal complications, pregnant women and women planning pregnancy require excellent blood glucose control. These women need to be seen by a physician frequently, must be trained in self-monitoring of blood glucose, and may require specialized labo-

ratory and diagnostic tests. Consultation with an obstetrician and medical specialist in diabetes is indicated before pregnancy.

Hypertension

Hypertension contributes to the development and progression of chronic complications of diabetes. Hypertension should be treated aggressively to achieve and maintain blood pressure in the normal range. The selection of an antihypertensive drug should be individualized to minimize the number and severity of side effects. For example, β -blockers should be used with caution in insulin-treated individuals because these drugs may mask early symptoms of hypoglycemia and prolong recovery from hypoglycemia.

Retinopathy

Diabetic retinopathy or other visual abnormalities require care by an ophthalmologist experienced in the management of people with diabetes.

Nephropathy

The patient with abnormal renal function (proteinuria or elevated serum creatinine) requires heightened attention and control of other risk factors (e.g., hypertension, smoking) and requires consultation with a specialist in diabetic renal disease.

Cardiovascular disease

Patients with cardiovascular risk factors should be carefully monitored. Evidence of cardiovascular disease such as angina, decreased pulses, and ECG abnormalities requires efforts aimed at correction of contributing risk factors (e.g., obesity, smoking, hypertension, sedentary lifestyle, hyperlipidemia, poorly regulated diabetes) in addition to specific treatment of the cardiovascular problem.

Neuropathy

Diabetic neuropathy may result in painful paresthesias, muscle weakness, and

loss of sensation. Autonomic involvement can affect the function of various organ systems (gastrointestinal, cardiovascular, genitourinary) and may require consultation with an appropriate medical specialist.

Foot care

Problems involving the feet may require care by a podiatrist or other medical professional experienced in the management of people with diabetes. Patients with evidence of sensory neuropathy should be educated about the risk and prevention of foot problems.

Children and adolescents

Children and adolescents with diabetes, especially preschoolers and teenagers, should be managed in consultation with

a physician who has expertise in treating children with diabetes.

References

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