

## IX. DIABETES DURING PREGNANCY

**TABLE 26**

**A. Quick Reference Guide for the Care of Diabetes Before & During Pregnancy**

When	Procedure/Test	Action or Goal
Prepartum	A1c monthly 24 hr urine creatine clearance & microalbumin each quarter Eye exam baseline and as indicated TSH (in type 1) Cardiac assessment if DM >10 years	A1c at least $\leq 7.0\%$
Prepartum & during PG	SMBG: preprandial, 1-2 hr post prandial, at bedtime, and 3 AM	Fasting BG* 60-90, or 1 hr post prandial <120 mg/dL
Prepartum & during PG	Diet: 40% carbohydrate, 20% protein, 40% fat Grams of carbohydrates = 10% of calorie level 3 meals plus bedtime snack Breakfast low in carbohydrates Self-management Training Calorie Level: <90% of DBW      36-40 calories/kg/day 90-120% of DBW    30 calories/kg/day 120-150% of DBW   24 calories/kg/day >150% of DBW      12-18 calories/kg/day (DBW = 110 lb. + 5 lb/inch over 5 ft., $\pm 10\%$ for large/small frame)	Reduce hyperglycemia and triglycerides
Prepartum & during PG	Insulin therapy (See Tables 28 and 29): <i>AM      PM      Dinner      Bedtime</i> N/R    --      N/R      -- N/R    --      R        N N/H    H        H        N H       H        H        Lantus ( <i>Class C</i> ) Or Insulin Pump Give 1 unit for every 10 grams of carbohydrate <sup>1</sup> Correcting dose: point drop in glucose for one extra unit = $1500 \div$ total daily dose of insulin <sup>1</sup>	Prepartum: A1c at least $\leq 7.0\%$ During pregnancy: A1c $\leq 6.0\%$  Fasting BG 60-90, or 1 hr post prandial <120 mg/dL
Monthly during PG	A1c	A1c $\leq 6.0\%$
During PG	Blood Pressure	Treat hypertension with Aldomet or Hydralazine (see below)

<sup>1</sup> This ratio is a starting point; this adjustment often needs to be individualized

\* BG throughout these Recommendations means plasma or serum glucose. For a discussion on the ways of measuring glucose in the blood and their differences, see the Appendix, page 93.

Full Clinical Recommendations available on American Diabetes Association website: [www.diabetes.org](http://www.diabetes.org)

- Insulin requirements may decline in 1<sup>st</sup> trimester and increase in 2<sup>nd</sup> and 3<sup>rd</sup> trimester.
- Statins should be discontinued and not taken during pregnancy.
- ACE inhibitors, beta blockers and diuretics should be avoided.
- ARBs are category C in the first trimester of pregnancy (maternal benefit may outweigh fetal risk in certain situations). Later in pregnancy, they are category D and should generally be discontinued before delivery.
- None of the oral anti-diabetic medicines are FDA approved for pregnancy. There is not sufficient data to establish their safety in pregnancy. There is one study using glyburide which seems to show that it is as effective and safe as insulin (see references).

**TABLE 27**

**B. Quick Reference Guide for the Care of Gestational Diabetes**

When	Who	Procedure/Test	Action or Goal
24–28 weeks or sooner	Each PG woman	GCT*	If 1 hr value >130-140 mg/dL, then do OGTT
24–28 weeks or sooner	GCT positive or high risk ◊	100 gm OGTT‡	OGTT positive, then treat for GDM
OGTT Positive	Those with positive OGTT	Teach diet, SMBG, and self-management Verify vitamins & folic acid supplementation	Fasting BG 60–90, or 1 hr post prandial <120 mg/dL
Diagnosed GDM	All GDM	Diet: 25 calories/kg actual wt/day Carbohydrates: 35–40% of calories Check first AM urine ketones	Reduce hyperglycemia and triglycerides
If glucose goals exceeded after 1 wk of diet therapy	All GDM	Start insulin if fasting BG >95 mg/dL, or 1 hr post prandial >140 mg/dL	Fasting BG 60–90, or 1 hr post prandial <120 mg/dL
Monthly	All GDM	A1c	A1c ≤6.0%
6 weeks post-partum and then every 3 years	All GDM	Fasting BG or OGTT	Rule out non-gestational diabetes

	<u>Dose</u>	<u>Fasting</u>	<u>1 hr</u>	<u>2 hr</u>	<u>3 hr</u>	<u>Result</u>
*GCT	50 gm	--	130-140	--	--	positive if exceeded
‡OGTT	100 gm	95	180	155	140	positive if 2 values met or exceeded

◊ High risk includes obesity; history of GDM, diabetes in first degree relative, history of poor pregnancy outcome, and higher risk ethnic groups; if urine ketones positive, check later in day; if positive, then carbohydrates may need to be increased

Full Clinical Recommendations available on American Diabetes Association website: [www.diabetes.org](http://www.diabetes.org)

**C. Screening, Diagnosis and Treatment of Gestational Diabetes (GDM)**

**Who and when**

- Risk of GDM should be assessed at first prenatal visit.
- Test as soon as feasible if markedly obese, previous GDM, glycosuria, or strong family history of diabetes.
- EVERY pregnant woman should be tested by 24-28 weeks of gestation.

## Testing

- A glucose challenge test (GCT) is done:
  - 50 gm of glucose is given orally regardless of time of day or prandial state.
  - A positive test is a plasma glucose of >130-140 mg/dL one hour later.
  - If the GCT is positive, then an OGTT is done.
- Oral Glucose Tolerance Test (OGTT):
  - Do after fasting for 8-14 hr; do in the morning; diet and physical activity unrestricted for 3 days. Remain seated during the test. No tobacco use during the test.
  - 100 gm OGTT is most commonly used and the most well validated. Test is positive if at least 2 plasma glucose values are met or exceeded: fasting  $\geq$ 95 mg/dL; 1 hr  $\geq$ 180 mg/dL; 2 hr  $\geq$ 155 mg/dL; 3 hr  $\geq$ 140 mg/dL.
- May go directly to the OGTT in high risk individuals or populations.

## Treatment

- Diet (see nutrition recommendations for MNT related to pregnancy and diabetes on page 54)
- Patient monitoring
- Insulin, if necessary
- Office monitoring
- Exercise
- Although oral anti-diabetic agents are not recommended during pregnancy, at least one study suggests that glyburide may be considered during the later part of pregnancy

## Patient monitoring

- Fingertick blood glucose four times daily: fasting and 1-2 hrs after each meal
- Blood glucose goals: fasting 60-90 mg/dL; 1 hr post prandial <120 mg/dL

**TABLE 28**

### Gestational Diabetes: Insulin (if diet fails)

Breakfast	Lunch	Supper	Bedtime
70/30	Regular	70/30	none
NPH/Regular	Regular	Regular	NPH
NPH/Humalog*	Humalog/Novolog*	Humalog/Novolog*	NPH
Humalog/Novolog*	Humalog/Novolog*	Humalog/Novolog*	Lantus**

\* NPH and Regular are preferred insulins in GDM, but if BG is not controlled, then Humalog/Novolog can be used

\*\* Class C - The safety of Lantus is controversial, because of the theoretical risk of stimulating the IGF-1 receptor in the fetus. This risk should be weighed against the benefit of tight glucose control not achieved by other insulins.

## Office monitoring

- Test A1c monthly - Goal: 4-6% (in the normal range)

## Exercise

- See exercise guidelines for recommendations related to pregnancy and exercise

## Post-partum

- Women who have had GDM have a 40-60% chance of developing type 2 diabetes.
- This chance decreases to 25% if the woman becomes lean and fit after delivery.
- The chance of developing type 2 diabetes increases with more marked hyperglycemia, obesity, GDM diagnosed before 24 weeks or previous GDM.
- Fasting BG or OGTT should be done 6 weeks after delivery and every 3 years thereafter.
- If IFG or IGT diagnosed, then the patient should be tested yearly.

## D. Management of the Patient with Diabetes Before and After Conception

### 1. Pre-conception care

Involve the diabetologist, internist, family practice physician, obstetrician, diabetes educator, dietician and social worker when available and where appropriate. The care should include:

- Patient education about the interaction of diabetes, pregnancy and family planning
- Education in diabetes self-management skills
- Physician directed care and testing
- Counseling by a mental health professional when indicated to reduce stress and improve adherence to treatment plan.

### 2. Pre-conception goals

- Use of appropriate meal plan
- Self-monitoring of blood glucose
- Self-administration and self-adjustment of insulin
- Treatment of hypoglycemia (by patient and family)
- Exercise
- Development of techniques to reduce stress and cope with denial
- A1c of <1% above the normal range (e.g., <7%)

### 3. Initial visit

- **History**
  - Duration and type of diabetes
  - Acute complications history (infections, DKA, hypoglycemia)
  - Chronic complications (retinopathy, nephropathy, hypertension, vascular disease, autonomic and peripheral neuropathy)
  - Diabetes management (insulin regimen, prior or current oral agents, SMBG regimen and results, diet and exercise)
  - Concomitant medical conditions (especially thyroid disease in type 1 diabetes)
  - Menstrual/pregnancy history and contraceptive use
  - Support system including family and work environment
- **Physical examination**
  - Blood pressure
  - Dilated retinal exam by an ophthalmologist or other eye specialist knowledgeable about diabetic eye disease
  - Cardiovascular exam for evidence of cardiac or peripheral vascular disease; if positive, screening tests for coronary artery disease should be done before attempting pregnancy
  - Neurological exam including exam for signs of autonomic neuropathy
- **Laboratory examination**
  - A1c
  - Serum creatinine
  - 24 hr urine for total protein or albumin (>190 mg/24 hr carries increased risk for hypertensive problems during pregnancy; >400 mg/24 hr carries increase risk for intrauterine growth retardation later in pregnancy)
  - Serum TSH in the type 1 patients because of the 5-10% co-incidence of hypo- or hyperthyroidism
  - Other tests as indicated

### ■ **Management plan**

- Counseling about:
  - Risk and prevention of congenital anomalies
  - Fetal and neonatal complications of maternal diabetes
  - Effects of pregnancy on maternal diabetic complications
  - Risks of obstetrical complications which occur more frequently in diabetic pregnancies (especially hypertensive)
  - The need for effective contraception until diabetes is well controlled
  - The cost benefit relationship between preconception care and the prevention of malformations
- SMBG
  - Finger stick blood glucose 4–6 times a day: preprandial, 1–2 hr post prandial, bedtime, 3:00 AM
  - Goals: fasting or before meals: 60–90 mg/dL; 1 hr post prandial: <120 mg/dL
- A1c
  - Measure every month
  - Goal: <1% above upper limit of normal (e.g., <7%)
  - It is safe for patient to get pregnant once A1c goal is achieved and maintained
  - Modify treatment plan if A1c goal is not reached in a few months

### ■ **Exercise**

See exercise guidelines for recommendations related to pregnancy and exercise, page 47.

### ■ **Diet**

See nutrition recommendations for medical nutrition therapy related to pregnancy and diabetes, page 54.

- **Insulin program** - for type 1 and type 2 diabetes, see table below.

**TABLE 29**

**Pregnant Patient with Diabetes: Insulin (type 1 and if diet fails in type 2)**

Breakfast	Lunch	Supper	Bedtime
70/30	Regular	70/30	none
NPH/Regular	Regular	Regular	NPH
NPH/Humalog*	Humalog/Novolog*	Humalog/Novolog*	NPH
Humalog/Novolog*	Humalog/Novolog*	Humalog/Novolog*	Lantus**
----- Or an insulin pump -----			

\* NPH and Regular are preferred insulins during pregnancy, but if BG is not controlled, then Humalog/Novolog can be used

\*\* Class C - The safety of Lantus is controversial, because of the theoretical risk of stimulating the IGF-1 receptor in the fetus. This risk should be weighed against the benefit of tight glucose control not achieved by other insulins.

## 4. Special considerations

### ■ **Hypoglycemia**

- Attempts to achieve normal glycemic control increase the risk of severe hypoglycemia.
- Frequent, unexplained severe hypoglycemia may be due to hypoglycemia unawareness, insulin dose errors or excess alcohol intake.
- There is no solid evidence that severe hypoglycemia is an independent risk to the developing human embryo.
- There is a risk to the mother; the patient and her family should be included in education about the management of hypoglycemia.

### ■ **Retinopathy**

- Diabetic retinopathy may accelerate during pregnancy; therefore, better control should be attained gradually, if possible.
- A baseline dilated eye exam should be done before conception and repeat exams done during the pregnancy as indicated.

### ■ **Hypertension**

- Hypertension is a frequent complication or concomitant disorder, especially in type 2 diabetes.
- ACE inhibitors, beta blockers and diuretics should be avoided during pregnancy.
- Aldomet and Hydralazine are known to be safe in pregnancy.
- ARBs are category C in the first trimester of pregnancy (maternal benefit may outweigh fetal risk in certain situations). Later in pregnancy, they are category D and should generally be discontinued before delivery.

### ■ **Nephropathy**

- Serum creatinine >3 mg/dL, creatinine clearance <50 mL/minute, or urine protein >300 mg/24 hr is associated with a significant risk of worsening maternal renal function and a higher risk for morbidity and mortality of the infant.
- A urine protein >190 mg/24 hr before or early in pregnancy is associated with an increase likelihood of pregnancy-induced hypertension.

### ■ **Neuropathy**

- Gastroparesis is a relative contraindication to pregnancy.
- Urinary retention or orthostatic hypotension may complicate the management of diabetes in pregnancy.
- Compartment syndromes, such as carpal tunnel syndrome, may be exacerbated by pregnancy.

### ■ **Coronary Artery Disease**

- Clinically proven, but untreated cardiovascular disease is associated with up to a 50% maternal mortality.
- The increased cardiovascular demands of gestation are more likely to be tolerated if treatment results in normal exercise tolerance.

## REFERENCE SECTION IX

American College of Obstetricians and Gynecologists (ACOG). Clinical Management Guidelines for Obstetrician-Gynecologists. *ACOG Practice Bulletin*. Number 30. Gestational Diabetes. 2001

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