

# Optimizing Maternal and Neonatal Outcomes in Perinatal Patients With Diabetes: AWHONN Practice Brief Number 21

An official practice brief from the Association of Women's Health, Obstetric and Neonatal Nurses.

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The information herein is designed to aid nurses in providing evidence-based care to women and newborns. These recommendations should not be construed as dictating an exclusive course of treatment or procedure. Variations in practice may be warranted based on the needs of the individual patient, resources, and limitations unique to the institution or type of practice.

## Recommendations

- Pregnant patients with diabetes should be closely monitored during the intrapartum and immediate postpartum periods via a standardized protocol. This protocol should include an individualized, multidisciplinary approach to promote optimal maternal and neonatal outcomes.
- Nurses can optimize maternal and neonatal physical and psychological outcomes via effective strategies throughout the perinatal continuum of care.

## Background

In the United States, diabetes mellitus (DM) is one of the most common complications of pregnancy (Dude et al., 2020). Although most cases of diabetes in pregnant patients are gestational DM (GDM), the prevalence of GDM and pregestational DM (PGDM) is increasing (American College of Obstetricians and Gynecologists [ACOG], 2018; Dude et al., 2020). Pregnancy is associated with an increase in insulin resistance, which is greatest in the third trimester because of the effect of several placental hormones, including progesterone, prolactin, human chorionic somatomammotropin, placental growth hormone, and cortisol (ACOG, 2018). Diabetes mellitus leads to significantly increased maternal, fetal, and neonatal risks associated with the degree of hyperglycemia, chronic complications, and comorbidities of diabetes (American Diabetes Association [ADA], 2024).

Significant risks exist for pregnant patients with GDM or PGDM. Maternal risks during the perinatal period include preterm birth, hypertensive disorders of pregnancy, cesarean birth, operative vaginal birth, (Oregon Health and Science University [OHSU], 2019), spontaneous abortion (ADA, 2024), and polydramnios (Preda et al., 2022). The risk of hypertension and other comorbidities is as high or higher for those with Type 2 DM compared to those with Type 1 DM (ADA, 2024). Fetal and neonatal risks during the perinatal period may include congenital anomalies, fetal growth restriction, large for gestational age/macrosomia, birth injury, shoulder dystocia, NICU admission, polycythemia, hyperbilirubinemia, hypoglycemia (OHSU, 2019),

electrolyte disturbances, organomegaly, and respiratory distress syndrome (ACOG, 2018). In addition to risks during the perinatal period, DM may be associated with an increase in long-term maternal risks, including obesity, fatty liver disease, Type 2 DM, future pregnancy risks, cardiovascular disease, and increased morbidity and mortality (OHSU, 2019). Long-term risks for the newborn may include obesity, nonalcoholic fatty liver disease, metabolic syndrome, Type 2 DM, cardiovascular disease, and increased morbidity and mortality (OHSU, 2019).

## Implications for Practice

### Intrapartum Glycemic Control

Glycemic control before labor affects the insulin dose required during active labor. Those with poor glycemic control before labor commonly require a higher insulin dose during labor (OHSU, 2019). During latent labor, the metabolic demands are generally stable. Once active labor begins, the metabolic demands increase, and insulin requirements typically decrease. However, all procedures and states of physiologic stress, such as labor, induce a counterregulatory hormone release of glucagon, cortisol, and epinephrine. The release of these hormones leads to a more insulin-resistant state that increases the risk of ketosis and often requires more frequent monitoring of glucose levels and an additional insulin dose (OHSU, 2019).

- *Blood glucose monitoring:* The target blood glucose range in pregnancy is 70 mg/dl to 100 mg/dl (ACOG, 2018; Dude et al., 2020). For

blood glucose levels less than 70 mg/dl or greater than 100 mg/dl, follow the institution's protocol. Regardless of the type of diabetes, blood glucose

- should be monitored every 2 hours when the patient is in early labor and not on an insulin drip.
- should be monitored every hour when the patient is in active labor and on an insulin drip.
- may be monitored less frequently for a patient with diet-controlled GDM, whose glucose values are within the normal range.
- may be monitored more frequently when medications such as ephedrine, epinephrine, terbutaline, or betamethasone are administered, or in the case of intrauterine inflammation, or infection or both.

Personal continuous glucose monitors are not approved by the U.S. Food and Drug Administration for inpatient use and should not be substituted for point of care testing or to guide management.

- **Insulin protocols:** Although agreement exists that maternal euglycemia should be maintained during the intrapartum period, standardized, universal protocols for the management of blood glucose levels for this time period have not been established. A standard insulin protocol for blood glucose results should be developed by the institution's obstetric service line.
- **Fetal monitoring:** Continuous fetal heart monitoring during labor for patients at risk of uteroplacental insufficiency or fetal acidemia, that is, those with uncontrolled diabetes, vascular disease, or hyperglycemia, is recommended. Limited evidence suggests that patients with GDM without other risk factors may be candidates for intermittent auscultation; however, more research is needed (Jabak & Hameed, 2022).

### Postpartum Glycemic Control

During the postpartum period, insulin requirements vary widely; close monitoring and dosing adjustments may be needed.

- In obstetric patients with Type 1 DM, insulin resistance dramatically decreases after childbirth because of the loss of placental hormone influence. The required insulin dose is 30% to 50% less during the immediate postpartum period in comparison to the prepregnancy dose (Ringholm et al., 2020).
  - Stop insulin after the delivery of the placenta for patients with Type 2 DM (OHSU, 2019).
  - Individualize continuation of prepregnancy oral antihyperglycemic medications or insulin administration and include frequent glucose monitoring.
- Encourage breastfeeding and/or feeding expressed human milk to optimize short- and long-term maternal and neonatal outcomes (Ringholm et al., 2020).
  - Consider adjusting insulin for patients with Type 1 DM because of the increased risk of nocturnal hypoglycemia.

### Special Considerations.

- Glucocorticosteroid administration:
  - Assess for hyperglycemic effects that peak at 4 hours to 10 hours after injection. The effects may continue for 24

hours to 48 hours but may last as long as 3 days to 5 days after injection.

- Monitor for higher rates of neonatal hypoglycemia and hyperbilirubinemia.
- Consider that most patients may need significantly more than their current insulin requirements for adequate control because of the varying physiologic responses to corticosteroids.
- Avoid betamimetic tocolytics in patients with DM.
- Diabetic ketoacidosis (DKA):
  - Be aware that pregnant patients are at increased risk of developing DKA at lower blood glucose levels than nonpregnant patients.
  - Manage the plan of care via a collaborative and multidisciplinary approach.
  - Transfer patients to a critical care setting with co-management by obstetrics and critical care personnel.

### Insulin Safety

- Ensure all oral antihyperglycemics are stopped before initiation of insulin.
- Initiate and maintain dedicated intravenous (IV) lines for the prescribed mainline fluid and IV insulin.
  - Use 20 ml of the prescribed insulin solution to prime the IV tubing so the patient receives the full insulin dose (Dude et al., 2018).
- Discard the IV insulin after 48 hours or if exposed to temperatures that exceed 98.6 °F (37 °C; U.S. Food and Drug Administration, 2017).
- Obtain a second registered nurse-independent validation, because insulin is a high-alert medication, in the following scenarios:
  - starting insulin drip,
  - hanging a new insulin bag,
  - giving an IV insulin bolus (push),
  - changing shifts or handing off to another nurse, and
  - using downtime processes when electronic verification is not available.
- Monitor for signs and symptoms of hypoglycemia (e.g., pallor, diaphoresis, tachycardia, tremors, irritability, weakness, confusion, lethargy).
- Monitor for signs and symptoms of hyperglycemia (e.g., abdominal pain, nausea and vomiting, altered sensorium). Continuous fetal heart monitoring may show abnormal fetal heart rate patterns and should be managed with intrauterine resuscitation techniques.

### Education for Nurses and Other Health Care Professionals

- Screen all patients for mood and anxiety disorders during the prenatal period. Pregnant patients with diabetes are at higher risk of depression and anxiety because of the stressors of DM management (OHSU, 2019); therefore, increased psychosocial care may be needed during the perinatal continuum of care.

- Continue point-of-care testing glucose monitoring in the immediate postpartum period for patients with GDM because of the potential for continued glucose abnormalities (OHSU, 2019).
- Individualize continuation of prepregnancy oral anti hyperglycemic medications or insulin administration and include frequent glucose monitoring in the postpartum period.
  - Consider reducing the insulin dosage during the first 1 month to 4 months after birth because insulin requirements remain approximately 21% lower than before pregnancy (Ringholm et al., 2020).
- Expect a physiologic decrease in hemoglobin A<sub>1C</sub> during pregnancy. Because of blood loss at birth and during the postpartum period, hemoglobin A<sub>1C</sub> may be low in the first 1 month to 2 months after birth (Ringholm et al., 2020) and should not be used to determine adequate glucose control.
- Assist in a seamless transition to follow-up care. Follow-up care should be a multidisciplinary collaboration in which the patient's risk factors and access to resources are taken into consideration (Choi et al., 2022).

## Education for the Patient After Birth

In the postpartum period, educate patients with GDM and their families about the need to complete a 75-g oral glucose tolerance test at 4 weeks to 12 weeks because of the increased incidence of developing Type 2 DM within 5 years to 10 years after birth. Even if the results of that screening are normal, using nonpregnant diagnostic criteria, the patient should be tested every 1 year to 3 years thereafter (ADA, 2024; OHSU, 2019).

In the postpartum period, educate patients with Type 1 DM and their families about the following:

- To maintain enough glucose for adequate milk production, maintain appropriate blood glucose levels, and avoid DKA, patients who breastfeed should consume a daily minimum of 210 g of carbohydrates (Ringholm et al., 2020).
  - Aim for glucose values of 72 mg/dl to 126 mg/dl before afternoon and evening meals and 72 mg/dl to 180 mg/dl at all other times (Ringholm et al., 2020)
- Aim to achieve prepregnancy weight within 3 months to 6 months after childbirth (Ringholm et al., 2020).

## Summary

Although diabetes is a common condition in the perinatal period, appropriate management and support can lead to positive maternal and neonatal outcomes. Multidisciplinary obstetric teams should establish standardized protocols for diabetic management to reduce unnecessary variation while individualizing patient needs to ensure safe, high-quality care.

## AWHONN's Contextual Statement

Although the words “woman,” “women,” and “mother” and related pronouns are used herein, AWHONN recognizes the existence of diverse gender identities and acknowledges that not all individuals who present for care self-identify as women or exclusively as women.

When referencing the published results of previous studies, terms used by the original authors are retained for accuracy. To provide appropriate, respectful, and sensitive care, the health care provider is encouraged to always ask individuals what words they use to describe themselves, their bodies, and their health care practices.

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