



Gestational Diabetes Guidelines 2006

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SCREENING

Universal Risk Assessment at First Prenatal Encounter

- Complete risk assessment for gestational diabetes mellitus (GDM) accounting for patient history and clinical risk factors.
- Classify high-risk with one or more of the following risk factors:
 - Advanced maternal age (age \geq 35 years).
 - Obesity (BMI $>$ 29 kg/m²).
 - High-risk ethnic population (Asian/Pacific Islander, American Indian, Hispanic, Black).
 - Personal history of GDM.
 - Previous macrosomic infant.
 - History of GDM related obstetric complications.
 - First degree relative with diabetes.
 - Polycystic Ovary Syndrome (PCOS).
 - Glycosuria.
- If woman does not meet any of the above criteria, complete Universal Screening between 24–28 weeks.
- The option to preclude universal screening at any time during pregnancy, although not recommended due to the increasing incidence of GDM in Colorado, may be considered only when **ALL** the following criteria are met:
 - Age $<$ 25 years.
 - BMI \leq 26 kg/m².
 - Caucasian.
 - No known diabetes in a 1st degree relative.
 - No history of abnormal glucose tolerance.
 - No history of poor obstetric outcome.

Early Screening for High-Risk Women

- Evaluate high-risk women for glucose tolerance as soon as prenatal care is established. Do not delay testing until 24–28 weeks.
 - Perform laboratory screening with a 50-g, 1-hour oral glucose challenge test (OGCT), administered without regard to time elapsed since the last meal.
 - **If OGCT is \geq 135 mg/dl, follow with a diagnostic 100-g, 3-hour oral glucose tolerance test (OGTT).**

- If OGTT reflects GDM diagnosis, and there is strong suspicion of pre-existing diabetes, obtain an HbA1c.
 - Possible signs of pre-existing diabetes include an early positive OGTT, very high fasting glucose ≥ 110 mg/dl, or very high values on the 100-g, 3-hour OGTT > 250 mg/dl.
 - HbA1c $> 6.5\%$ in any gestation indicates need for an anatomy scan and echocardiogram to rule out major malformations and possible further diagnostic testing.
- If all values on the 3-hour OGTT are normal, repeat OGTT between 24–28 weeks.
- **If OGCT < 135 mg/dl, rescreen between 24–28 weeks.**

Universal Screening between 24–28 weeks

- Perform laboratory screening with a 50-g, 1-hour OGCT administered without regard to time elapsed since the last meal.
- **If OGCT is ≥ 135 mg/dl, follow with a diagnostic 100-g, 3-hour oral glucose tolerance test (OGTT).**
 - If OGCT ≥ 200 mg/dl*, test serum fasting blood glucose (FBG) before 100-g, 3-hour OGTT is given.
 - If serum FBG < 95 mg/dl, proceed with OGTT.
 - If serum FBG ≥ 95 mg/dl, diagnose GDM. No OGTT necessary.
 - If FBG result is not immediately available, continue with OGTT.
 - * There are no accepted criteria or literature to support the 1-hour test alone.
 - If suspect glucose intolerance due to macrosomia, polyhydramnios, or any other clinical indicators, rescreen anytime in the 3rd trimester.
- **If OGCT < 135 mg/dl, no further testing required.**

DIAGNOSIS

- The diagnostic test indicated for GDM is a 100-g, 3-hour OGTT in a fasting state after a 3-day unrestricted diet (150-g of carbohydrate or 10 carbohydrate servings per day).
 - Most healthy women consume ≥ 150 -g of carbohydrate per day.
 - If there is concern that carbohydrate intake is inadequate due to a low-carbohydrate diet, hyperemesis gravidarum, acute medical or lifestyle stress, chronic malnutrition, restricted diet due to philosophical/religious/health beliefs or eating disorders, instruct to consume at least 10 carbohydrate servings per day for 3 days prior to test.
- Follow these guidelines for the OGTT:
 - No food or beverage 8–14 hours before test, except water.
 - No smoking during the test.
 - Remain at rest during the test.
 - Drink glucose solution in less than 5 minutes.

OGTT Diagnostic Criteria for Gestational Diabetes*

- If only one value meets or exceeds thresholds, repeat 100-g, 3-hour OGTT in 3–4 weeks and recommend physical activity and nutrition counseling because 30% of women subsequently develop GDM.
- If 2 or more values meet or exceed thresholds, diagnose GDM.

Time	mg/dl
Fasting	≥ 95
1-hour	≥ 180
2-hour	≥ 155
3-hour	≥ 140

*American Diabetes Association, Carpenter and Coustan.

MEDICAL NUTRITION THERAPY (MNT)

Optimally, a registered dietitian (RD) and/or certified diabetes educator (CDE) should provide MNT, focusing on healthy food choices and blood glucose control. If this resource is not available in your community, an RN or trained community health worker may provide nutrition counseling.

Assess

- **Individualize** the specific calorie level based on an assessment of pre-pregnancy weight (PPW), physical activity level, and pregnancy weight gain to date.

Weight Gain and Calorie Intake Recommendations for Women with GDM

BMI (kg/m ²)	Recommended weight gain (lbs.)	Estimated calorie intake kcal/kg/day PPW
Underweight (< 19.8)	28–40	36–40
Normal weight (19.8–26)	25–35	30
Overweight (26.1–29)	15–25	24
Obese* (> 29)	15	12–18

* For obese women, a 30–33% calorie restriction (~1600 kcals) has shown reduced hyperglycemia and plasma triglycerides with no increase in ketonuria.

Instruct

- Inform women they will be using a structured, short-term meal plan to control GDM.
- Educate on healthy food choices and smaller, frequent meals evenly spaced throughout the day.
 - Avoid simple carbohydrates such as desserts, candy, regular soda pop, and other sweets.
 - Limit fruit juice to only a ½ cup of 100% juice, dependent on blood glucose response.
 - Maintain a minimum intake of 175-g of carbohydrate (12 carbohydrate servings) per day, or approximately 700 kcals from carbohydrates. Choose from high fiber foods such as whole grains and fresh fruits and vegetables.
- Teach carbohydrate counting and/or the plate method to control portion sizes.
- Instruct how to read food labels for counting carbohydrates and determining portion sizes.
- Encourage healthy maternal weight gain for optimal birth outcomes and wellness of mother.
 - The GDM meal plan may not always emphasize low-fat, heart-healthy eating because the fetus requires cholesterol from the mother.
- Instruct to keep a record of food and beverage intake including what, amount (cups, etc.), meal and snack times, and results of fasting and postprandial blood glucose levels.
- See Gestational Diabetes Nutrition Guidelines for more specifics. <http://www.cdphe.state.co.us/pp/diabetes/tools.html>.

Evaluate

- Review food and blood glucose records to assess MNT compliance and blood glucose control.
- Ensure that appropriate weight gain, normoglycemia, and the absence of ketonuria are achieved through MNT.
- Assess that food intake is not restricted to less than 12–18 kcal/kg/day PPW in an attempt to avoid medication therapy.

PHYSICAL ACTIVITY

- Develop an individualized exercise plan based on a physical assessment by the provider.
- Regular physical activity (30 minutes/day, 5 days/week) has clear benefits, including reduced insulin resistance, reduced postprandial hyperglycemia, and prevention of excessive weight gain.
- Recommend moderate physical activity after meals to achieve postprandial blood glucose goals. This is especially effective following the largest meal of the day.
- Actual heart rate should not exceed 140 beats/minute.
- Ensure adequate hydration and avoid overheating during all physical activity.
- Contraindications to physical activity include: preeclampsia, growth restriction, abruption, placenta previa, or vaginal bleeding.

BLOOD GLUCOSE MONITORING

- Train on self-monitoring of blood glucose (SMBG). Supply with a glucose meter and testing strips, as possible, to ensure SMBG throughout pregnancy. A glucose meter with memory is ideal.
- Instruct to check blood glucose 4 times/day; fasting and 1 or 2-hours postprandial.
- Considerations of SMBG:
 - Postprandial glucose levels peak approximately 90 minutes from time of meal.
 - Postprandial glucose values are the most effective in determining the likelihood of macrosomia and other adverse pregnancy outcomes. Daily SMBG may reduce adverse outcomes such as macrosomia.
 - SMBG is an essential guide for evaluating MNT.
 - Continue testing 4 times/day or more throughout the pregnancy if possible.

Self-Monitoring Blood Glucose Goals

<i>Time</i>	<i>mg/dl</i>
Fasting	< 95
1-hour postprandial	< 130–140
2-hour postprandial	< 120

- Identify all abnormal values and determine if attributable to diet. If so, adjust or reinforce meal plan.
- When reliable blood glucose values have been collected for a minimum of 1–2 weeks, assess need for medication management. Consider medication therapy if patient is following the prescribed nutrition and physical activity plan and:
 - 20% of blood glucose values exceed the target goals or;
 - Two or more elevated blood glucose values taken at the same time of day meet or exceed the target range (e.g. two abnormal fasting values, two abnormal postprandial dinner values).
- If frequency of SMBG is decreased, rotate SMBG with different meals each day.
- Never discontinue SMBG during GDM. Remain vigilant because glucose intolerance increases as pregnancy progresses.

MEDICATION MANAGEMENT

- Allow up to two weeks for blood glucose to optimize in response to MNT before prescribing medication. Initiate medication therapy if unsuccessful with MNT.
- For fasting blood glucose > 115 mg/dl begin medication therapy without prior MNT because MNT alone is likely to fail.

Insulin

- Prescribe human insulin.
 - Insulin Lispro (Humalog) and Aspart (Novolog) more effectively reduce postprandial glycemic excursions than Regular insulin. However, NPH and Regular have also been used safely in pregnancy.
 - Due to insufficient evidence, Glargine (Lantus) is not yet recommended for routine use during pregnancy and is especially discouraged when retinopathy is present. However, there is no evidence that Lantus crosses the placenta and experience with its use is growing.
- SMBG should guide the doses and timing of the insulin regimen.
- Insulin therapy has shown benefits for pregnancies in which the fetal abdominal circumference (AC) is greater than the 75th percentile at 28–33 weeks gestation on ultrasound.

Oral Hypoglycemic Agents

- The FDA has not approved the use of any oral hypoglycemic agents in women with GDM.
- Glyburide has proved successful in recent controlled trials for treatment of hyperglycemia during pregnancy. Glyburide is the only oral hypoglycemic agent that should be considered as an alternative to insulin.
 - Glyburide can be an option for individuals refusing insulin.
 - Glyburide peaks 2–3 hours after meals, therefore the dose should be given 30–60 minutes before breakfast and dinner, and should not be given before bedtime.
 - Glyburide is more likely to fail in women who are diagnosed with GDM at < 24 weeks, have significant fasting hyperglycemia (especially >110 mg/dl), are morbidly obese, and have advanced maternal age (age ≥ 35 yrs old).
- Metformin should not be initiated during pregnancy. Unlike Glyburide, Metformin crosses the placenta and there is inadequate data at this time to determine its safety. If used to manage PCOS, discontinue use of Metformin after 1st trimester.
- For pre-existing diabetes mellitus controlled by oral hypoglycemic agents, discontinue oral agents and initiate insulin. The literature remains too weak at this point, especially with thiazolidinediones, to continue use during pregnancy. Acarbose appears safe, but is usually poorly tolerated due to GI complaints.

PRENATAL SURVEILLANCE

- Initiate daily fetal movement determinations (“kick counts”) at 28 weeks.
- Prenatal surveillance includes a twice-weekly Non-stress Test (NST), weekly Amniotic Fluid Indices (AFI), weekly Biophysical Profile or Contraction Stress Test.
 - If woman is euglycemic with diet only, may delay surveillance until 40 weeks.
 - If medication therapy is not required, but euglycemia has not been documented, initiate surveillance at 36 weeks.

- If medication therapy is required, initiate surveillance in women with otherwise uncomplicated GDM at 32–34 weeks.
- If woman has pre-existing diabetes, evidence of growth abnormalities, abnormal amniotic fluid levels, hypertension, or other adverse obstetric history, consider earlier surveillance.
- Using a fetal based strategy (AC > 75th %ile at 28–33 weeks) to guide therapy may help identify women that may benefit from more intensive medical management.
- Selection of the prenatal test, whether NST, AFI, Biophysical Profile, or Contraction Stress Test, is at the discretion of the practitioner.

LABOR AND DELIVERY MANAGEMENT

- Do a clinical or ultrasound estimate of fetal weight (EFW) within 2 weeks of delivery.
- Timing of delivery remains relatively open. There is no data to support delivery prior to term or cesarean delivery purely on the basis of GDM.
 - Well-controlled GDM pregnancies on MNT have little indication for delivery prior to 38–39 weeks gestation. Delivery at ~39 weeks gestation has been shown to decrease macrosomia in women with good dating criteria and a favorable cervix.
 - Consider fetal lung maturity documentation by amniocentesis in women undergoing induction of labor or cesarean delivery prior to 38 weeks.
- Counsel all women regarding possible cesarean delivery.
- To determine mode of delivery when EFW is 4,000–4,500-g, consider past delivery history, clinical pelvimetry, evidence of body to head disproportion (fetal AC three weeks ahead of biparietal diameter measurement on ultrasound), and progression of labor.
- Manage as a high-risk delivery if woman has poor glycemic control, hypertensive disorder, or previous stillbirth.

POSTPARTUM FOLLOW-UP

Immediately Postpartum

- It is **crucial** women return to their provider to receive the appropriate postpartum counseling, testing, and follow-up after delivery. All women following GDM pregnancies have an approximate 50% risk for developing type 2 diabetes within the next 5–10 years and ~80% if they have impaired fasting glucose (IFG) or impaired glucose tolerance (IGT) postpartum.
- Encourage breastfeeding, emphasizing the following benefits:
 - May decrease maternal progression to type 2 diabetes.
 - Reduces insulin resistance in mothers.
 - Promotes weight loss for the mother.
- Encourage women to aim for their pre-pregnancy weight 6 to 12 months after the baby is born. Then, if overweight, work to lose at least 5 to 7 percent (10 to 14 pounds for someone who weighs 200 pounds) of body weight slowly, over time, and keep it off.
- Educate on lifestyle modifications to lessen insulin resistance and prevent or delay the onset of type 2 diabetes.
- Schedule a follow-up 75-g, 2-hour oral glucose tolerance test (OGTT) in 6–12 weeks.

6–12 Weeks Postpartum

- Perform a 75-g, 2-hour OGTT for reclassification of maternal glycemic status.

Reclassification Criteria for Postpartum Maternal Glycemic Status*

Time	Normoglycemia	Pre-diabetes	Type 2 Diabetes Mellitus
Fasting	< 100 mg/dl	≥ 100 mg/dl and < 126 mg/dl Impaired Fasting Glucose (IFG)	≥ 126 mg/dl
2-hour	< 140 mg/dl	≥ 140 mg/dl and < 200 mg/dl Impaired Glucose Tolerance (IGT)	≥ 200 mg/dl

* American Diabetes Association criteria

- If glucose levels are normal following 2-hour OGTT, reassess glycemia at a minimum of 1–3 year intervals.
 - If fasting or 2-hour values reflect diagnosis of pre-diabetes (IFG or IGT), test for diabetes annually. Refer to a primary care physician, advise to continue MNT, and follow an individualized exercise program. Women with pre-diabetes have ~17% risk per year of developing type 2 diabetes.
 - If fasting or 2-hour values reflect diagnosis of type 2 diabetes, refer to providers for diabetes self-management skills; PCP, CDE or nurse for SMBG education, RD, social worker, pharmacist, exercise physiologist, trained community health worker.
- Include contraceptive education to ensure optimal glycemic regulation from the start of any subsequent pregnancy. Given ~50% of pregnancies are unplanned in women with a history of gestational diabetes, women should be using adequate contraception starting 6–12 weeks postpartum.
 - Combined estrogen and progesterone containing oral contraceptives do not appear to cause significant effects on glucose metabolism, but should not be given to women with elevated triglycerides.
 - Depo-Provera has been associated with an increased likelihood of weight gain and glucose intolerance; therefore postpartum weight loss and maintaining a healthy weight should be stressed.
 - Intrauterine devices have not been shown to cause an increased risk of infection in women with a history of GDM and may be a highly effective method for some women.
 - It is critical that children born to women with GDM be followed closely for the development of obesity and/or abnormalities of glucose tolerance. Counsel on the importance of a healthy lifestyle for their newborn child and other family members as well.

PRE-EXISTING DIABETES MELLITUS

The management of pre-existing diabetes is beyond the scope of this document, however the following highlights some of the important steps to take preconception and initially once a woman has entered into prenatal care.

Preconception

Diabetes and its coexisting medical complications may result in adverse maternal medical and obstetrical outcomes. Therefore all women with diabetes should have preconception counseling, which addresses both obstetrical and medical considerations.

- Counsel on the importance of near normal blood glucose control prior to conception (HbA1c < 6.5 %). Preconception euglycemia decreases the risk of both miscarriage and congenital anomalies to levels near equal to normal pregnancies. Document euglycemia by HbA1c and SMBG monitoring in the 3–6 months prior to conception.
- Discontinue statins, ace inhibitors and angiotensin receptor blockers prior to conception due to possible adverse effects.

- Ascertain that proliferative retinopathy is in remission or controlled before conception.
- Recommend that women actively trying to become pregnant discontinue oral agents and initiate insulin to achieve optimal glycemic control before becoming pregnant.
- Recommend at least 1 mg folic acid supplements daily prior to conception to help prevent birth defects.

Prenatal

Due to the significant risk for adverse pregnancy outcomes without appropriate therapy and surveillance, including intrauterine fetal death and severe maternal preeclampsia, women with pre-existing diabetes should see a high-risk obstetric specialist and endocrinologist for high-risk management throughout the pregnancy, whenever possible. The following recommendations are not extensive, and should not be considered the only source when managing pre-existing diabetes in pregnancy.

- Obtain an HbA1c test at first prenatal visit and every 12 weeks throughout pregnancy. Decreasing the HbA1c to < 7.0% is the goal (< 6.5% is optimal) and often requires intensive, flexible insulin regimens based on both pre-meal and post-meal glucose testing, and initiation of carbohydrate/insulin ratios and correction factors.
- Discontinue oral agents at first prenatal visit and initiate insulin, with the understanding that insulin requirements often decrease in the first trimester placing the mother at risk for nocturnal hypoglycemia and frequently increase by 2–3 fold in the late 2nd and 3rd trimester.
- Continue SMBG 4–10 times/day especially in women on intensive, flexible insulin regimens and in women with type 1 diabetes and hypoglycemic unawareness.
- Continue MNT and counsel on healthy maternal weight gain. Weight gain often does not need any restriction in women with type 1 diabetes who are at or below ideal body weight.
- Refer to an ophthalmologist in the first trimester, and then as needed.
- Obtain baseline preeclampsia labs and monitor for evidence of increasing proteinuria with 12 to 24-hour urines in women with proteinuric renal disease.
- Monitor mother for complications such as worsening renal disease, gastroparesis, progressive retinopathy, and for the development of preeclampsia. Understand that DKA can occur in women with type 2 diabetes as well as women with type 1 diabetes with glucose values < 200 mg/dl.
- Monitor the fetus for evidence of growth restriction from placental insufficiency, large for gestational age due to inadequately treated diabetes and/or obesity, major malformations, fetal distress and consider earlier delivery, especially for fetuses at risk for intrauterine fetal demise. Initiate fetal activity records at 28 weeks and fetal surveillance at 30–32 weeks in all women with pre-existing diabetes.
- Manage labor and delivery using an IV insulin drip to keep mother's glucose 100–150 mg/dl to avoid neonatal hypoglycemia. Decrease mother's insulin dose to pre-pregnancy levels (or lower) immediately after delivery.

These clinical guidelines (approved 9/12/2006) are adapted from the *American Diabetes Association (ADA) Standards of Medical Care in Diabetes—2006*. They are designed to assist clinicians in managing women with gestational diabetes and are not intended to replace a clinician's judgment or establish a protocol for all women with gestational diabetes. For references, important updates, or additional copies of guidelines, go to <http://www.coloradoguidelines.org> or call 720-297-1681 or 1-866-401-2092.