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## บทความ

### Public Health Guidelines for Enhancing Diabetes Control Through Maternal- and Child-Health Programs

**บรรณาธิการ** แนวทางการควบคุมโรคเบาหวานในแผนงานบริการอนามัยแม่และเด็ก เป็นเรื่องที่น่าสนใจและสามารถนำมารับใช้ให้เหมาะสมกับสภาพท้องถิ่นของประเทศไทยได้พอสมควร เมื่องจากในปัจจุบันสถานบริการสาธารณสุขของรัฐและเอกชนแทบทุกแห่งได้ให้บริการอนามัยแม่และเด็กเป็นประจำอยู่แล้ว รายงานประจำสำนักงานCDC ที่จะนำแนวทางการควบคุมโรคเบาหวานในโครงการบริการอนามัยแม่และเด็กของCDC สาธารณรัฐอเมริกา มาลงไว้เป็นแนวคิดสำหรับสถานบริการสาธารณสุขต่าง ๆ ที่จะนำไปปรับใช้ให้เหมาะสมกับสภาพท้องถิ่นของคนในโอกาสต่อไป

*These guidelines were developed by the Division of Diabetes Control, Center for Prevention Services, CDC, in collaboration with the Division of Maternal and Child Health, Bureau of Health Care Delivery and Assistance, Health Resources and Services Administration, and have been endorsed by the Association for Maternal and Child Health and Crippled Children's Programs.*

#### INTRODUCTION

This document provides guidelines for maternal- and child-health programs for an appropriate public health approach to diabetes control during pregnancy. Particular concerns for the public health-care sector include: (1) screening of women to detect gestational diabetes; (2) identification of women with established diabetes who may become pregnant; (3) assurance of appropriate care for women with diagnosed diabetes (either established or gestational) on-site or through referral; (4) postpartum follow-up and continuing care of women with established diabetes to maintain good blood-glucose control before pregnancy and throughout subsequent pregnancies; and (5) postpartum follow-up of women with gestational diabetes to detect previously undiagnosed established diabetes, to monitor the maintenance of ideal body weight to reduce the chance of developing diabetes later in life, and to ensure prompt diagnosis of diabetes if and when it develops. Key elements are: the identification and establishment of linkages with existing programs and resources and development of the necessary referral and follow-up mechanisms.

## STATEMENT OF THE PROBLEM

The presentation of a pregnant woman with established diabetes mellitus\* or gestational diabetes mellitus† (GDM) to a public health clinic is relatively rare (about 3%-4% of all pregnancies). However, the morbidity associated with pregnancies affected by diabetes may be substantial, since diabetes may result in a disproportionate number of adverse pregnancy outcomes (1). Therefore, the combination of diabetes and pregnancy presents a special challenge in the public health-care setting.

Incorporating several basic guidelines and principles into the public health sector's management of pregnancy may markedly improve pregnancy outcomes for women with either established or gestational diabetes. With appropriate care, the level of risk associated with diabetes and pregnancy can be reduced to that of the nondiabetic population.

Diabetes diagnosed before conception.

\*Carbohydrate intolerance of variable severity with onset or first recognition during pregnancy.

**Problems Related to Established Diabetes.** While only approximately 0.3% of all U.S. pregnancies occurs among women with established diabetes, many serious clinical problems are associated with diabetes during pregnancy. The estimated 10,000-14,000 infants born annually to women with established diabetes are at high risk for mortality; prematurity; congenital defects; macrosomia; neonatal hypoglycemia; respiratory distress syndrome; and hyperbilirubinemia, particularly when maternal glucose levels are not tightly controlled during pregnancy (1).

Risks of maternal complications are also associated with diabetes during pregnancy and include: ketoacidosis; exacerbated microvascular, renal, ocular, and neural complications; urinary-tract infections; toxemia; and hydramnios (2).

**Problems Related to Gestational Diabetes.** GDM occurs in about 2%-3% of pregnancies in the United States (3) and usually develops during the second or third trimester, when levels of insulin-antagonist hormones increase and insulin resistance usually occurs. Approximately 90,000 women with GDM give birth each year. GDM may go undetected in up to 50% of cases.

The effects of GDM on offspring include: macrosomia; birth trauma due to difficult delivery; shoulder dystocia; hypoglycemia; increased incidence of fetal/neonatal mortality (particularly from women with previously unidentified adult-onset, Type II, diabetes); hypocalcemia; and hyperbilirubinemia (4).

Women with GDM are at increased risk for developing diabetes after parturition (5). In addition, many women diagnosed as glucose-intolerant during pregnancy may be previously unidentified Type II diabetics. This risk of developing diabetes and the opportunity to identify as yet undiagnosed women with Type II diabetes are also compelling reasons for screening.

**Opportunities to Improve Outcomes.** The public health sector can improve pregnancy outcomes among women with established diabetes and women in whom GDM is detected by several methods, including: (1) identification (including outreach, screening, and diagnosis); (2) care/referral (including appropriate patient education and nutrition counseling, referrals to high-risk centers or to private care); (3) maternal/neonatal follow-up; and (4) professional education.

**Purpose of the Guidelines.** The guidelines should be adapted to the needs of each state, its health-care delivery system, and the levels of professional and fiscal resources available. The guidelines are designed to: (1) increase public and provider awareness of the problem and identify special needs related to diabetes before conception and during pregnancy; (2) propose concrete suggestions for enhancing diabetes control through maternal- and child-health programs in the public health system by improving coordination of the health-care system components, use of resources, and patient involvement in the care regimen; and (3) provide a framework for states/localities to use in adapting these guidelines to meet their specific planning, care, and training needs.

## IDENTIFICATION OF WOMEN WITH DIABETES

**Outreach.** Prepregnancy counseling and early prenatal care by professionals knowledgeable about diabetes during pregnancy are particularly important for women with established dia-

betes (6). Normalization of maternal glucose levels before pregnancy and during the first 8 weeks of gestation has been effective in reducing the occurrence of congenital malformations (1). Strict control of glucose throughout pregnancy can reduce the risk of perinatal mortality among infants of mothers with diabetes to a level seen in nondiabetic pregnant women. Therefore, prepregnancy counseling—with the goal of attaining euglycemia before conception and maintaining it throughout gestation—is important for women with diabetes. Prepregnancy evaluation is also important to assess maternal complications of diabetes, such as detecting the presence of retinopathy, nephropathy, hypertension, and coronary atherosclerosis.

Ideally, a woman with established diabetes is aware of the risks associated with diabetes and pregnancy and will consult a physician when contemplating pregnancy. In reality, however, most women come to public health-care settings already several weeks pregnant. Outreach efforts for women with established diabetes include:

1. Identifying women with established diabetes who come to family planning clinics and encouraging referral for prepregnancy counseling;
2. Asking women with diabetes already under care to disseminate messages to their friends and acquaintances (e.g., through support groups) about the importance of preconception counseling and prenatal care;
3. Discussing with women who have established diabetes the importance of glycemic control before pregnancy when they bring children into public health clinics for care;
4. Increasing provider awareness through professional education;
5. Enlisting the aid of local American Diabetes Association or Juvenile Diabetes Foundation chapters in arranging for public service announcements regarding the importance of planned pregnancy and early care for women with diabetes;
6. Developing media campaigns that encourage preconception and early prenatal care (e.g., placing posters in highly visible areas);
7. Providing patient-education materials to local physicians;
8. Recruiting and training persons indigenous to the target population, such as volunteers or community-health workers, to stress the importance of preconception and early prenatal care and proper nutrition during pregnancy;
9. Identifying home-health nurses and enlisting their aid in referral for specialized and follow-up care during pregnancy;
10. Maintaining communications with directors of nursing and education coordinators of outlying hospitals to ensure the availability of patient-education opportunities;
11. Working with primary-care centers;
12. Developing and identifying specialized-care referral centers for women with established diabetes or GDM who cannot be adequately treated in a public health-care setting.

To maximize resources, localities should develop an outreach plan to target their efforts and to optimally use scarce public health resources.

Unlike women with established diabetes, women who develop GDM need to be identified by health-care providers. Therefore, outreach efforts related to identifying GDM should be targeted at those health-care professionals who have contact with pregnant women (e.g., nurse-midwives, nurse-practitioners, family practitioners, obstetricians, and nutritionists).

**Screening and Diagnosis.** Screening and diagnostic activities in the public health-care setting focus on identifying women who develop GDM. The following recommendations for GDM screening and diagnosis were formulated at the Second International Workshop-Conference on Gestational Diabetes Mellitus (7).

Many investigators have supported the view that certain risk factors may assist in identifying pregnant women prone to developing GDM. These include: age of 25 years or older; obesity; history of diabetes in a first-degree relative; history of pregnancy with stillbirth or infant over 9 pounds; and history of congenital malformation in a previous child. Although a history of hypertension is often cited as a risk factor for GDM, it does not necessarily assist in identifying a woman prone to develop GDM. However, it is a serious coexisting condition and can increase the risk of adverse outcome in women with GDM. It is now well accepted that only universal screening can completely identify all patients with GDM. However, most pregnant patients with these specific risk factors will not have GDM, since GDM occurs in only approximately 2%-3% of the population.

Therefore, it is recommended that, where possible, all pregnant women be screened for GDM (7). In public health settings, universal screening may not be possible. Therefore, if factors exist that preclude universal screening, all women 25 years of age or older and women with any of the above-mentioned risk factors (regardless of age) should be screened. These factors are not only associated with greater risk of developing GDM but are more often associated with poor perinatal outcome.

Urine testing alone is not an adequate screening test for glucose intolerance during pregnancy. Blood-glucose screening should be performed between 24 weeks' and 28 weeks' gestation. The following glucose challenge test is recommended: (1) patient is given 50 grams of a standard glucose solution to be ingested in a 10-minute period without regard to time of day or last meal; (2) patient should not eat or smoke until 1-hour blood sample is drawn; (3) blood sample is taken at 1 hour and analyzed by standard techniques available to the health department. A venous plasma-glucose result of 140 mg/dl (7.8 mmol/L) is recommended as a threshold for referral for definitively diagnosing GDM. Whole blood-glucose standards are approximately 15% less than plasma-glucose values.

Indications for screening before 24 weeks' gestation include: (1) previous GDM; (2) previous large-for-gestational-age infant; (3) polyhydramnios; (4) suspected large-for-gestational-age fetus; (5) glycosuria value of 1+ or greater on two or more occasions or 2+ or greater on one occasion; (6) increased thirst or urination; (7) recurrent vaginal and urinary-tract infections (e.g., monilial vulvovaginitis). These high-risk women should be screened on initial visit, or as soon as possible in the pregnancy, and again at 24 weeks' gestation (if not positive on the earlier test).

If blood-glucose meters are used for screening, the cut-off values will differ, and the sensitivity and specificity of the procedure will vary from screening using venous plasma. A lower value should be used as a screening cut-off for referral for definitive diagnosis.

Definitive diagnosis of GDM should be accomplished with a 100-gram oral glucose-tolerance test (OGTT). The test should be performed in the morning after an overnight fast of at least 8 hours but not more than 14 hours, and after at least 3 days' unrestricted diet (over 150 grams carbohydrate) and physical activity. A 100-gram oral glucose load is given in a volume of at least 400 ml fluid. Venous plasma glucose is measured fasting and at 1, 2, and 3 hours. The patient should remain seated and not smoke throughout the test. Definitive diagnosis requires that two or more of the following venous plasma-glucose concentrations be met or exceeded:

fasting: 105 mg/dl (5.8 mmol/L)  
1-hour: 190 mg/dl (10.6 mmol/L)  
2-hour: 165 mg/dl (9.2 mmol/L)  
3-hour: 145 mg/dl (8.1 mmol/L)

Capillary blood measurements, using glucose oxidase-impregnated test strips, are useful for monitoring therapy but not sufficiently accurate for diagnostic purposes. Glycosylated hemoglobin (i.e. HbA<sub>1c</sub> or HbA<sub>1</sub>) is also not a sensitive enough diagnostic indicator for GDM.

(อ่านต่อฉบับหน้า: Vol 17 No. 31)