OLIVE VIEW-UCLA MEDICAL CENTER
INPATIENT OBSTETRICS
POLICY & PROCEDURE

NUMBER: 4749
VERSION: 2

SUBJECT/TITLE: **DIABETES IN PREGNANCY**

MD ORDER: **YES [ ] NO [X]**

POLICY: Pregnancies complicated with pre-gestational or gestational diabetes are at high risk for maternal, fetal, and neonatal complications. These complications, in many instances, may be prevented.

PURPOSE: To define the incidence and diagnosis of diabetes mellitus in pregnancy.
To outline the nursing and medical management of diabetic patients in the intrapartum period.
To outline the maternal and fetal complications.

DEPARTMENTS: **Nursing 3D- PostPartum/Nursery, OB/GYN**

DEFINITIONS:

PROCEDURE:

I. INTRODUCTION

A. Normal pregnancy is a state of insulin resistance. However, through enhanced insulin production, most pregnant women can maintain normal blood glucose levels. Gestational diabetes mellitus (GDM) is a state of glucose intolerance that develops or is first recognized in pregnancy.

B. Gestational diabetes develops during pregnancy in approximately 7% of the population depending on the population studied. It occurs with greater frequency in certain ethnic groups (Hispanic, African-American, Asian, Native American). GDM represents 85-90% of all pregnancies complicated by diabetes.

C. Diabetes is one of the most common medical complications of pregnancy. The condition increases the risk of perinatal mortality and is associated with increased risks of maternal and neonatal morbidity.

D. For women who have pre-gestational diabetes, the leading cause of perinatal mortality is congenital malformations. There is a 2-3 fold

increase in the incidence of major congenital malformations in the neonate (6-8% versus the general background risk of 3%).

II. PATHOPHYSIOLOGY

A. In pregnancy, several changes occur that enhance a state of insulin resistance because the fetus relies on glucose for energy. To spare glucose for the developing fetus, several hormones are produced that antagonize insulin and affect carbohydrate metabolism. These hormones include estrogen, progesterone, human chorionic somatomammotropin (hCS), which are of placental origin, and cortisol, which originates from both the placenta and fetus.

B. These hormones increase in concentration beginning in the early first trimester, reaching peak levels at/after 30 weeks gestation. This explains the propensity for patients to develop gestational diabetes during the late 2^{nd} or early 3^{rd} trimester.

C. These hormones counteract the effects of insulin at the level of peripheral tissues (muscle, liver, fat) reducing the target organ sensitivity to insulin. This creates a state of insulin-resistance that may lead to elevated blood glucose levels.

D. Insulin secretion increases by about 30% during pregnancy. Hyperglycemia develops when the pancreas is unable to increase insulin secretion to compensate for the peripheral insulin-resistance.

III. DIAGNOSIS

A. Risk factors:
   1. Previous macrosomic infant
   2. Previous unexplained IUFD
   3. Previous history of GDM, impaired glucose metabolism, or glucosuria
   4. Family history of type 2 diabetes
   5. Obesity (> 120% of ideal body weight)
   6. Ethnicity (Asian, Native American, African American, Hispanic)

B. All patients with any of the above risk factors (with the exception of ethnicity) should be screened at the initial prenatal visit and again at 24-28 weeks if the initial screen is negative.

C. Women under the age of 25 with any of the identified risk factors and all women over the age of 25 (regardless of risk assessment) should be screened between 24 and 28 weeks.

D. The diagnosis of gestational diabetes requires two or more abnormal

values.

IV. MEDICAL MANAGEMENT

Focus is on the prevention of hypoglycemia and hyperglycemia. Refer to **Appendix A** for "Peripartum Diabetic Management" guidelines

A. Intrapartum
   1. Labor
      a. Decreased insulin requirements are most often seen (labor is similar to exercise).
      b. Capillary blood glucose monitoring should be done every one to two hours. The goal is to maintain maternal blood glucose between 70-110 mg/dl, as it will lessen the risk of neonatal hypoglycemia.
      c. Intrapartum management of blood glucose via intravenous insulin infusion requires the use of a controlled volume administration set and a pump device that is able to administer the desired flow rate.
      d. Only regular insulin (fast-acting) may be given intravenously (IV). It should be administered via the IV piggyback route or via a direct line in the presence of a primary line.
      e. In the presence of an insulin infusion, a glucose-containing solution also needs to be infused to maintain blood glucose levels above 70 mg/dl. If patient is euglycemic, other solutions for use include saline solution or ringers lactate (LR). For insurance, during the latent phase of labor, if the patient is euglycemic without an insulin infusion, LR or normal saline without glucose may be used. However, once the patient enters the active phase of labor, D5 should be added and an insulin infusion begun if necessary. Avoid high flow rates, and continue to monitor glucose values.
      f. Use normal saline or LR for intravenous bolus prior to epidural.

   2. Preterm Labor
      Magnesium Sulfate or Nifedipine is the tocolytic of choice as beta-mimetics may cause severe hyperglycemia and metabolic acidosis.

   3. Planned Cesarean delivery or induction to prevent traumatic birth injury, cesarean birth may be considered if the estimated fetal weight by ultrasound is $\geq$ 4250-4500 grams. Induction of labor in pregnancies with a fetus with suspected macrosomia has not been found to reduce birth trauma and may increase the cesarean delivery rate.
      a. Schedule for morning hours; nothing by mouth (NPO) after midnight.
      b. Hold insulin dose on the morning of delivery.
      c. If surgery is to be delayed, may give 1/3 AM NPH dose.
      d. The obstetrical and neonatal team should know pre-operative status of maternal diabetic control.
      e. Monitor glucose post delivery.

B. Postpartum

1. Obtain baseline blood glucose post delivery in the recovery room. Monitor plasma glucose in pre-gestational patients ac and hs or, if NPO, at least every six hours. For patients with gestational diabetes, fasting blood glucose should be obtained as well as two hour post prandial to evaluate glucose status.

2. Requirements for insulin decrease (one-half of pre-pregnancy dose) or may disappear altogether, especially in class A2 diabetics. Class A2 patients should be evaluated for persistence of diabetes mellitus immediately postpartum and treated if indicated.

3. Observe for hypoglycemic reaction in patients receiving insulin.

4. Patients with gestational diabetes (Class A1 and A2) should be screened for glucose intolerance before their six weeks postpartum appointment.

5. Breastfeeding is recommended for all patients.

6. Instruct patients to monitor for signs and symptoms of breast infection and report them to the health care provider immediately. Infection can affect diabetes control, leading to hyperglycemia and other complications.

V. NURSING MANAGEMENT

A. Intrapartum

1. Electronically monitor uterine activity and fetal heart rate continuously.
2. Monitor vital signs at least every hour.
3. Monitor capillary blood glucose every one to two hours or as ordered.
4. Routine intake and output.
5. Start intravenous infusion with appropriate solution based on maternal glucose status.
6. Document blood glucose values on patient flow record. Utilize reference range sticker on nursing flow sheet.

VI. COMPLICATIONS

A. Maternal

1. Polyhydramnios
2. Preterm labor

3. Progression of vascular disease
4. Infection
5. Prognostically bad signs:
   a. Pyelonephritis
   b. Ketoacidosis
   c. Pregnancy induced hypertension
   d. Non-compliance

B. Fetal/Neonatal
1. Increased morbidity and mortality (associated with severity of maternal disease).
2. Increased congenital anomalies. Most common are cardiovascular, central nervous system (neural tube defects such as spina bifida and anencephaly) and skeletal (caudal regression is specific to diabetes). Less common are gastrointestinal and genitourinary.
3. Respiratory distress syndrome (fetal hyperinsulinemia interferes with surfactant production) or transient tachypnea of the newborn (TTN).
4. Macrosomia and associated birth trauma (ten times more common in diabetic pregnancies).
5. Intrauterine growth restriction (IUGR) in cases associated with maternal vasculopathy.
6. Hypocalcemia
7. Hypoglycemia
8. Hypomagnesemia
9. Hyperbilirubinemia
10. Polycythemia
11. Prematurity
    a. Spontaneous due to hydramnios, preterm labor, preterm premature rupture of membranes.
    b. Iatrogenic as necessitated for fetal or maternal indication.

VII. DIABETIC CONTROL USING CONTINUOUS INSULIN INFUSION (See protocol)

A. Maintain a separate peripheral IV with D5½NS at 125 cc/hour to provide adequate hydration, caloric, and electrolyte supplementation.
B. Preparation
1. Obtain pre-mixed bag from the pharmacy. Formula yields a solution containing 1 Unit insulin/1.0 ml. Insulin must be double-checked with a second RN and an infusion pump with a "Burette" must be used.

Units/Hour	ml/hour
0.5	0.5
1.0	1.0

2.0	2.0
5.0	5.0

2. When insulin is to be administered IV, prior to administering solution, flush tubing thoroughly with insulin solution in order to saturate non-specific binding sites within the IV tubing.
3. Blood glucose must be checked every hour. Notify MD if result out of range.
4. Adjust insulin drip rate according to written sliding scale.
5. If pre-mixed bag is unavailable, mix 50 Units Regular insulin in 50 ml normal saline.

References:	
Approved by: Christine Holschneider (Chief Physician), Jan Love (Clinical Nurse Director II)	Date: 04/25/2017
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Appendix A

Peripartum Diabetic Management

Intrapartum Glucose Control: Goal 70-110 mg/dL

	Induction of Labor	Latent Phase of Labor	Active Phase Labor	Elective C/Section	
				AM	Delayed
IV solution (100 mL/hr)	LR	LR	D5LR	LR	D5LR
ADA Diet	Outpatient Diet	Outpatient Diet	NPO	NPO	NPO
Glucose checks	2 hrs. Post Prandial	2 hrs. Post Prandial	Q 2 hr if < 110 mg/dL **Q 1 hr if on Insulin Drip**	Pre-Op	Q 1 hr
Hypoglycemic agents	Same as outpatient	Same as outpatient	Start Insulin Drip if BS ≥111mg/dL x 2	None	1/3 AM NPH dose

111-130	**1 Unit/hr**	If repeat BS is within same range, increase Drip by 1 Unit/hr or 1 mL/hr
131-150	**2 Units/hr**	
151-170	**3 Units/hr**	
171-190	**4 Units/hr**	
> 191	**5 Units/hr**	
Insulin Drip (1Unit/1 mL/hr) 100 Units Regular Insulin in 100mL NS		

Above Insulin Drip protocol must be transcribed on an Order Sheet. Once order is written, RN will adjust Insulin Drip rate based on above guidelines and inform MD of what change has been made. Drip will be turned off once glucose level ≤110 mg/dL and restarted once ≥111 mg/dL

Management of severe HypoGlycemia

	< 50 mg/dL Patient Unconscious	< 50 mg/dL Patient Conscious	50 - 70 mg/dL Patient Conscious
IV solution	D10 @ 200cc/hr	D5 @ 200cc/hr	D5 @ 125cc/hr
Agents	**Glucagon 1mg** SC or IM (repeat in 5 min if no response)	None	None
Glucose checks	Q15 min until **>70mg/dL**	Q15 min until **>70mg/dL**	per above Protocol

Post Partum Glucose Control	Fasting	Post Prandial
Acceptable BS levels	≤ 140mg/dL	≤ 180-200 mg/dL

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