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Promoting Health After Gestational Diabetes: A National Diabetes Education Program Call to Action

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Abstract

The National Diabetes Education Program joins the American College of Obstetricians and Gynecologists (the College) to promote opportunities for obstetrician-gynecologists and other primary care providers to better meet the long-term health needs of women with prior gestational diabetes mellitus (GDM) and their children. Up to one third of GDM women may have diabetes or pre-diabetes postpartum, yet only about half of these women are tested postpartum, and about a quarter are tested 6 to 12 weeks postpartum. Women with GDM face a lifelong increased risk for subsequent diabetes, primarily type 2. Timely testing for pre-diabetes may provide an opportunity for obstetrician-gynecologists to prevent or delay the onset of type 2 diabetes through diet, physical activity, weight management, and/or pharmacological intervention. The College and American Diabetes Association recommend testing women with a history of GDM at six to 12 weeks postpartum. If the postpartum test is normal, retest every three years and at first prenatal visit in a subsequent pregnancy. If pre-diabetes is diagnosed, test annually. Since children of GDM pregnancies face an increased risk for obesity and type 2 diabetes, families need support to develop healthy eating and physical activity behaviors. Current criteria indicate that GDM occurs in 2 to 10 percent of all pregnancies. If new GDM diagnostic criteria are used, the frequency of GDM may increase to about 18 percent of pregnancies annually. The projected increase in the number of women with GDM and the potential subsequent associated risks underscore the need for proactive long-term primary care management of the mother and her offspring.

Using current criteria, it is estimated that gestational diabetes mellitus (GDM) affects 2 to 10 percent of all pregnancies, depending on the population studied [1]. Women with prior GDM are at a seven-fold increased risk for developing type 2 diabetes during their lifetime

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[2]. Approximately half of these women will develop type 2 diabetes in the decade after their pregnancy. Their offspring may also be at increased risk for obesity and subsequent type 2 diabetes. There is strong evidence that lifestyle changes or the diabetes drug metformin can prevent or delay type 2 diabetes in many of these high-risk women [3]. Testing for diabetes at six to 12 weeks postpartum identifies women with glucose intolerance (pre-diabetes or diabetes). However, a retrospective study of 11,825 women with prior GDM within a large HMO found that only about half of the women were tested with either a fasting plasma glucose (FPG) or 75 g oral glucose tolerance test (OGTT) from seven days to six months postpartum. Of these women, 46 percent were tested during the six- to 12-week postpartum period [4]. Ferrara et al. found increased rates of postpartum testing from 20.7 percent in 1995 to 53.8 percent in 2006 [5]. Another study found that the rate of test orders improved over time from 15.9 percent in 1999 to 79.3 percent in 2004 [6]. These findings suggest that orders for a test did not correlate well with completion of the test. To improve the rate of testing, more complex solutions than simple test reminders might be required such as patient education or changes in health care delivery systems.

The case for postpartum testing is compelling, even using the following modest estimates. For example, if GDM complicates 5 percent of the estimated 4,000,000 pregnancies in the United States each year, approximately 200,000 women will be diagnosed with GDM. Postpartum testing of these 200,000 women could identify about:

- 8,000 (~4 percent) with type 2 diabetes who need referral for diabetes management.
- 30,000 (~15 percent) with impaired fasting glucose or impaired glucose tolerance (IGT) who would benefit from diabetes prevention efforts.
- 162,000 (~81 percent) with normal postpartum blood glucose testing who should be counseled to maintain a normal weight, exercise, avoid smoking, and eat a healthy diet [7].

While all women should be counseled about following a healthy lifestyle, women with a history of GDM and normal postpartum blood glucose would particularly benefit from such counseling.

The extent to which new GDM diagnostic criteria based on the Hyperglycemia and Adverse Pregnancy Outcome (HAPO) study [8] will be adopted is uncertain. The HAPO criteria are recommended by the American Diabetes Association (ADA) [9] and if they are used, it is estimated that the frequency of GDM will increase to 18 percent of pregnancies each year [10]. The HAPO-based criteria call for a diagnosis of GDM when any of the following three 75 g, two-hour oral glucose tolerance test thresholds are met or exceeded: fasting 92 mg/dL, one-hour 180 mg/dL, or two hours 153 mg/dL [10]. We do not yet have data to quantify the subsequent risk of type 2 diabetes when GDM is diagnosed using the new criteria. However, the recognized risks for diabetes subsequent to GDM, along with the potential large projected increase in the number of women with this diagnosis, underscores the need for obstetrician-gynecologists to be proactive in addressing the long-term health needs of affected women and their children.

Gestational Diabetes Mellitus is defined as diabetes diagnosed during pregnancy that is not clearly overt diabetes [9]. Because the number of pregnant women with undiagnosed type 2 diabetes has increased, the ADA recommends testing women with risk factors for type 2 diabetes for diabetes at their initial prenatal visit in order to prevent fetal malformations resulting from undiagnosed maternal glycemia [9]. At postpartum testing, about 30 percent of GDM women may have impaired glucose metabolism or diabetes, primarily type 2 [4].

Type 2 diabetes is the common type of diabetes to follow GDM [11]. Kim et al. reported a conversion rate to type 2 diabetes ranging from 2.6 percent to 70 percent over a period from 6 weeks to 26 years postpartum [12]. Cumulative incidence of type 2 diabetes increased markedly in the first five years after the index pregnancy and appeared to plateau after 10 years [12]. Non-Caucasian and Hispanic women appear to be at particularly high risk for diabetes after GDM [7].

Women who have GDM in their first pregnancy are at higher risk of GDM in their subsequent pregnancies and the risk for GDM increases with subsequent pregnancies. A 2007 meta-analysis reported that the recurrence rate of GDM in a second pregnancy varied between 30 percent and 84 percent [13]. Women with undiagnosed hyperglycemia in subsequent pregnancies have high rates of early fetal loss and major congenital malformations in their infants [14]. Many of these women have presumably progressed to undetected type 2 diabetes prior to conception. These fetal abnormalities can be prevented with identification of diabetes and excellent blood glucose control prior to conception.

Risk for cardiovascular disease is increased in women with prior GDM. Studies in women with prior GDM suggest that a chronic inflammatory response may be present and represents an early feature of the cluster of cardiovascular disease risk factors that relate to insulin resistance and the metabolic syndrome [15].

Studies in Pima Indian mothers with GDM have found an increased rate of offspring childhood obesity, impaired glucose tolerance and type 2 diabetes, compared to offspring from pregnancies without GDM in the same population [16]. More recently, it has been shown in a German population that overweight and insulin resistance in children is increased throughout childhood in offspring of GDM mothers with a history of GDM compared with offspring of mothers with type 1 diabetes or mothers without diabetes. Overweight risk was associated mainly with maternal obesity [17]. A Danish study in primarily Caucasian women with prior GDM or type 1 diabetes found a high prevalence of type 2 diabetes and pre-diabetes in their adult offspring compared to offspring of women with no history of diabetes [18]. It has been proposed that treatment of GDM may break this cycle and potentially decrease the risk of offspring obesity and metabolic disease [19].

The Diabetes Prevention Program and other clinical trials provide high level evidence for the positive impact of interventions to prevent progression to type 2 diabetes in people at high risk, including non-pregnant women with prior GDM [20]. While lifestyle intervention (150 minutes of physical activity per week and 5 to 7 percent weight loss) was more effective than pharmacologic therapy with metformin in all Diabetes Prevention Program participants with pre-diabetes, lifestyle changes and metformin were similarly effective in reducing the incidence of diabetes in the Diabetes Prevention Program participants with a history of GDM. Among Diabetes Prevention Program participants with prior GDM, both lifestyle and metformin reduced the development of diabetes by 50 percent or more [3, 20].

Diabetes Prevention Program participants were followed for an average of 10 years. Results at follow-up showed that when compared with the placebo control group, there were enduring benefits [21]. Ten-year follow-up results specific to the GDM subset of Diabetes Prevention Program participants are not yet available.

Breastfeeding has significant short-term and long-term benefits for the infant as well as to the mother after pregnancy. The evidence is inconclusive among the offspring of women with GDM as to whether breastfeeding reduces the child's risk of overweight, obesity, and type 2 diabetes. Few data are available on the effects of lactation on risk factors for type 2 diabetes, such as maternal obesity, central obesity, and weight gain subsequent to a

pregnancy complicated by GDM [22]. Because of positive findings in many women, exclusive breastfeeding is encouraged in women with prior GDM [14].

If glucose-lowering medications are needed immediately postpartum, glibenclamide or glipazide or insulin may be considered, as these drugs do not appear in the mother's breast milk [23]. Metformin may be used for treatment of diabetes or its prevention in those with pre-diabetes after the lactation period is over.

The ADA [9] and American College of Obstetricians and Gynecologists (the College) recommend that women with GDM be tested for glucose intolerance from six to 12 weeks postpartum. Follow-up testing is recommended at least every three years and at the first subsequent prenatal visit if the postpartum test is normal, or annually if pre-diabetes is diagnosed, as in Table 1. Several studies conducted in women with prior GDM found that the 75 g glucose challenge with fasting and two-hour glucose measurements was the most sensitive test to identify glucose abnormalities in these women [14]. The diagnostic criteria for pre-diabetes and diabetes in Box 1 are based on ADA guidelines for non-pregnant adults [9].

Both the College and ADA recommend that women at risk of type 2 diabetes should be counseled about the benefits of lifestyle modifications, which include dietary changes and physical activity to lead to weight reduction and maintenance. Box 2 outlines specific ways to modify lifestyles to prevent or delay the onset of diabetes. Timely detection of pre-diabetes may provide an opportunity to prevent or delay the onset of type 2 diabetes through diet, physical activity, weight management, and/or pharmacological intervention.

To improve the health of women with prior GDM and their offspring, the National Diabetes Education Program is calling for obstetrician-gynecologists and others who provide care for women with prior GDM to take action to:

- improve the rate of postpartum testing to identify women with or at high risk for type 2 diabetes.
- provide or refer to early treatment and prevention interventions for high risk women.
- counsel the mother that it is vital she be tested for diabetes prior to any subsequent pregnancy.
- counsel the mother that her offspring may be at risk for obesity and metabolic disease and might also benefit from early interventions to improve their health and lower their risk for subsequent obesity or diabetes.

A concerted effort is needed to improve the long-term health of women with prior GDM and their children. Obstetrician-gynecologists serve many women as their primary care provider and are often the sole physician that women see regularly during their reproductive years. A pregnancy complicated by GDM should alert obstetrician-gynecologists and other primary care providers to take the following actions:

- Have a system in place to test for glucose intolerance as recommended in Table 1.
- Recommend and support breastfeeding.
- Refer patients to a registered dietitian or community program for weight management.
- Consider using pharmacological agents for pre-diabetes.
- Treat existing hypertension.

- Counsel women
 - about their increased lifelong risk for diabetes and need for regular testing.
 - about contraception options.*
 - to seek blood glucose testing before their next pregnancy.
 - to eat healthy foods, get at least 30 minutes of physical activity each day.
 - about their child’s possible increased risk for obesity and diabetes and need to get 60 minutes of physical activity each day.
 - to quit smoking
 - to inform the child’s pediatrician or other health care provider about the mother’s GDM.

* The importance of providing these women with effective contraception options is paramount to ensure a planned pregnancy with diabetes tests completed prior to conception. A detailed discussion of these contraception options is outside the scope of this article, but we suggest that for more information readers refer to ACOG Practice Bulletin #121 Long-Acting Reversible Contraception: Implants and Intrauterine Devices [24].

Wider adoption of the medical home concept involves practice redesign for primary care. The medical home emphasizes care coordination, continuity, evidence-based practice, enhanced access, and payment reform. The payment structures in this model may better support the contribution and expertise of the physician and other health care team members as they provide preventive care as well as medical treatment. Incorporating the services of other health care professional team members such as nurses, dietitians, and diabetes educators may improve follow-up and help ensure that testing for diabetes at six to 12 weeks postpartum is completed. These individuals could also counsel and advise families about healthy lifestyle habits to help lower risks for future health problems in women with prior GDM and their children.

The diagnosis of GDM by the obstetrician should initiate a long-term family intervention by all involved primary care providers, including obstetrician-gynecologists, pediatricians, family practice physicians and nurse practitioners, to minimize the mother’s risk of developing diabetes or to diagnose diabetes as early in its course as possible, and to ensure healthy growth and development of the offspring. The National Diabetes Education Program encourages obstetrician-gynecologists to take the lead to initiate these long-term interventions. Resources to support these actions can be found in Box 3.

Box 1 Diagnostic Criteria for Prediabetes and Diabetes

Prediabetes:

- A1C 5.7% to 6.4 %, or
- FPG 100 to 125 mg/dL after an overnight fast indicates impaired fasting glucose, or
- 2-hour plasma glucose value 140–199 mg/dL post-75 g glucose challenge indicates impaired glucose tolerance

Diabetes:

- A1C 6.5% or more,* or
- FPG 126 mg/dL or more,* or

- 2-hour plasma glucose value 200 mg/dL or more post-75 g glucose challenge,* or
- random plasma glucose 200mg/dL or more with symptoms (polyuria, polydipsia and unexplained weight loss)

FPG, fasting plasma glucose.

*Repeat to confirm on a subsequent day unless symptoms are present.

Modified from American Diabetes Association. Standards of medical care in diabetes--2011. Diabetes Care 2011;34:S11–61.

Box 2. Lifestyle Changes to Delay Onset or Prevent Type 2 Diabetes in Adults

Collaborating with patients to set short-term, specific and realistic goals can help support lifestyle change efforts.

Nutrition therapy:

- An integral part of a healthy, sustained weight loss program is the subtraction of calories each day from the diet. For most people, weight loss diets should supply at least 1,000 to 1,200 kcal/day for women and 1,200 to 1,600 kcal/day for men.
- Total fat should be 25 to 35 percent of total calories and saturated fat less than 7 percent.
- Portion control is essential for weight loss.

Physical activity:

- Adults should get at least 30 minutes of moderate-intensity physical activity 5 days a week. Daily activity time can be broken into segments. Brisk walking is an excellent form of moderate-intensity physical activity (see www.health.gov/paguidelines/default.aspx).
- National Diabetes Education Program provides tools to help people track their daily food, calorie, and fat intake, as well as physical activity (see Box 3).

Behavior therapy:

- Knowledge is essential, but rarely adequate, to sustain behavior change over the long term.
- Effective behavioral strategies that patients can use in their efforts to modify their lifestyles include: self-monitoring, stress management, stimulus control, problem-solving, self-directed goal-setting, cognitive restructuring, and social support.
- Behavioral therapies may help adoption of diet and activity changes. The National Diabetes Education Program provides a searchable database of tools, programs and research that addresses the “how to” of psychosocial issues and lifestyle and behavior change (see www.ndep.nih.gov/sbcr).

Weight loss:

- Realistic yet clinically meaningful weight loss goals call for a 5 to 7 percent reduction in initial weight (10–14 pounds (4.5 to 6.3 kg) for a 200-pound (90.6 kg) person).

Follow-up and referral:

- A focus on improved glucose and cholesterol levels, blood pressure and self-esteem can reinforce the importance of lifestyle changes that lead to modest weight loss.
- Follow-up and monitoring of a patient's progress is essential.
- Referral to registered dietitians and community weight control or wellness clinics can help patients maintain lifestyle changes.

Reprinted from National Diabetes Education Program Guiding Principles for Health Care Professionals (see Box 3). Available at: www.ndep.nih.gov/publications/PublicationDetail.aspx?PubId=108. Retrieved September 19, 2011.

Box 3. Resources

It is clearly recognized that while limited access to healthcare may prevent some women who have had GDM from receiving appropriate postpartum evaluation, the National Diabetes Education Program provides the following resources that are copyright-free and easily ordered, downloaded, or reproduced: www.YourDiabetesInfo.org.

For women with prior GDM

- “It’s Never Too Early... To Prevent Diabetes” (www.ndep.nih.gov/am-i-at-risk/gdm/index.aspx) is a toolkit describing the diagnosis and management of GDM, steps to prevent or delay the onset of diabetes, and outreach to community organizations to raise awareness.
- “It’s Never Too Early to Prevent Diabetes. A Lifetime of Small Steps for a Healthy Family” (<http://www.ndep.nih.gov/publications/PublicationDetail.aspx?PubId=93>) is a tip sheet to help women with a history of GDM to prevent or delay type 2 diabetes and to lower their children’s risk for obesity.
- *Small Steps. Big Rewards. Your GAME PLAN to Prevent Type 2 Diabetes* (<http://www.ndep.nih.gov/publications/PublicationDetail.aspx?PubId=71>) is a booklet to help adults at risk for diabetes to track their daily food, calorie and fat intake, as well as physical activity.
- “Tips for Teens: Lower Your Risk for Type 2 Diabetes” (<http://www.ndep.nih.gov/publications/PublicationDetail.aspx?PubId=103>) is a tip sheet for children at risk for diabetes.

For health care professionals

- *Small Steps. Big Rewards. Your GAME PLAN to Prevent Type 2 Diabetes Health Care Provider Toolkit* (www.ndep.nih.gov/publications/PublicationDetail.aspx?PubId=118) is a toolkit to help clinicians diagnose and treat prediabetes and counsel and motivate patients. It contains an office poster and copier-ready patient education materials to help people to take steps to prevent or delay diabetes.
- Diabetes HealthSense (www.ndep.nih.gov/sbcr) is a toolkit with guidelines for a healthy lifestyle for women at increased risk for Type 2 diabetes or those women with Type 2 diabetes.
- *Guiding Principles for Diabetes Care* (www.ndep.nih.gov/publications/PublicationDetail.aspx?PubId=108) is an

evidenced-based booklet outlining important patient-centered principles of diabetes care to help health care professionals identify people with pre-diabetes and undiagnosed diabetes for treatment aimed at preventing long-term complications.

GDM, gestational diabetes mellitus.

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Table 1

Diabetes Case Finding Recommendations for Women with History of Gestational Diabetes

Time	Test
6 weeks to 12 weeks postpartum	Two-hour plasma glucose post-75 g glucose challenge
Every 3 years and at first prenatal visit if postpartum test is normal	A1C, FPG, or 2-hour plasma glucose post-75 g glucose challenge
Annually if prediabetes is diagnosed	A1C, FPG, or 2-hour plasma glucose post-75 g glucose challenge

FPG, fasting plasma glucose.

Data from American Diabetes Association. Standards of medical care in diabetes--2011. *Diabetes Care* 2011;34:S11–61.