INTRODUCTION:

- **Definition:** Gestational Diabetes (GDM) is impaired glucose tolerance with first onset or recognition during pregnancy.
- **Prevalence:** 4.6-9.2% of US pregnancies are affected by GDM. An increased prevalence of GDM is found among Hispanic, African American, Native American, Asian, and Pacific Islander women.\(^1\)
- **Maternal Risk factors for GDM development include:**
  - Personal history of GDM
  - Obesity (BMI≥30)
  - PCOS
  - Impaired glucose tolerance
  - Glycosuria early in pregnancy
  - Strong family history of diabetes (one first degree relative, or more than one second degree relative)
  - Previous macrosomia
  - Previous unexplained third trimester loss or neonatal death.
- **Maternal/fetal risks of GDM diagnosis:** GDM is associated with significant maternal and neonatal morbidity. Maternal risks include development of hypertensive disorders and preeclampsia and development of type 2 diabetes mellitus later in life (50% develop DM within 20 years, 60% of Latinas within 5 years postpartum).\(^1\) Neonatal risks include large for gestational age, macrosomia, shoulder dystocia, stillbirth, and newborn morbidity including hypoglycemia and respiratory distress. Obstetrical risks include risks associated with macrosomia such as increased rate of operative vaginal birth and cesarean section, brachial plexus injury, fracture, and neonatal depression.

DIAGNOSIS:

All pregnant women will be screened for gestational diabetes, with the exception of women who already carry a diagnosis of type 1 or type 2 diabetes. The diagnosis will be based on specific criteria.

**Early Screening for High Risk Populations:**

Pregnant women who meet the following criteria should be screened as early as possible, preferably at the first prenatal visit. If the initial screening result is normal, they should be re-screened at 24-28 weeks. Indications for early testing include, but are not limited to:

- Personal history of GDM
• Obesity (BMI≥30)
• PCOS
• Impaired glucose tolerance
• Glycosuria early in pregnancy
• Strong family history of diabetes (one first degree relative, or more than one second degree relative)
• Previous macrosomia
• Previous unexplained third trimester loss or neonatal death.

**Standard Screening for GDM->Two-step Screening:**
- Pregnant women should be tested between 24-28 weeks (preferably closer to 24 weeks)
- A one hour 50 gm oral glucose tolerance test will be used
- **>135 mg/dl is considered an abnormal test result and requires** a 3 hour 100 gm oral glucose tolerance test (GTT).
- If the **one hour GLT is >185 mg/dl**, then a fasting BG is checked prior to the 3 hour GTT. If the fasting BG is less than 105, then the remainder of the GTT is administered. If the fasting BG is 105 or greater, the rest of the GTT may be cancelled and the patient proceed to treatment of GDM.²
- **GTT with 2 out of 4 glucose levels greater than or equal to cutoff value diagnostic for gestational diabetes**

<table>
<thead>
<tr>
<th></th>
<th>mg/dL</th>
<th>mmol/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting</td>
<td>95</td>
<td>5.3</td>
</tr>
<tr>
<td>One hour</td>
<td>180</td>
<td>10.0</td>
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<tr>
<td>Two hours</td>
<td>155</td>
<td>8.6</td>
</tr>
<tr>
<td>Three hours</td>
<td>140</td>
<td>7.8</td>
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</table>

**Early screening for detection of undiagnosed diabetes:**
- 1 hour GLT (50 gram glucose loading test). If abnormal (>135) proceed with 3 hour GTT (100 gram oral glucose tolerance test)
- Draw Hemoglobin A1c at the time of the 3 hour GTT.
- If the 3 hour GTT is normal plan for repeat 3 hour GTT between 24-28 weeks (Omit screening test because it was already abnormal).
- If the patient has abnormal GTT indicating gestational diabetes early in pregnancy, she should be referred to maternal-Fetal Medicine for prenatal care.
- An HgbA1c ≥ 6.5%, the patient should be referred to Maternal Fetal Medicine for prenatal care.
Late screening

- Patients should undergo a one hour glucose challenge test no matter what the gestational age at presentation for prenatal care.

Testing s/p Bariatric Surgery:

- Stable patients after bariatric surgery should undergo routine glucose testing as outlined above.
- If patients cannot tolerate the osmotic load of a glucose tolerance test, they can undergo fasting and postprandial BS check x5days between 24-28 weeks gestation. This is also an option for other women who are unable to tolerate a GLT/GTT. A normal result should show 90-100% glucose control; <90% normal BS patients should be treated as GDM.

GESTATIONAL DIABETES TREATMENT AND MANAGEMENT:

Once the diagnosis is made, the patient will meet with a Registered Nurse for glucometer teaching and scheduled for nutrition consultation. Glucose levels will be reviewed after one week of following a nutritionally appropriate diet. Target blood glucose levels are:

- Fasting 70-90 mg/dl
- 140 mg/dl at one hour post prandial
- 120 mg/dl at 2 hours post prandial

The target level control is 80% of glucose values within appropriate range.

If glucose levels are within normal limits, the patient will continue use of the glucometer until the provider feels it is safe to decrease frequency of testing.

If >20% of glucose values are abnormal the patient can be co-managed with MD or transferred to a physician (Generalist OBGYN, Family Medicine, or MFM) for medication management.

Initial Medication Management for Gestational Diabetes: The suggested treatment regimen for is with metformin prescribed as follows (See Appendix I on evidence regarding use of metformin for treatment of diabetes):

- If BG are elevated both fasting and post meal, start 500mg twice daily with breakfast and dinner.
- If fasting BG are in target range, then once daily dosing with breakfast may be adequate.
- All women should be counseled that some mild GI upset is common in the first days of metformin use and that the majority of cases improve and/or resolve.
- Patients should be seen weekly until adequate glycemic control is achieved.
- If BG control is inadequate, the dose may be increased by increments of 500mg in either daily or twice daily dosing as the glycemic profile dictates up to a maximum of 2,550 mg/day. Modest additional benefit has been observed with
doses up to ~2,500 mg/day; however, GI adverse effects may limit use (Nathan 2009). If doses >2,000 mg/day are needed, consider administering in 3 divided doses to minimize GI adverse effects.

- If the patient’s BG are not adequately controlled on 2550 mg of metformin for two weeks or if metformin is not tolerated, then insulin is recommended. Encourage adherence to nutrition therapy and daily exercise. Patients whose blood glucose cannot be controlled on metformin will be transferred to a Maternal-Fetal Medicine specialist.

Antenatal testing with GDM:
- Patients with gestational diabetes requiring medical treatment or without documented good glucose control with diet will begin a regimen of twice weekly antenatal testing starting at 32 weeks.
- For patients with target glucose control with diet, testing should begin at 36 weeks.
- Antenatal testing will include a weekly NST or BPP.
- Twice weekly fetal testing should be considered for patients with poor glucose control or noncompliance. The expectation is that the PROVIDER is responsible for notifying the antenatal testing unit if twice weekly testing is recommended.

<table>
<thead>
<tr>
<th>CLINICAL INDICATION</th>
<th>Ultrasound</th>
<th>Start EGA</th>
<th>FREQUENCY</th>
<th>NST or BPP</th>
<th>START EGA</th>
<th>FREQUENCY</th>
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<tbody>
<tr>
<td>DM 1 or 2, on meds (controlled)</td>
<td>EFW</td>
<td>24</td>
<td>Monthly</td>
<td>Yes</td>
<td>32</td>
<td>Twice weekly</td>
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<tr>
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<td>EFW</td>
<td>24</td>
<td>Monthly</td>
<td>Yes</td>
<td>32</td>
<td>Weekly</td>
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<td>EFW</td>
<td>At dx</td>
<td>Monthly</td>
<td>Yes</td>
<td>36</td>
<td>Weekly</td>
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<tr>
<td>GDM on medication</td>
<td>EFW</td>
<td>At dx</td>
<td>Monthly</td>
<td>Yes</td>
<td>32</td>
<td>Twice weekly</td>
</tr>
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Timing of Delivery
- There are no clear gestational age guidelines regarding induction for women with well-controlled gestational diabetes on diet alone. It is reasonable to induce these patients between 40-41 weeks. An ultrasound for EFW should be obtained at 37-38 weeks gestation for counseling about mode of delivery in the presence of suspected fetal macrosomia (EFW >4500 g at delivery). ³
- Patients with well-controlled gestational diabetes treated with oral medications or insulin are recommended to undergo induction of labor between 39-40 weeks.
Postpartum Care:
All patients diagnosed with gestational diabetes will be scheduled for glucose testing at 6 weeks postpartum. The patient’s PCP will be notified of the diagnosis for long-term follow up.

- A 2 hour 75-gram OGTT will be ordered at the routine 6 week postpartum visit.
- The OB care provider will make sure that **Gestational Diabetes** is on the problem list of the patient.
- Both the **patient** and the **patient’s PCP** will be informed by the OB care provider of an abnormal result of the 2 hour 75-gram OGTT.
- The patient should be referred back to her PCP for annual HgA1C measurements.

LOGISTICALLY PRACTICE FOR BMC AND CHC PROVIDERS:
- Send message to **P BMC OBGYN YAW NURSE TRIAGE [10693]** to schedule GDM teaching with a registered nurse at Yawkey. Patients can be scheduled under the Diabetic Teaching Nurse. The clinic is on Thursday afternoon from 1 to 4 PM.
- Place order for glucometer, lancets, and test strips. Patients should have supplies prior to their RN teaching visit.
  Mass Health patient
  - Freestyle lite meter kit dispense one.
  - Freestyle lite test strips # 150 x 6 refills
  - Freestyle lite lancets # 150 x6 refills

  Blue Cross Blue Shield
  - Onetouch ultra meter kit
  - Onetouch ultra blue test strips # 150 x6 refills
  - Delica lancets # 150 x 6 refills

- The patient will be instructed to check fasting glucose levels and 1 or 2 hours after each meal. (tailor to patient, but have it be consistent)
- The patient will be scheduled by the RN to see the nutritionist to discuss nutrition within 2 weeks of diagnosis.
- If there are updates to patient’s diabetes status, send an EPIC message to P BMC OBGYN ATU with the update in ultrasound indications for the patient. This includes if she is already being followed in ATU for GDM but is now newly on medications.
- In CHC it is the provider’s responsibility to ensure glucometer teaching and nutritional consultation per the CHC policy. The CHC provider should send ATU referral at time of diagnosis of GDM to plan for antenatal testing going forward.
REFERENCES:


Appendix I

**Background to change in recommendations for pharmacologic treatment**

While prior data had suggested oral hypoglycemic (glyburide, metformin) were reasonable first line agents, the American Congress of Obstetrics and Gynecology (ACOG) now “more strongly endorses” insulin as first line treatment for GDM. This has been the recommendation of the American Diabetes Association for many years. ACOG now recommends that oral agents “be reserved for women who are unwilling or unable to use insulin.” The Society of Maternal Fetal Medicine subsequently issued a statement updating their recommendations for the pharmacologic treatment of gestational diabetes. They cite a large meta-analysis of studies comparing insulin, metformin and glyburide. In it, glyburide was found to be associated with higher birthweight, more frequent macrosomia, and more neonatal hypoglycemic when compared to either metformin or insulin. Metformin has also been associated with decreased gestational weight gain and decreased gestational hypertension in multiple studies. In this and later meta analyses, metformin was found to be on par with insulin and in many studies associated with slightly better perinatal outcomes.

The BMC MFM group has decided to adhere to the recommendations of SMFM: We advise metformin over glyburide as the oral agent of choice based on superior perinatal and neonatal outcomes. We believe this is a reasonable alternative to insulin as a first line agent. Based on available data, approximately 50% of women treated with metformin will not be adequately controlled and will ultimately require insulin. We recommend stopping the use of glyburide. Women already titrated on glyburide with adequate glycemic control may remain on it in the interest of consistency of care.