



Section 12: Preconception, Pregnancy, and Postpartum Care

Concern	Care/Test	Frequency
Preconception, Pregnancy, and Postpartum Care	▪ Ask about reproductive intentions/assess contraception	At diagnosis and then every visit ◊
	▪ Provide preconception counseling/assessment	3 – 4 months prior to conception ◊
	▪ Screen for undiagnosed type 2 diabetes in women with known risk	At first prenatal visit
	▪ Screen for GDM in all women not known to have diabetes	At 24 – 28 weeks gestation ◊
	▪ Screen for type 2 diabetes in women who had GDM	At 6 – 12 weeks postpartum, then at least every 3 years lifelong

◊ Consider referring to provider experienced in care of women with diabetes during pregnancy

MAIN TOPICS INCLUDED IN THIS SECTION:

- Maternal/Child Risks Associated with Diabetes
- Pre-Existing (Pre-Gestational) Diabetes
- Diabetes Medications and Pregnancy Planning
- Gestational Diabetes
- Screening and Diagnosis
- Care of Women with Gestational Diabetes
- Gestational Diabetes: Postpartum Care
- Pre-Existing Diabetes: Postpartum Care
- Breastfeeding and Lactation
- Additional Resources
- References

Maternal/Child Risks Associated with Diabetes

“Major congenital malformations remain the leading cause of infant mortality and serious morbidity in women with type 1 and type 2 diabetes” (ADA, 2012). Maternal normoglycemia is necessary prior to conception, during fetal organogenesis, and throughout gestation, and is known to decrease infant and maternal morbidity and mortality (ADA, 2012). Both fasting and post-prandial plasma glucose levels are strong predictors of the outcomes of pregnancy complicated by diabetes. The A1C level is a strong predictor of fetal congenital anomalies and first trimester miscarriages. The risk of malformation increases directly with increasing maternal glycemia during the first 6-8 weeks of gestation as measured by a first trimester A1C level (ADA, 2012). Near-normal A1C levels (goal of at least < 7.0% (ADA, 2012), but some health care provider groups use a goal of 6.5% or less) are ideal before attempting conception.

Women with either pre-existing or gestational diabetes are at higher risk of maternal and infant complications during pregnancy and postpartum when compared to women without diabetes. However, with preconception counseling and intensive glycemic management before and during pregnancy, women with diabetes can achieve outcomes similar to women without diabetes. A team of providers experienced in caring for women with diabetes can facilitate good pregnancy outcomes (ADA, 2012).

Fetal/infant risks related to maternal hyperglycemia include (ADA, 2012):

- Insulin effect and other fetal growth factors may be associated with macrosomia and birth injuries (e.g., shoulder dystocia)
- Maternal vascular disease affects the uterine blood supply, resulting in fetal growth restriction (FGR) or intrauterine growth restriction (IUGR)
- Hypoglycemia is more common in infants born to mothers on insulin and may require intravenous glucose infusions
- Effects of hyperviscosity or hyperbilirubinemia may be complications in the infant
- Fetal lung maturity may be delayed, resulting in respiratory distress syndrome (RDS) at higher gestational ages than typically seen
- Hypertrophic cardiomyopathy may be significant enough to require medication
- Neurologically, infants may be immature, have hypotonicity, and a poor suck reflex that delays adequate oral feeding development
- Infants born to mothers with diabetes are at a higher risk for overweight or obesity, as well as glucose intolerance in childhood and thereafter

These risks increase in proportion to the degree of maternal hyperglycemia. Other maternal risks of uncontrolled diabetes potentially include aggravation of pre-existing diabetes complications, increased risk of hypertensive disorders such as pre-eclampsia, and increased risk for cesarean delivery.

Pre-Existing (Pre-Gestational) Diabetes

Pre-existing or pre-gestational diabetes refers to type 1 diabetes, type 2 diabetes, MODY, and cystic fibrosis-related diabetes diagnosed prior to pregnancy. Research shows that less than 50% of pregnancies in women with pre-existing diabetes are planned. Moreover, serious congenital malformations can occur early in pregnancy (often before a woman discovers that she is pregnant) (ADA, 2012). Preconception care is recommended for all women with pre-existing diabetes. Preconception care is defined as a set of interventions that aim to identify and modify biomedical, behavioral, and social risks to a woman's health or pregnancy outcome through prevention and management. It is important for providers to assess a woman's desire for pregnancy, obtain routine diabetes screenings, exams and lab tests, and carefully monitor and re-evaluate existing complications as necessary in order to prepare for a desired or unexpected pregnancy.

The guidelines provided in Table 12-1 are general recommendations for preconception care, intrapartum care, and postpartum care. Take into consideration cultural preferences, level/skill of literacy, and other needs when designing and implementing a care plan for women with diabetes. If the woman is already pregnant, begin prenatal care and counseling about diabetes in pregnancy as soon as possible.

Ongoing communication among all professionals involved in treating women with pre-existing or pre-gestational diabetes is essential to ensure optimal diabetes management during preconception and pregnancy.

Screening for Pre-Existing Diabetes at First Prenatal Visit

Women at risk for diabetes should be screened at the first prenatal visit. This includes women with the following criteria:

- Women with BMI ≥ 25 kg/m²
- A1C $\geq 5.7\%$, IGT, IFG or prediabetes
- Race/ethnicity (Hispanic/Latino, African American, Native American, Asian American, or Pacific Islander) (ACOG, 2001)
- Family history (first-degree relative with diabetes)
- History of Gestational Diabetes Mellitus (GDM) baby weighing more than 9 lbs at birth, unexplained stillbirth, or malformed infant.
- Markers of insulin resistance (e.g., acanthosis nigricans and/or waist circumference > 35 inches (> 31 inches for Asian women))
- Women with Polycystic Ovary Syndrome (PCOS)
- Medications which affect normoglycemia
- Physical inactivity
- History of hypertension ($> 140/90$ mmHg) or on therapy for hypertension
- History of cardiovascular disease
- History of dyslipidemia: HDL < 35 mg/dL and/or triglycerides ≥ 250 mg/dL

For additional information, see *Section 13: Assessing Risk and Prevention of Type 2 Diabetes*.

Women with cystic fibrosis (CF) also require prompt pregnancy counseling and diabetes screening. Cystic fibrosis-related diabetes (CFRD) is a common comorbidity and disproportionately affects women. New published screening guidelines recommend screening women with CF for diabetes prior to conception or when pregnancy is confirmed.

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Table 12-1: Preconception, Intrapartum, and Postpartum Care Recommendations

Care	Recommendations
General Counseling/ Education	<ul style="list-style-type: none"> ▪ Provide information on maternal and neonatal risk of pregnancy ▪ Inform women that risk is minimized with optimal glycemic control prior to conception ▪ Encourage communication of desire/intent to become pregnant, discuss pre-pregnancy planning such as tobacco, alcohol, and recreational drug cessation, and eliminating exposure to secondhand smoke ▪ Discuss importance of folic acid supplementation and benefits of breastfeeding ▪ Assess individual circumstances (e.g., years with diabetes, level of control, and history of complications) ▪ Consult or refer to multidisciplinary team (e.g., CDE, dietitian) experienced in caring for pregnant women with diabetes ▪ Discuss potential for frequent medical visits (up to two visits per week after 32 weeks) and frequent phone contact during pregnancy ▪ Detect pregnancy as early as possible; if suspected, seek testing and medical care immediately ▪ Discuss potential infertility issues; refer for counseling if attempts to become pregnant have exceeded six months
Contraception	<ul style="list-style-type: none"> ▪ Review contraceptive options; oral contraception is a viable option for women with diabetes unless contraindicated (e.g., significant vasculopathy, hypertension, or a strong family history of thromboembolic disease) ▪ Educate women about emergency contraception
Medications	<ul style="list-style-type: none"> ▪ Evaluate all glucose lowering agents for safety and switch to an intensive insulin regimen to reduce risk to infant (Refer to Table 12-2) ▪ Evaluate all other medications/supplements for safety and teratogenicity (including other prescriptions, over-the-counter medications, herbal remedies, and teas)
Initial Medical Assessment/ Diabetes-Focused Visits, Including Complication Screening <i>(Screening for Pre-conception complications is essential)</i>	<ul style="list-style-type: none"> ▪ Complete a history and physical, including past pregnancy history, a gynecological exam, and a comprehensive foot exam ▪ Order lab work for: fasting lipid profile, urinalysis (culture and sensitivity), albumin/creatinine ratio or creatinine clearance, serum creatinine for eGFR, A1C, thyroid stimulating hormone (TSH), and any other lab work related to general health screening with pre-existing diabetes. During pregnancy, 24-hour urine collections are utilized to assess protein and creatinine clearance since normal levels for other kidney screening tests have not been developed in pregnancy ▪ Advise a daily prenatal vitamin and vitamin D supplementation per provider recommendation. (For women with prior history of neural tube defects, a 4.0 mg tablet of folic acid during the preconception period is recommended to reduce the risk of birth defects.) ▪ Stabilize any existing health problems prior to pregnancy (e.g., hypertension, retinopathy, renal dysfunction, gastroparesis, or other neuropathies) ▪ Assess risk factors for CVD. Obtain a resting electrocardiogram in asymptomatic patients age 35 years or older. Women with a history of CVD symptoms should be referred for cardiology consultation and further testing. ▪ Make a referral for a dilated retinal exam; if disease is present, frequent and close monitoring by a retinal specialist will be necessary ▪ Refer to dentist for complete oral screening exam (see <i>Section 9: Oral Care</i>) ▪ Provide immunizations as scheduled ▪ Discuss routine prenatal care, including how to contact a health care provider
Emotional/ Mental Health	<ul style="list-style-type: none"> ▪ Discuss the risk of intrapartum and postpartum depression ▪ Assess and screen for depression and other psychosocial concerns (see <i>Section 10: Emotional and Sexual Health Care</i>) ▪ Refer to mental health specialist as needed

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Table 12-1: Preconception, Intrapartum, Postpartum Care Recommendations (continued)

Care	Recommendations
Medical Nutrition Therapy	<ul style="list-style-type: none"> ▪ Refer to registered dietitian (RD) for nutritional assessment/recommendations and incorporation of required nutrients needed during preconception, pregnancy, and lactation (referral to a lactation consultant may be helpful) ▪ Assess for potential disordered eating in women with type 1 diabetes and type 2 diabetes ▪ Discuss small and frequent meals to prevent post-prandial hyperglycemia and pre-meal starvation ketosis ▪ Individualize weight goals based on pre-pregnancy weight and consider the Institute of Medicine's recommendations for weight gain during pregnancy
Self-Management/ Self-Monitoring	<ul style="list-style-type: none"> ▪ Refer to a certified diabetes educator (CDE) for an educational assessment and to intensify self-management skills, including self-monitoring of blood glucose (SMBG) and testing frequency (fasting, 1- or 2-hr post-meal) ▪ Verify accuracy of meter by ordering a meter/lab correlation to ensure that values are accurate (within 10% of lab) ▪ Teach self-adjustments to treatment plans (diet, physical activity, and medication) based on SMBG results ▪ Discuss how pregnancy affects metabolism and how insulin needs will change ▪ Explain hypoglycemia and treatment options, including use of Glucagon (if using insulin) ▪ Discuss the demands of intensive diabetes management during preconception, pregnancy, and postpartum ▪ Encourage written blood glucose logs for clinical review and or download meters to assess recent blood glucose numbers ▪ Provide instructions for urine ketone testing with recommended testing times and appropriate actions to take if results are positive
Pregnancy Confirmed	<ul style="list-style-type: none"> ▪ Discuss the specialized tests and exams to closely monitor fetal development and monitor for signs of distress (ultrasounds, including targeted anatomic assessment, formal fetal echocardiogram, serial growth ultrasound, and antenatal testing, biophysical profiles, non-stress tests, etc.) ▪ Refer for grief/loss counseling with pregnancy loss
Postpartum Care	<ul style="list-style-type: none"> ▪ Encourage continued self-management to maintain excellent glycemic control ▪ Discuss changes in insulin requirements (women with pre-existing diabetes will have a precipitous drop postpartum and insulin doses will need to be recalculated) ▪ Explain insulin requirements during lactation (insulin requirements drop during the night when glucose is siphoned into the breast milk; therefore, there may be an increased risk of hypoglycemia) ▪ Women with type 2 diabetes controlled with oral medication prior to pregnancy can discuss the option of switching back to oral medications. (Due to limited availability on the safety of the use of these drugs during lactation, it is recommended that women review this with their primary care provider and infant's pediatrician.) ▪ Offer contraception options prior to delivery or immediately postpartum if no plan has been determined. ▪ Discuss importance of maintaining or resuming care with usual primary care provider ▪ Communicate any necessary information needed for resuming care such as date of last dilated eye exam, lab results, and any other diabetes care issues to primary care provider ▪ Resume preconception counseling/education

Diabetes Medications and Pregnancy Planning

Women taking the insulin Detemir or Gargine should be transitioned to NPH or insulin pump therapy, preferably before conception. Table 12-2 provides a list of common medications used in women with type 2 diabetes. This table is only a guide; specific information regarding any medication use during the preconception period must be individualized.

Table 12-2: Common Medications in Type 2 Diabetes and the Preconception Period[®]

Medication	Placental Transfer	Teratogenicity	Pregnancy Class ^{††}	Preconception Period
<i>Oral Antidiabetics</i>				
▪ Metformin	Yes	No	Class B	Continue
▪ TZD	Unknown	Unknown	Class C	Discontinue
▪ Sulfonylurea	No	No	Class B/C	Continue (Glyburide only)
▪ Exenatide	Minimal	Unknown	Class C [*]	Discontinue
▪ DPP-4	Unknown	Unknown	Class C [*]	Discontinue
<i>Antihypertensives</i>				
▪ ACE/ARB	Yes	Yes	Class X	Discontinue
▪ Beta-blocker	Minimal	No	Class C	Continue (except Atenelol Class D)
▪ Calcium Channel Blocker	Minimal	No	Class C	Continue
▪ Diuretic	No	No	Class B	Continue
<i>Hyperlipidemic agents</i>				
▪ Statin	Yes	Yes	Class X	Discontinue
▪ Fibrate	No	No	Class C	Discontinue and re-evaluate need
<i>Bile Acid Sequestrant/Resin</i>	No	No	Class B	Continue [❖]

Source: Valika, B and Urban R.

^{††}Explanation of Pregnancy Classes:

Pregnancy Class A - Controlled studies show no risk

Pregnancy Class B - No evidence of risk in humans

Pregnancy Class C - Risk cannot be ruled out

Pregnancy Class D - Positive evidence of risk

Pregnancy Class X - Contraindicated in pregnancy

^{*} Registry available for these drugs via manufacturer for patients with prenatal exposure

[❖] May lead to malabsorption of prenatal vitamins so separate from vitamins by at least 3-4 hours.

[®] Detemir (Levemir) was recently approved by the FDA (Class B). For more information see: http://www.accessdata.fda.gov/drugsatfda_docs/label/2012/021536s037lbl.pdf

Gestational Diabetes

Gestational diabetes mellitus (GDM) is defined as any degree of glucose intolerance with onset first recognized during pregnancy and commonly recognized after 20 weeks gestational age. The prevalence of GDM among U.S. women is approximately 7% but varies between 1-14% depending on the population and the diagnostic criteria used. GDM is more likely to occur with advanced age, overweight and obesity, a family history of diabetes, a personal history of abnormal glucose tolerance, a prior macrosomic infant, prior poor obstetric outcome, and in populations with a high risk of type 2 diabetes (e.g., American Indians, African Americans, Hispanic/Latino Americans, and Asian Americans). Women with GDM who required insulin during pregnancy have a greater risk of developing type 2 diabetes within a five-year period of time. After having GDM, a woman’s lifetime risk for developing type 2 diabetes is 70%. Uncontrolled GDM carries many risks to both the mother and the fetus. Table 12-3 provides a listing of some of these risks.

Table 12-3: Risks of Uncontrolled Gestational Diabetes to the Mother and Fetus/Infant

Risks to the Mother	Risks to the Fetus/Infant
<ul style="list-style-type: none"> ▪ Hypertensive disorders such as pre-eclampsia during pregnancy ▪ Delivery risks associated with macrosomia ▪ Increased potential for cesarean delivery ▪ Development of GDM in subsequent pregnancies ▪ Development of metabolic disorders later in life including: hypertension, dyslipidemia, arteriosclerotic cardiovascular disease, and type 2 diabetes 	<ul style="list-style-type: none"> ▪ Macrosomia and associated delivery risks ▪ Polyhydramnios ▪ Hypoglycemia ▪ Seizures ▪ Hypocalcemia ▪ Polycythemia ▪ Jaundice ▪ Increased risk of developing type 2 diabetes later in life ▪ Increased risk of overweight/obesity later in life

Screening and Diagnosis

Currently there is no universally accepted recommendation for the screening and diagnoses of GDM which creates confusion for both women and providers. The results of the 2008 Hyperglycemia and Adverse Pregnancy Outcomes (HAPO) study highlighted the importance of GDM screening by demonstrating that blood glucose levels that are only one standard deviation away from normal glucose can be detrimental to maternal and fetal health outcomes. Universal screening and diagnostic and treatment criteria will be the topic of an NIH sponsored Consensus Development Conference to occur in October 2012.

Current guidelines recommend screening pregnant women with risk factors for diabetes at their first prenatal visit using standard diagnostic criteria. A positive test using the standard criteria indicates a diagnosis of diabetes. This is especially important given the increase in undiagnosed, obesity-related type 2 diabetes among women of childbearing age. Standard diabetes diagnostic criteria from the ADA include:

- A1C \geq 6.5%
- Fasting plasma glucose \geq 126 mg/dL
- 2-hour plasma glucose \geq 200 mg/dL during an OGTT using a 75-gram glucose load
- Classic symptoms of hyperglycemia with random plasma glucose \geq 200 mg/dL

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For more detailed information on testing for diabetes see the Quick Reference sheet “Tests to Diagnose Diabetes” in the Quick References section.

Women not diagnosed with diabetes previously should be screened at 24 –28 weeks of gestation using accepted screening recommendations:

ACOG 2011 recommendations see: http://www.acog.org/Resources_And_Publications/Committee_Opinions/Committee_on_Obstetric_Practice/Screening_and_Diagnosis_of_Gestational_Diabetes_Mellitus

ADA 2012 recommendations see: http://care.diabetesjournals.org/content/35/Supplement_1/S11.full#sec-11

Table 12-4 provides a guide for applying current criteria for diagnosis of GDM from two agencies identifying standards for GDM screening and diagnoses.

Table 12-4: Testing and Threshold Values for Diagnosis of Gestational Diabetes

Organization	Amount of Glucose	Fasting	1 Hour	2 Hour	3 Hour
American College of Obstetrics and Gynecology ¹	100 grams	95 mg/dL	180 mg/dL	155 mg/dL	140 mg/dL
American Diabetes Association ²	75 grams	92 mg/dL	180 mg/dL	153 mg/dL	

¹ A positive diagnosis requires that two or more thresholds be met or exceeded ACOG Committee Opinion 504, Sept. 2011

² One abnormal glucose value that exceeds the values is sufficient to diagnosis GDM American Diabetes Association Clinical Guidelines, Diabetes Care, 2012

Care of Women with Gestational Diabetes

Once a diagnosis of GDM is made, it is important to provide support and education. Referral to a registered dietitian, a certified diabetes educator, or other specialist is recommended. Medical nutrition therapy is essential for providing healthy eating recommendations and ensuring that nutritional needs of pregnancy are being met. Individualized meal planning is important. A diabetes educator can educate regarding diagnosis, initiate self-blood glucose monitoring, order supplies, and provide initial monitoring guidelines. Intensive self-monitoring of blood glucose is recommended. Optimal testing times and results are as follows:

American College of Obstetrics and Gynecology (ACOG)

- Fasting < 95 mg/dL
- 1-hour post-prandial < 130-140 mg/dL
- 2-hour post-prandial < 120 mg/dL

Fifth International Workshop-Conference on Gestational Diabetes Mellitus

- Fasting < 95 mg/dL
- 1-hour post-prandial < 140 mg/dL
- 2-hour post-prandial < 120 mg/dL

There is evidence suggesting a 1-hour post-prandial blood glucose goal of 100-129 mg/dL, if it can be achieved without excessive hypoglycemia, may lower fetal risk more than the previous 2-hour post-prandial recommendation. At this time, due to accumulating evidence, the 1-hour or 2-hour post-prandial test is recommended. Care should be individualized and based on clinical judgment. Research and evidence related

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to care of women with diabetes during pregnancy continues to surface. It is important for health care providers caring for pregnant women with diabetes to continually stay apprised of evolving research in this area.

Women should document blood glucose values in a logbook to be reviewed by health care provider(s). The majority of women can control their blood glucose levels during pregnancy through healthy eating and physical activity. Insulin should be used to control elevated glucose levels that are not controlled by diet and physical activity alone. All available types of insulin are not routinely used during pregnancy due to lack of research or history of use. For more information, please refer to the tool titled “Insulin Therapy 2012” in the Tools Section.

Metformin is being studied in pregnancy for the treatment for GDM. The Metformin in Gestational Diabetes (MiG) trial is a prospective randomized multicenter trial in women with gestational diabetes mellitus (GDM) that is testing the hypothesis that metformin treatment, compared with insulin, is associated with similar perinatal outcomes, improved markers of insulin sensitivity in the mother and baby, and improved treatment acceptability. Two year follow-up of these offspring showed them having the overall same level of body fat, but favorably more subcutaneous versus visceral body fat. Providers using metformin must be aware that studies show a 34.7%- 46.3% failure rate (Moore et. al, & Rowan et. al) and women receiving metformin may require supplemental insulin to achieve adequate blood glucose control.

Providers are using glyburide for GDM treatment based on studies available over the last 10 years. A randomized controlled trial in 2000 (Langer, 2000) indicated that glyburide treatment provides a safe alternative to insulin therapy. Subsequent retrospective trials have demonstrated that glyburide treatment, compared with insulin, resulted in lower mean glucose values, a higher percentage of women with “excellent glycemic control,” and fewer hypoglycemic episodes. There is an emerging view that glyburide treatment, compared with insulin, improves glycemic profiles; however, providers not familiar with this therapy should refer women with GDM to clinical programs that specialize in this care. More recent evidence indicates that the half-life of glyburide during pregnancy is 2-4 hours versus the usual 12 hours in women who are not pregnant. Therefore, providers choosing to use glyburide should consider recommending glyburide one hour prior to a meal to optimize post-prandial glucose excursions. Due to the shorter half-life, glyburide can be dosed multiple times per day.

There is a subset of pregnant women who are more likely to fail treatment with use of glyburide. These women are older, have higher BMIs, or are multiparous with higher fasting blood glucose values. This treatment failure is due to more advanced insulin resistance. These women will likely require insulin to achieve adequate blood glucose control (Kahn et al. & Jacobson et al.).

Fetal well-being should be monitored through growth ultrasounds, biophysical profiles, and non-stress testing for any woman on insulin or other therapy for GDM or pre-existing diabetes.

Gestational Diabetes: Postpartum Care

Almost all women with GDM revert to normal glycemia postpartum. After delivery, insulin or other therapy is usually discontinued. A two-hour 75-gram oral glucose tolerance test (OGTT) is recommended at the six- to twelve-week postpartum check and at least every three years thereafter. Women with GDM are at increased risk for developing type 2 diabetes and its associated metabolic abnormalities, including hypertension, dyslipidemia, and atherosclerotic cardiovascular disease. Approximately 35-65% of women go on to develop type 2 diabetes within 10 years.

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Because of this increased risk, it is essential to provide women with prevention information and tools to facilitate lifestyle changes. Physical activity, healthy eating, and weight control are important prevention measures. It is proven that regular physical activity improves blood glucose control, reduces cardiovascular risk factors, contributes to weight loss, and improves overall well-being. For additional information, see *Section 13: Assessing Risk and Prevention of Type 2 Diabetes*.

Discuss and offer postpartum contraception to avoid the possibility of pregnancy immediately following recovery from delivery. Early screening and preconception counseling/education should also be provided prior to subsequent pregnancies.

Pre-Existing Diabetes: Postpartum Care

Women with pre-existing diabetes experience a marked decrease in insulin needs immediately following delivery. Postpartum insulin needs are slightly lower than those prior to pregnancy. Insulin may be recalculated and distributed as appropriate throughout the day at 0.6 units/kg or reducing the pre-delivery total daily dose of insulin by 50%. For women who breastfeed, nocturnal hypoglycemia is a concern due to the drop of insulin requirements during the night with glucose siphoning into the breast milk. As a result, the majority of insulin is needed during the day. If glycemic control is successful in the postpartum period, metformin and/or glyburide can be restarted for women with type 2 diabetes in certain circumstances. Past information, such as pre-pregnancy insulin regimen and glycemic control, along with a review of insulin changes required for increasing insulin needs during pre-pregnancy, can help determine a more individualized medication/insulin plan postpartum for the experienced provider.

Breastfeeding and Lactation

Breast milk provides the best nutrition for babies and breastfeeding is recommended for all mothers with either pre-existing diabetes or gestational diabetes.

Research shows that breastfed infants are less likely to become overweight or obese, even if the mother is overweight, obese, or has diabetes. For children at higher risk for type 2 diabetes or obesity because of family history, breastfeeding may play a critical role in helping to lower the risk of obesity throughout the child's lifetime. Although the exact relationship is not known, it appears that breastfeeding may reduce the risk for developing type 2 diabetes by as much as 39%. Other health benefits of breastfeeding for the infant include fewer problems with infectious and non-infectious diseases and milder cases of respiratory infections, ear infections, and diarrhea.

Attention to nutrition is vital for breastfeeding mothers with diabetes to assure optimal nutrition for their infants while controlling their own blood glucose levels. Breastfeeding can cause low blood sugar, especially for women using insulin. Eating a snack containing carbohydrate either before or during breastfeeding can help reduce the risk for low blood sugar. Energy requirements during the first six months of lactation require an additional 200 calories above the pregnancy meal plan or about 500 calories above the pre-pregnancy meal plan. Attempting to lose weight through a strict weight loss regimen is not recommended while breastfeeding. However, with a minimum energy intake of 1,800 calories/day, most women can meet the nutritional requirements for lactation, and depending upon energy expenditure, gradually lose weight.

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As in pregnancy, the need for certain nutrients increases while breastfeeding. It is important to assure adequate intakes of protein, calcium, magnesium, zinc, vitamin B12, vitamin D, foliate, and vitamin B6. Fluid intake can affect breast milk production, so mothers are encouraged to drink at least 8 cups of fluids daily. Remind breastfeeding mothers that alcohol and nicotine can pass into breast milk and affect the baby, so drinking alcohol and smoking are not advised during breastfeeding.

Consider the risks and benefits during lactation of any medication prior to starting it. The benefits of breastfeeding are an important consideration in determining treatment. If oral hyperglycemic agents are used, close monitoring of infant for signs of hypoglycemia is important. Signs of hypoglycemia for the infant include irritability, tremors, jitteriness, lethargy, high pitched or weak cry, apnea or irregular breathing, convulsions, or localized seizures.

Providers are choosing to use some oral agents during lactation. These oral agents are summarized below in Table 12-5. When studies about diabetes medication use during lactation are not available, providers could consider choosing medications with:

- low oral bioavailability
- high protein binding (Above 90%)
- large molecular weight

Table 12-5: Type 2 Diabetes Oral Medications with Breastfeeding

Glipizide	Pregnancy category C, Lactation category L3, Pediatric concerns none but observe for hypoglycemia
Glyburide	Pregnancy category C, Lactation category L3, Pediatric concerns none but observe for hypoglycemia
Metformin	Pregnancy category B, Lactation category L1, Pediatric concerns none reported via milk (Plasma levels undetectable in infant)

Additional Resources

1. Becoming a Parent: Preconception Checklist, developed by the Wisconsin Association for Perinatal Care, Madison, WI: http://www.perinatalweb.org/images/stories/PDFs/Materials%20and%20Publication/becoming%20a%20parent_preconception_checklist.pdf.
2. Health Care Provider Reference to Becoming a Parent: Preconception Checklist, developed by the Wisconsin Association for Perinatal Care: http://www.perinatalweb.org/images/stories/PDFs/Materials%20and%20Publication/becoming_parent_provider_reference.pdf.
3. Small Steps, Big Rewards. Prevent Type 2 Diabetes. National Diabetes Education Program (NDEP) Campaign. Information and materials available: http://www.ndep.nih.gov/campaigns/SmallSteps/SmallSteps_index.htm.
4. Gestational Diabetes: What You Need To Know. National Institute of Diabetes and Digestive and Kidney Disease (NIDDK) Information and materials available: http://diabetes.niddk.nih.gov/dm/pubs/gestational_ES/index.htm.
5. For Women With Diabetes: Your Guide to Pregnancy. National Institute of Diabetes and Digestive and Kidney Disease (NIDDK) Information and materials available: <http://diabetes.niddk.nih.gov/dm/pubs/pregnancy/>.
6. Managing Gestational Diabetes: A Patient's Guide to a Healthy Pregnancy [NIH Pub. No. 04-2788] National Institute of Child Health and Human Development To order copies call 1-800-370-2943 or go to the following and search for Keyword = "Gestational Diabetes" and Type = "Health Publications" <http://www.nichd.nih.gov/publications/pubs.cfm?from=>.
7. Am I at Risk for Gestational Diabetes [NIH Pub. No. 00-4818] National Institute of Child Health and Human Development To order copies call 1-800-370-2943 or go to the following and search for Keyword = "Gestational Diabetes" and Type = "Health Publications" <http://www.nichd.nih.gov/publications/pubs.cfm?from=>.

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