COLORADO
DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT
DIABETES PREVENTION AND CONTROL PROGRAM

Colorado Department of Public Health and Environment

Gestational Diabetes
Addendum 2009

INTRODUCTION

This is an addendum to the 2006 Clinical Guidelines on gestational diabetes. Please refer to the guidelines for current standards of care at http://coloradoguidelines.org/guidelines/gestationaldiabetes.asp. The purpose of the addendum is to address outcomes of recent research and **potential** changes in the current standards of screening, diagnosis and treatment of gestational diabetes mellitus (GDM). Recent research in gestational diabetes considers the effects on the fetus more than in the past.

PRECONCEPTION

Increasing evidence points to the importance of a healthy weight prior to becoming pregnant, especially as an increased number of women of reproductive age are overweight and obese (currently >60 percent in the United States[1]). Maternal obesity prior to conception is the strongest predictor for large for gestational age ($\geq 90^{th}$ percentile) and increased fat mass in the infant, more so than weight gain during pregnancy or treated gestational diabetes[2]. A 5-10 percent decrease in weight can improve insulin sensitivity and decrease the risk of diabetes and hypertension, and is strongly advised for overweight and obese mothers considering pregnancy[3]. Providers should assess weight of all women of reproductive age during health care visits and counsel on healthy eating and exercise to attain a healthy weight if overweight (body mass index $\geq$ 25 kg/m^2) or obese (body mass index $\geq$ 30 kg/m^2).

SCREENING and DIAGNOSTIC TESTING

The current methods of screening and diagnosis of GDM do not consider neonatal outcomes. In fact, they were used primarily to predict the likely future occurrence of diabetes in the mother. The "Hyperglycemia and Adverse Pregnancy Outcomes"[4] trial was conducted with 25,505 pregnant women in 15 centers in nine countries and looked at maternal glycemic thresholds in relationship to neonatal outcomes, including large for gestational age, primary C-section, clinical neonatal hypoglycemia and cord blood C-peptide >90^{th} percentile (a marker for fetal hyperinsulinemia). The conclusions likely will lead to a change in the current screening practices and diagnostic criteria used by practitioners, and will bring the U.S. standards in line with other criteria around the world, creating a universal standard. In place of the one-hour 50-gram oral glucose challenge test as a screen and a subsequent three-hour 100-gram oral glucose tolerance test for diagnosis, it is **likely** that both the screening and diagnosis of GDM will be consolidated into one 75-gram oral glucose tolerance test with a fasting, one-hour and possibly a two-hour, blood glucose value. This is currently under consideration by the International Association of the Diabetes and Pregnancy Study Groups.

DEFINITION

The current definition of gestational diabetes does not exclude those with undiagnosed pre-existing diabetes. Distinguishing women with pre-existing diabetes from women with GDM is important, because the former are at risk of giving birth to infants with major malformations and are at higher risk for serious adverse pregnancy outcomes. The definition **likely** will change to distinguish between pre-existing diabetes discovered for the first time during pregnancy and diabetes that develops in response to the pregnancy. The proposed GDM definition may exclude women with an elevated A1C or random glucose $\geq$ 200 mg/dl prior to 20 weeks gestation. Currently, the A1C test is not used to diagnose diabetes, and efforts to standardize it among laboratories are being pursued.

TREATMENT

Fetal-Based Strategy

A number of randomized control trials indicate that using a fetal-based strategy to dictate maternal glucose control results in improved outcomes for the fetus[5]. Increased fetal abdominal circumference on an ultrasound conducted between 28-34 weeks correlates with increased amniotic fluid insulin levels, a marker of poor maternal glycemic control. By modifying and individualizing maternal glucose goals based on fetal abdominal circumference, which indicates the development of excess subcutaneous and visceral fat in the fetus, infants have a decreased likelihood of being born either large or small for gestational age. Maternal glycemic control should be tightened if the fetal abdominal circumference is >75th percentile, but may be relaxed slightly if the fetal abdominal circumference is completely normal.

Weight Gain Guidelines

The current weight gain recommendations, established in 1990 by the Institute of Medicine, were based primarily on a higher prevalence of maternal underweight at that time. The institute is expected to release updated weight gain recommendations in 2009, which likely will place greater restrictions on weight gain. Research shows that no significant weight gain is needed in an obese mother to have a normally grown infant[6]. As mentioned in the Preconception section, overweight or obese pre-pregnancy weight and high maternal weight gain account for the majority of infants who are born large for gestational age or macrosomic (> 4000 gms). Both contribute, but pre-pregnancy weight appears to be the strongest predictive factor.

Medical Nutrition Therapy – Fat Content

Increasing research in the area of diet composition shows that maternal triglycerides and free fatty acids have a significant impact on causing large for gestational age or macrosomic infants, independent of maternal glucose[7]. Saturated fats contribute to higher levels of maternal triglycerides. Women should not replace carbohydrates with high-fat foods, in particular foods high in saturated fat. Current data suggest that both simple carbohydrates and saturated fats should be avoided, in addition to excess calories.

Physical Activity

Moderate exercise, 30 minutes or more per day, is recommended for most women, unless there is an obstetric contraindication. Likely, exercise is even more important in overweight or obese women who are often insulin resistant and at risk for preeclampsia or GDM. Regular exercise, especially begun early in pregnancy, carries multiple benefits, which include improving maternal insulin sensitivity, preventing excess weight gain, and increasing blood flow to the placenta at rest. Regular exercise may blunt postprandial glucose excursions, decreasing the need for medical therapy.

Metformin

The data from the randomized controlled trial, "Metformin versus Insulin for the Treatment of Gestational Diabetes"[8] were reassuring, as there did not appear to be an increased risk of adverse pregnancy outcomes in the metformin group. However, the data were not conclusive enough to recommend the standard use of metformin during pregnancy beyond the first trimester. Nearly half the women on metformin required supplemental insulin. Metformin is contraindicated in the case of intrauterine growth restriction, placental insufficiency and preeclampsia. Additionally, since metformin crosses the placenta, it could increase insulin sensitivity in the fetus, possibly affecting growth and fetal hepatic glucose production. The long-term effects of metformin are not known, and the infants in the trial currently are being studied into their childhood.

POSTPARTUM

Diagnosis of Type 2 Diabetes

As a clarification, a woman needs only one elevated value on the two-hour 75-gram oral glucose tolerance test, either fasting $\geq$ 126 mg/dl **or** two-hour $\geq$ 200 mg/dl, to be diagnosed with type 2 diabetes postpartum.

Encourage Breastfeeding

Benefits include weight loss for the mother, decreased likelihood of maternal progression to type 2 diabetes, reduced insulin resistance in mothers and a decreased likelihood of obesity in the child[9,10].

ENDNOTES

1 Catalano OM, Ehrenberg HM, "The short- and long-term implications of maternal obesity on the mother and her offspring," *Int J Obstet Gynecol*, 2006 Oct; 113(10):1126-33.

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4 Metzger BE, Lowe LP, Dyer AR, Trimble ER et al., "Hyperglycemia and Adverse Pregnancy Outcomes" *N Engl J Med*, 2008 May; 358(19):1991-2002.

5 Kjos SL, Schaefer-Graf U, Sardesi S, Peters RK, Buley A, Xiang AH et al., "A randomized controlled trial using glycemic plus fetal ultrasound parameters versus glycemic parameters to determine insulin therapy in gestational diabetes with fasting hyperglycemia," *Diabetes Care,* 2001 Nov; 24(11):1904-1910.

6 Abrams BF, Laros RK Jr., "Prepregnancy weight, weight gain, and birth weight," *Am J Obstet Gynecol*, 1986 Mar; 154(3):503-9.

7 Schaefer-Graf UM, Graf K, Kulbacka I, Kjos SL, Dudenhausen J, Vetter K, Herrera E, "Maternal lipids as strong determinants of fetal environment and growth in pregnancies with gestational diabetes mellitus," *Diabetes Care,* 2008 Sep; 31(9):1858-63. Epub 2008 Jul 7.

8 Rowan JA, Hague WM, Gao W, Battin MR, Moore MP et al., "Metformin versus insulin for the treatment of gestational diabetes," *N Engl J Med,* 2008 May; 358(19):2003-2015

9 Schaefer-Graf UM, Hartmann R, Pawliczak J, Passow D, Abou-Dakn M, Vetter K, Kordonouri O, "Association of breast-feeding and early childhood overweight in children from mothers with gestational diabetes mellitus," *Diabetes Care*, 2006 May; 29(5):1105-7.

10 Mayer-Davis EJ, Rifas-Shiman SL, Zhou L, Hu FB, Colditz GA, Gillman MW, "Breast-feeding and risk for childhood obesity: does maternal diabetes or obesity status matter?" *Diabetes Care*, 2006 Oct; 29(10):2231-7.