

Diabetes Mellitus in American Indians— Standards for Diagnosis and Management

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SUMMARY

In most American Indian tribes the frequency of diabetes mellitus is much greater than among the non-Indians, and surveillance of health records has shown that many types of illnesses occur more often in the diabetics than in the nondiabetics. Standards, or guidelines, have been developed for diabetes detection and treatment for purposes of limiting diabetes diagnoses to persons with high probabilities of having the disease and concentrating diabetes case finding among high-risk groups or individuals. The guidelines emphasize that early diagnosis and careful management of diabetic pregnancies can decrease rates of macrosomia, congenital malformations, spontaneous abortion, stillbirth, and neonatal death. Diabetes management is based on staging criteria and requires trained paramedical workers in many aspects of management of asymptomatic diabetics, while the physicians concentrate more extensively on diabetics with symptoms and remediable complications. *DIABETES 25:528-31, June, 1976.*

Among the comprehensive health services the Indian Health Service (IHS) health workers provide the Indian people, the diagnosis and treatment of diabetes mellitus and associated conditions are major activities in most service units. Diabetes mellitus is much more prevalent in most American Indian tribes than it is among non-Indians.¹⁻³ Indeed, some tribes, such as the Pima and Papago, have diabetes rates 10 to 15 times the presumed frequency among whites,⁴ although diabetes prevalence data for the white population usually have not been obtained with the precision of most Indian studies. In their investigation of computerized health records of Papago Indians, Reinhard and Greenwalt⁵ noted that diabetics have significantly greater frequencies of large varieties of illnesses (which extend well beyond the usually recognized complications) than is the experience of an age-, sex-, and geographically matched nondiabetic control population.

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West² has reviewed published reports of diabetes prevalence rates in aboriginal groups, and he has concluded that most of the American Indian tribes that have been studied within recent years have high rates of diabetes. He also has concluded that diabetes was probably unusual in American Indians before about 1940 and that, in addition to genetic aspects, environmental factors (especially diet and obesity) are of considerable importance in the emergence of diabetes. He noted that high diabetes rates have been reported for at least 41 Indian tribes.

American Indians with diabetes incur the usual plethora of vascular complications—retinopathy, neuropathy, nephropathy, and augmentation of the otherwise low rates^{1,6} of coronary heart disease and myocardial infarction;^{1,4,7} the amputation of gangrenous feet and legs is frequent.^{1,4,8} Diabetes is a major factor in fetal and neonatal loss and congenital malformations in some tribes.⁹ Various forms of management may ameliorate some complications, such as gangrenous feet and legs, and careful control of diabetes during pregnancy may reduce the extent of deleterious fetal effects.^{8,9}

Some IHS service units have given diabetes major emphasis in their program plans¹⁰ and training materials.¹¹ Because of increasing concern by health professionals and the Indian people with the epidemic proportions of diabetes among many tribes, in 1967 the Phoenix IHS Area conducted a workshop on control and prevention of diabetes mellitus.⁸ The recommendations of the expert consultants ranged from weight-control programs to careful foot care of diabetics.

The IHS internists have stressed the importance of diabetes detection and treatment.¹² They, also, have endorsed the recommendations of a Subcommittee (of the Health Information System Advisory Committee, IHS) for Detection, Diagnosis, and Management of Diabetes Mellitus.¹³ Among the purposes of these

guidelines¹³ are to (1) limit the diagnosis of diabetes* to persons most likely to be affected by the disease; (2) concentrate diabetes case finding among high-risk groups or individuals; (3) base diabetes management on staging criteria; (4) make use of trained paramedical workers (community health medics—physician's assistants, pharmacist practitioners, public health nurses, community health representatives) to a major extent in management of asymptomatic diabetics, so that physicians can give greater attention to diabetics with symptoms and remediable complications; and (5) stress that early diagnosis and careful management of diabetic pregnancies can markedly reduce the complications (spontaneous abortion, stillbirth, neonatal death, congenital malformations, macrosomia).

Based on the recommendations of the Diabetic Subcommittee,¹³ the IHS internists have proposed the following standards (or guidelines) for diagnosis and management of diabetes mellitus.

Subjective:

History (initially and at least annually thereafter) regarding:

1. Conditions attributable to elevated plasma glucose levels (polyuria, polydipsia, weight loss, pruritis).
2. Symptoms or past history of sensory or motor neurologic abnormality.
3. Symptoms or previous diagnosis of urologic disease or vaginitis.
4. Symptoms or prior diagnosis of cardiovascular disease.
5. *For women:* Obstetric abnormality (delivery of infant \geq 9 lbs., stillbirth, neonatal death, infant with congenital malformation, toxemia of pregnancy, spontaneous abortion).
6. Diabetes in near relatives (parents, siblings, children).
7. Acute visual disturbances.

Objective:

1. Diagnostic criteria:

*By limiting the diagnosis of diabetes (except during pregnancy—see below) to persons with plasma glucose (PG) two hours after a 75-gm. oral carbohydrate load to \geq 200 mg./dl., the frequency of the diagnosis of diabetes in Pimas was reduced almost 18 per cent from the rate based on PG \geq 160 mg./dl.¹⁴ Rationale for selecting the 200-mg./dl. criterion includes the bimodal distribution (and the intersection point between the "normal" and "hyperglycemic" curves) of two-hour PG levels demonstrated in Pima Indians¹⁵ and an abrupt increase of specific diabetic complications (retinopathy, nephropathy) in follow-up evaluation of Pimas whose two-hour PG levels were \geq 200 mg./dl.⁷

- a. All men and *nonpregnant* women:
 1. Preferably, modified glucose tolerance test (GTT), with determination of *plasma* glucose (PG) at two hours after loading; \geq 200 mg./dl., diabetic (*if confirmed by additional test*); \leq 179 mg./dl., nondiabetic; 180-199 mg./dl., indeterminate.†
 2. Alternatively acceptable, either two fasting PGs \geq 160 mg./dl. or two two-hour postprandial PGs \geq 200 mg./dl.
- b. Pregnant women (more liberal criteria):
 1. First or second trimester—two-hour GTT PG \geq 140 mg./dl.
 2. Third trimester—two-hour GTT PG \geq 160 mg./dl.
2. Evaluation (performed initially and annually thereafter); a standardized minimum examination including but not limited to the following:
 - a. Height (initially only), weight, per cent desirable weight.
 - b. Blood pressure.
 - c. Ophthalmoscopic examination.
 - d. Peripheral pulses (palpation).
 - e. Skin examination (especially lower extremities).
 - f. Electrocardiogram (12-lead), for patients \geq 40 years of age (every five years).
 - g. Neurologic examination (vibratory, touch, deep-tendon reflexes of lower limbs).
 - h. Serum creatinine or blood urea nitrogen.
 - i. Urinalysis (albumin, acetone, glucose).
 - j. PPD skin test‡ (annually, if negative; if positive, obtain chest x-ray instead).

Assessment:

Based on these evaluations:

1. Diagnoses include:
 - a. Diabetes mellitus.
 - b. Diabetic complications (renal, cardiovascular, neurologic, optic, infectious, obstetric).
 - c. Other contributing conditions (obesity, pregnancy).
2. Diabetes staging for purposes of management recommendations (table 1):
 - a. Asymptomatic diabetes without remediable complications.

†Since the diagnosis of diabetes has medical, cost-benefit, and personal importance, the diagnosis should be confirmed by repeating the test.

‡Annual PPD skin test or chest x-ray recommended because of high rate of tuberculosis in southwestern Indian diabetics.¹

TABLE 1

Minimal management of diabetes mellitus based on stages¹³

Diabetic Stage	Management		
	General	Other	Routine
I. Asymptomatic diabetics without remediable complications.*	Patient to see PHN/CHM/CHR† every 3 months for history, weight, and urinalysis; referral to physician, if changes occur.	Physician to see patient at least annually.	Annual diabetes examination (See text item no. 2. "Evaluation").
II. Asymptomatic diabetics with remediable complications.*	Physician to institute specific therapy for complications.	Physician to see patient at least every 3 months.	Annual diabetes examination.
III. Symptomatic diabetics with or without remediable complications.	As for II; also physician to see at least every 3 months for hyperglycemic control, symptom inquiry, weight, blood pressure, urinalysis.	If patient goes 1 year without symptoms, and no remediable complication, may see physician every 6 months and follow schedule of I otherwise.	Annual diabetes examination.

**Remediable complications*: Infections, hypertension, congestive heart failure, arrhythmias, acute neuropathy, peripheral vascular disease (leg ulcers, incipient gangrene); mature cataracts, (?) retinopathy, pregnancy. *Nonremediable complications*: nephropathy, chronic stable polyneuropathy, autonomic neuropathy.

†PHN=Public health nurse; CHM=Community Health medic (or physician's assistant); CHR=Community health representative.

b. Asymptomatic diabetes with remediable complications.

c. Symptomatic diabetes with or without complications.

Plan (management):

1. Dietary management and weight control for all diabetics, especially stressed for overweight patients.
2. Hypoglycemic therapy (preferably insulin), for the symptomatic or the asymptomatic diabetic with a complication in which the maintenance of normoglycemia may be indicated in the management of that complication.
3. Management of complications (by appropriate specific or symptomatic therapy).
4. Pregnant diabetic (*requires careful management*, including meticulous control of plasma glucose levels):
 - a. Keep two-hour PG \leq 160 mg./dl.
 - b. Avoid hypoglycemia and ketosis, both deleterious to fetus (requires feeding frequently, avoiding prolonged fasts, and, even with obesity, restricting daily diet to *no less* than 1,500-2,000 calories).
 - c. When hypoglycemic therapy is required, insulin is currently the only acceptable agent.
 - d. Specialist (obstetrician/internist) referral for any complications, failure to maintain normoglycemia, infection, or intercurrent illness.

5. Management by "stage" (see table 1).

6. Diabetes case finding:§

a. Recommended frequency of glucose tolerance testing, based on diabetes prevalence in the local service-unit population aged \geq 35 years (varying by age group):

1. High prevalence (\geq 35 per cent)—at five-year intervals for persons aged 15-29 years and \geq 50 years; at two-year intervals for persons 30-49 years.
2. Medium prevalence (15-34 per cent)—at five-year intervals for persons aged \geq 30 years, once at leaving high school for *females* 15-29 years.
3. Low prevalence (\leq 14 per cent)—once during ages 30-49 years, only when *high risk* (see item "b" below) during ages \geq 50 years or \leq 29 years.

b. Other specific conditions in which diabetes screening is considered appropriate, based on known risk factors for diabetes:

1. Obstetric abnormalities—infant \geq 9 lbs. at birth, stillbirth, neonatal death, congenital malformations of offspring, toxemia of pregnancy, or spontaneous abortion.

§Because of the extraordinary prevalence of the disease in many American Indian populations and because the over-all health care mission of the IHS includes public health and preventive medicine responsibilities, guidelines concerning the IHS role in diabetes case finding and screening have been defined.

2. Diabetes family history (order of priority: both parents, one or more siblings, one parent).
3. Gross obesity (≥ 150 per cent desirable weight).
4. Coronary heart disease, peripheral or cerebral vascular disease.
5. Peripheral neuropathy and cranial (motor or sensory) neuropathy.
6. Active tuberculosis.
7. Recurrent infections, especially vaginal moniliasis.
8. Hypertension.
9. Proteinuria of unknown cause.
10. Hyperlipidemia (cholesterol ≥ 250 mg./dl.; fasting triglyceride ≥ 200 mg./dl.).
11. Acute refractive eye changes.

DISCUSSION

The guidelines presented are intended to define minimum acceptable standards of care for American Indian diabetics and to encourage the development of systematic and cost-effective methods of diabetes management and detection at the individual service-unit level. Utilization of the guidelines also demands a responsible attitude, with alertness to matters beyond the scope of the standards. Complications of the disease or contributory factors may require individualized diagnosis and management. Nevertheless, the guidelines should provide a structure to enhance rational approaches to the problem of diabetes, in regard to both the individual patient and the public-health aspect.

Although tailored to the organization and mission of the Indian Health Service, the guidelines may be useful to other groups responsible for the diagnosis and management of diabetes or for broader community or public-health activities. The general outline can be modified to the requirements of other health-service organizations. In particular, the systematic utilization of nurses, physicians' assistants, dietitians, community health workers, and other paramedical personnel in the care of diabetic patients should be

beneficial not only to the Indian Health Service but also to a variety of other health systems.

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