Differentiate diagnostic criteria of gestational diabetes versus preexisting diabetes.
Identify 3 potential complications of gestational diabetes.
Identify glucose goals for a woman with gestational diabetes.
Age-adjusted Prevalence of Obesity and Diagnosed Diabetes Among US Adults

Obesity (BMI ≥ 30 kg/m²) and Diabetes Prevalence by Age and Year

<table>
<thead>
<tr>
<th>Year</th>
<th>BMI Category</th>
<th>1994</th>
<th>2000</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No Data</td>
<td>&lt;14.0%</td>
<td>14.0%–17.9%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No Data</td>
<td>&lt;4.5%</td>
<td>4.5%–5.9%</td>
</tr>
</tbody>
</table>


Total Diabetes Prevalence in Wisconsin Adults by County Sept., 2011

Source: 2011 Burden of Diabetes in Wisconsin

Diabetes Prevalence in Wisconsin

<table>
<thead>
<tr>
<th>Age Category</th>
<th>Estimated Number Diagnosed (%)</th>
<th>Estimated Number Undiagnosed (%)</th>
<th>Estimated Total Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-44 years</td>
<td>47,870 (2.4%)</td>
<td>17,880 (0.9%)</td>
<td>65,750 (3.2%)</td>
</tr>
<tr>
<td>45-64 years</td>
<td>156,230 (10.1%)</td>
<td>58,150 (3.8%)</td>
<td>214,380 (13.9%)</td>
</tr>
<tr>
<td>Age 65+</td>
<td>142,090 (18.7%)</td>
<td>52,870 (6.9%)</td>
<td>194,960 (25.6%)</td>
</tr>
<tr>
<td>All adults</td>
<td>346,190 (7.4%)</td>
<td>129,900 (2.8%)</td>
<td>475,090 (10.1%)</td>
</tr>
</tbody>
</table>

Source: 2011 Burden of Diabetes in Wisconsin
1. “Provide preconception counseling that addresses the importance of control as close to normal as possible, ideally A1C < 6.5% to reduce the risk of congenital anomalies.”

2. “Family planning should be discussed and effective contraception should be prescribed and used until a woman is prepared and ready to become pregnant.”

3. “Women with preexisting type 1 or type 2 diabetes who are planning pregnancy or who have become pregnant should be counseled on the risk of development and/or progression of diabetic retinopathy.”

American Diabetes Association Standards of Medical Care Diabetes Care, 39: Supp. 1, Jan, 2016.

---

PRECONCEPTION TESTING

- Rubella, rapid plasma reagin, hep B and HIV, pap and cervical cultures
- Prenatal vitamins with at least 400 mcg folic acid
- Smoking cessation counseling
- A1c, tsh, creatinine, urine microalbumin-to-creatinine ratio
- Review of med list for potentially teratogenic drugs (ace inhibitors and statins)
- Comprehensive eye exam

American Diabetes Association Standards of Medical Care Diabetes Care, 39: Supp. 1, Jan, 2016.

---

IDENTIFYING DIABETES DURING PREGNANCY
“A woman goes to a clinic to see her healthcare provider for a healthy physical…”

Why is she there, what can she expect?

“A woman goes to a clinic to see her healthcare provider for her first pregnancy visit…”

Why is she there, what can she expect?

1. SCREEN FOR PREEXISTING DIABETES

- Screen women with risk factors for type 2 diabetes at their initial prenatal visit using standard diagnostic criteria

American Diabetes Association Standards of Medical Care Diabetes Care, 39: Supp. 1, Jan, 2016.
1. All adults who are overweight (BMI \geq 25) and have additional risk factors
   - Physical inactivity
   - First degree relative with diabetes
   - High risk race/ethnicity: African American, Latino, Native American, Asian American, Pacific Islander
   - Women who delivered a baby weighing >9lb or who were diagnosed with gdm
   - Hypertension, CVD, HDL<35 and/or Triglyceride >250
   - PCOS, prediabetes, acanthosis nigricans (and other clinical conditions of severe insulin resistance)
2. No risk factors, start at age 45
3. Normal repeat every 3 years, with consideration for more frequent testing depending on initial results (e.g., those with prediabetes should be tested yearly) and risk status

American Diabetes Association Standards of Medical Care Diabetes Care, 39: Supp. 1, Jan, 2016.

CRITERIA FOR TESTING FOR DIABETES/PREDIABETES IN ASYMPTOMATIC ADULTS

DIABETES SCREENING AND DIAGNOSIS

American Diabetes Association 2016 Clinical Practice Recommendations

<table>
<thead>
<tr>
<th>Test</th>
<th>Fasting (8 hours min)</th>
<th>2-hour OGTT 75 gm</th>
<th>Random Glucose</th>
<th>A1c</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt; 100</td>
<td>&lt; 140</td>
<td></td>
<td>4-5.6</td>
</tr>
<tr>
<td>Pre-Diabetes (IFG/IGT)</td>
<td>100-125</td>
<td>140-199</td>
<td></td>
<td>5.7-6.4</td>
</tr>
<tr>
<td>Diabetes</td>
<td>126 or &gt;</td>
<td>200 or &gt;</td>
<td>200 or &gt; (with symptoms)</td>
<td>\geq/&gt;6.5 *</td>
</tr>
</tbody>
</table>

*confirm results by repeat testing

HORMONES OF PREGNANCY

American Diabetes Association 2016 Clinical Practice Recommendations

DIABETES SCREENING AND DIAGNOSIS

Test Fasting 8 hours min 2-hour OGTT 75 gm Random Glucose A1c
Normal < 100 < 140
Pre-Diabetes (IFG/IGT) 100-125 140-199
Diabetes 126 or > 200 or > (with symptoms) \geq/>6.5 *

*confirm results by repeat testing
2/29/2016

2. GESTATIONAL DIABETES SCREENING-TIMING

- ADA (2016): All women without known diabetes screened at 24-28 weeks gestation
  - 2 step ACOG/ADA
  - 1 step ADA
- No conflict between 3 organizations (ADA, AAFP, ACOG) – all advise to screen at 24-28 weeks

GESTATIONAL DIABETES STATS

- "Up to 9.2% of pregnancies are affected by gestational diabetes (GDM)."
- "Women who had GDM have up to a 70% lifetime risk of developing type 2 diabetes."

American Diabetes Association FAST FACTS 12/2015
RISK FACTORS FOR GDM
- Same risk factors as for type 2 diabetes
- Age related risk starts at age 25
- Pregnant with multiples
- Steroid use, drugs that elevate glucose

SCREENING FOR GESTATIONAL DIABETES
2 STEP APPROACH
- All pregnant women should be screened for GDM
- 1-Hour "Glucola" (50 gms)
- No food, etc after consuming drink
- Select a cutoff of 135 or 140, if glucose is = or greater then the next step is 3-Hour GTT (100 gms)

3-HOUR GTT RESULTS—USE EITHER?

<table>
<thead>
<tr>
<th></th>
<th>O'Sullivan NDDG</th>
<th>Carpenter and Coustan, 2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting</td>
<td>105</td>
<td>85</td>
</tr>
<tr>
<td>1-hour glucose</td>
<td>190</td>
<td>140</td>
</tr>
<tr>
<td>2-hour glucose</td>
<td>165</td>
<td>125</td>
</tr>
<tr>
<td>3-hour glucose</td>
<td>145</td>
<td>140</td>
</tr>
</tbody>
</table>

*One set of diagnostic criteria for the 3-hour OGTT cannot be clearly recommended above the other*  
2 or more elevations for diagnosis of GDM

ACOG Practice Bulletin 137, August, 2013
American Diabetes Association Standards of Medical Care Diabetes Care, 39: Supp. 1, Jan, 2016.
**3-HOUR GTT RESULTS-USE EITHER?**

<table>
<thead>
<tr>
<th></th>
<th>O’Sullivan NDDG</th>
<th>Carpenter and Coustan, 1998</th>
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<tbody>
<tr>
<td>Fasting</td>
<td>195</td>
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</tr>
<tr>
<td>1-hour glucose</td>
<td>190</td>
<td>180</td>
</tr>
<tr>
<td>2-hour glucose</td>
<td>165</td>
<td>130</td>
</tr>
<tr>
<td>3-hour glucose</td>
<td>145</td>
<td>140</td>
</tr>
</tbody>
</table>

***If any of the 3 hour criteria is accepted, it has to be the Carpenter and Coustan criteria which was only adjusted for lab methods.***

**OTHER RECOMMENDATIONS:**

- If 1-hour glucose is = or > 200 mg/dl, many programs skip the 3-hour GTT, diagnose GDM and refer. A result above 182 mg/dl showed a 95% probability of diabetes (Carpenter and Coustan, 1982).

**HAPO - HYPERGLYCEMIA AND PREGNANCY OUTCOMES (NEJM, 2008)**

- 23,325 women, 15 centers, 9 countries
- International Prospective Analysis, 7 years
- The chance of having a macrosomic infant increased 4-6 times when comparing lowest to highest fasting glucose (75-105 mg/dl)
- Other complications increase as well with higher “normal” blood glucose levels.
SCREENING FOR GESTATIONAL DIABETES
1 STEP APPROACH

75 gram OGTT
➢ Fasting ≥92
➢ 1 hour ≥ 180
➢ 2 hour ≥ 153

*Diagnose GDM if any ONE number exceeds threshold noted.

Diabetes Care, March, 2010
ADA Clinical Practice Recommendations, Diabetes Care, 1/2011, 1/2012,
1/2013, 1/2014, 1/2015, 1/2016
There are no current recommendations from any organization to use an A1C to screen for gestational diabetes. There have been a few studies.

- **Predictor?** – If it is elevated in early pregnancy they have prediabetes or type 2?
- **Pong et al, 2014 in AJOG**
  - N=526, convenience sample Women’s Hospital in California
  - A1c 5.7-6.4% (prediabetes A1c) 1/3 develop gdm
  - A1c less than 5.7%, then 8.7% develop gdm

### CAN A1C BE USED TO SCREEN FOR GDM OR BE AN EARLY PREDICTOR?

### DO WOMEN WITH PREDIABETES DEVELOP GDM?

- **Prediabetes**
  - Fasting 100 or >
  - 75 gram 2 hour 140-199
  - A1c 5.7-6.4
  - Early pregnancy diagnosis
  - Beta cell loss
  - Micro/macro vascular risk
  - What if control appears normal on or off meds?

- **Gestational diabetes**
  - Fasting 92 or > / 95 or >
  - 75 gram 2 hour 180 or >
  - A1c no guideline dx gdm
  - After 24 weeks
  - Beta cell loss

### Insulin Requirement and Gestational Age

- Type 1: 2x/4x increase
- Type 2: 5x/10x increase
- Pre-Pregnancy
- Perinatal wedge
- Post Pubertum
- Insulin requirement

- 10 Weeks Gestational Age (weeks)
- 20 Weeks
- 40 Weeks
- 6 Weeks
Screen for preexisting diabetes at first visit per ADA guidelines.

Do not avoid diagnosing type 2 diabetes during pregnancy. Remember that first trimester a1C’s and glucose labs are almost always lower than prepregnancy values. If in question always provide care for a woman with preexisting diabetes.

Adopt and follow one of the sets (ADA or ACOG) of guidelines for screening and diagnosing GDM. Do not use NDDG.

If early glucose levels equal or exceed those for gdm at 24 weeks, then it’s a problem early in pregnancy and requires at least the same intervention as you would do at 24 weeks.

Referral to CDE and Registered Dietitian:

- Gestational Diabetes Disease process
- Nutritional management
- Physical activity/exercise
- Medications/insulin – hold
- Monitoring – glucose, urine ketones – lab usually recommended
- Acute complications – hold
- Chronic complications
- Psychosocial Concerns
- Strategies to promote health/behavior change (future risk of type 2 diabetes and prevention strategies)

Gestational Diabetes Diagnosed - Now What?

Healthy Eating and Exercise

Nutritional Strategies for Gestational Diabetes
ADA NUTRITIONAL GUIDELINES FOR GDM

- “Carbohydrate-Controlled”
- Individualizing Weight Gain and Caloric Needs
- Monitoring Ketone Levels possibly
- Determining Protein, Fat and Micronutrient Needs
- Self-Blood Glucose Monitoring for all Women
- Criteria for when insulin is needed
- Follow-up, suggest 3 visits

ADA 5th International Workshop GDM, 2007

IMPACT OF NUTRITIONAL THERAPY FOR GDM

Randomized prospective interventional trial
- 215 women with GDM
- Those using the nutritional guidelines:
  - Fewer patients treated with insulin (24.6 vs. 31.7%)
  - Lower A1c (5 vs. 5.2)

Australian Carbohydrate Intolerance Study
- 1000 women, 24-34 weeks, GDM
- Randomly assigned to the intervention group (using guidelines) vs routine care
  - Intervention group lower birth weights, lower % LGA, less macrosomia

ADA 5th International Workshop GDM, 2007

MATERNAL WEIGHT GAIN RECOMMENDATIONS

(Singleton Pregnancy)

<table>
<thead>
<tr>
<th>BMI Category</th>
<th>Weight Gain Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight BMI &lt;18.5:</td>
<td>28-40 lb</td>
</tr>
<tr>
<td>Normal BMI 18.5-24.9:</td>
<td>25-35 lb</td>
</tr>
<tr>
<td>Overweight BMI 25-29.9:</td>
<td>15-25 lb</td>
</tr>
<tr>
<td>Obese BMI &gt; or =30:</td>
<td>11-20 lb</td>
</tr>
</tbody>
</table>

Institute of Medicine, 2009
MATERNAL WEIGHT GAIN

- Maternal Health Outcomes of concern...
  - Postpartum weight retention
  - C-Section delivery
  - Pregnancy Induce Hypertension

- Infant Health Outcomes of concern...
  - SGA and LGA
  - Preterm birth
  - Childhood obesity

Institute of Medicine, 2009

CALORIE RESTRICTION

- Moderate Caloric Restriction 30-33% or 2400 reduced to 1800 kcals/day
  - Reduces hyperglycemia
  - No increase in ketonuria and free fatty acids

- Severe Caloric Restriction 50% or more
  - Causes ketonuria and increase in free fatty acids and is not recommended

ADA 5th International Workshop GDM, 2007

HOW TO LOSE A POUND...

- Eliminate 3500 calories in a week to lose a pound
- Eliminating 500 calories per day
  - Walk 30 minutes and
  - Eliminate 250 calories in intake

- Changing calorie needs
  - Depend on what are you already eating and what are you doing, what you can change.
NUTRITION PLANS FOR WOMEN WITH GDM

- **Sweet Success (CDPP)**
  - Calorie distribution is individualized based on usual intake, preferences and meds
  - 3 meals and 3-4 snacks 2-3hrs apart
  - Only 2-3 carbs per meal/snack
  - Avoid fruit in am and juice entirely
  - Limit processed foods
  - HS snack no more than 10hrs from next breakfast

- **Matria Healthcare Diabetes in Pregnancy Program Standard Orders:**
  - Calorie distribution based on individualized intake, preferences and meds
  - 3 meals and 3 snacks
  - CHO counting if patient has good understanding

- **Joslin Diabetes Center**
  - Minimum of 155g carb per day
  - GDM
    - 40-45% of total calories
    - 10-15g at breakfast and HS snack
  - Pre-existing Diabetes
    - 45-55% of total calories
    - 14g at breakfast and HS snack
    - 10-15g for HS snack
    - Individualized carb as per usual intake and BG levels

CARBOHYDRATE REDUCTION: HOW LOW IS TOO LOW?

- **2002 Dietary Reference Intake**
  - 130 g/day non pregnant women
  - 175 g/day for pregnant women

- Carb's ensure fetal brain development and functioning
- Carbohydrates = 40-45% of total calories

ADA 5th International Workshop GDM, 2007

GDM NUTRITIONAL STUDY: VARIED CARB AMOUNTS

- **Study:** 152 women
- RCT
  - 40% carb (intervention)
  - 55% carb (control)

- **Results**
  - Both groups 54.7% requiring insulin
  - Reviewed logs to verify amount of carb consumed to match recommendations (P .0001)

  - No difference in perinatal outcomes

Moreno-Castillo et al. 2013
"GOOD CARBS" VS "BAD CARBS"

- Pregnancy does not change the glycemic index values of specific foods
- Low glycemic food can reduce postprandial glucose levels
- Spikes occurring when the total carb intake is the same can be explained by glycemic index
- No interventional studies using glycemic index with GDM
- Wide inter-individual variability i.e. time of day, etc.
- Avoid labeling foods as good or bad!
- High fiber diets benefit to lower glucose in the non-pregnant state, no specific benefit shown in pregnancy

ADA 5th International Workshop GDM, 2007

HIGH GLYCEMIC INDEX (GI) FOODS

GI rating (%) is calculated by dividing the AUC for the test food by the AUC for the reference food (same amount of glucose) and multiplying by 100. Scale 0-100.


GDM NUTRITIONAL STUDIES: TYPE OF CARBOHYDRATE

Moses et al, 2009
- Significantly higher number in high GI group met criteria to start insulin (59 vs 29%)
- And ½ of these women avoided insulin by switching to the low GI diet

RCT, Louie et al, 2011
- 99 women, rct
- Low GI group <= 50
- High fiber and moderate GI approx. 60
- Both groups 40-45% carbs
- Similar outcomes
**SUMMARY-NUTRITION FOR GDM**

- Women need to learn how to count carbs on some level and distribute into 3 smaller meals (less with breakfast) and 2-3 snacks.
- Protein with meals and snacks. Include evening snack.
- Adding fiber may help.
- Encourage lower glycemic index foods.
- If cereal/bagels/juice in am shows high spikes in glucose, avoid it.
- Do all of this in a way to promote healthy nutrition for a pregnant woman.
- Avoid over-restriction.

**EXERCISE RECOMMENDATIONS**

- Monitor fetal activity and glucose levels
- Limit activity to 15-30 minutes
- Women who have been physically active before pregnancy are urged to continue

  ADA 5th International Workshop GDM, 2007

- ACOG- 20-30 minutes moderate intensity most days of the week

  ACOG Committee Opinion No. 650, 12/2015

**EXERCISE STUDIES**

- One study showed physical activity before and during pregnancy reduced GDM by 69% (NEJM, 2001)
- Another study showed reduction of glucose at 30 minutes by 23 mg/dl (Journal of MFM, 2001)

ADA 5th International Workshop GDM, 2007
EXERCISE DURING PREGNANCY

- Bedrest frequently recommended, but rarely indicated
- Physical activity = any body movement produced by the contraction of skeletal muscles
- Exercise = planned, structured, and repetitive movements done to improve physical fitness
- Heart rate responses can be blunted during pregnancy, use exertion scale

ACOG Committee Opinion No. 650, 12/2015

EXERCISE STUDIES-SOMETHING NEWER?

- Retrospective cohort 5 antenatal centers Irish Atlantic seaboard (Kgosidialwa et al, 2015 J Clin Endo Met 100 (12))
  - 567 GDM, 2499 NGTT
  - Diet and exercise prescribed to women with gdm
  - Macrosomia/LGA lower in gdm group (OR .48/.61, 95% CI), no SGA difference
- Retrospective analysis in Beijing China (Wang et al, 2015 BMC pregnancy and Childbirth15:255)
  - 2750 GDM, 74.9% received exercise intervention starting at approx 25 weeks
  - Gained less weight, decreased preterm birth, less macrosomia
  - Women with dietary and exercise intervention had the lowest rate of macrosomia

SAFE ACTIVITIES DURING PREGNANCY

- Walking
- Swimming
- Stationary cycling
- Low-impact Aerobics
- Yoga (modifed-avoid position reducing venous return)
- Pilates (modified)
- Running or jogging*
- Racquet sports*(avoid if balance limitations, risk of falling)
- Strength Training*

*consult with OB, may be safe for those who participated in these activities prior to pregnancy

ACOG Committee Opinion No. 650, 12/2015
CONTRAINDICATIONS TO EXERCISE DURING PREGNANCY

**Absolute**
- Hemodynamically significant heart disease
- Restrictive lung disease
- Incompetent cervix or cerclage
- Multiple gestation at risk for premature labor
- Persistent 2nd or 3rd trimester bleeding
- Placenta previa after 26 weeks
- Premature labor during current pregnancy
- Ruptured membranes
- Preeclampsia or pregnancy-induced hypertension
- Severe anemia

**Relative**
- Anemia
- Unevaluated maternal cardiac arrhythmia
- Chronic bronchitis
- Poorly controlled type I diabetes
- Extreme morbid obesity
- Extreme underweight, BMI < 12
- History of extremely sedentary lifestyle
- IUGR during current pregnancy
- Poorly controlled hypertension
- Orthopedic limitations
- Poorly controlled seizure disorder
- Poorly controlled hyperthyroidism
- Heavy smoker

ACOG Committee Opinion No. 650, 12/2015

UNSAFE ACTIVITIES DURING PREGNANCY

- Contact sports
- Activities with a high risk of falling (e.g., downhill snow skiing, water skiing, surfing, off-road cycling, gymnastics and horseback riding)
- Scuba diving
- Sky diving
- Hot yoga or hot pilates

ACOG Committee Opinion No. 650, 12/2015

STOP EXERCISE IF...

- Vaginal bleeding
- Regular painful contractions
- Amniotic fluid leakage
- Dyspnea before exertion
- Dizziness
- Headache
- Chest pain
- Muscle weakness affecting balance
- Calf pain or swelling

ACOG Committee Opinion No. 650, 12/2015
More than half of the women with gestational diabetes will obtain control without medication/insulin.

**GLUCOSE GOALS AND MANAGEMENT STRATEGIES**

General agreement is that we want to restore normal glycemia to prevent complications from gestational diabetes.

Postprandials – Trying to reduce peak postprandial glucose.

Fifth International Conference GDM, 2007
GLUCOSE GOALS FOR GDM
ACOG/ADA GUIDELINES (2013/2016)

- Fasting <95 mg/dl
- *2 hours Postprandial <120 mg/dl
  OR
- *1 hour Postprandial <140 mg/dl
  *(ACOG 130 in past?)

*Postprandial values are timed from the start of the meal

NON DIABETES RANGE OF GLUCOSE LEVELS COMPARED TO GDM TARGETS

<table>
<thead>
<tr>
<th>Time</th>
<th>Non DM Range HOD 2007</th>
<th>ACOG 2001 targets for GDM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting</td>
<td>75 +/- 12</td>
<td>60-90</td>
</tr>
<tr>
<td>Premeal</td>
<td>78 +/- 11</td>
<td>60-105</td>
</tr>
<tr>
<td>1 hour postmeal</td>
<td>105 +/- 13</td>
<td>&lt;130-140</td>
</tr>
<tr>
<td>2 hour postmeal</td>
<td>97 +/- 11</td>
<td>&lt;120</td>
</tr>
<tr>
<td>3am</td>
<td>68 +/- 10</td>
<td>60-90</td>
</tr>
</tbody>
</table>

MATERNAL
Glucose
Amino Acids
FFA
TGFA
Ketones
Insulin
Glucagon

FETAL
Insulin
Glucagon
RISKS OF GDM

- Macrosomia or IUGR
- Polyhydramnios
- Neonatal Hypoglycemia
- Shoulder Dystocia and Traumatic Birth
- Polycythemia, Hyperbilirubinemia, Jaundice
- Hypocalcemia and Hypomagnesemia
- Respiratory Distress, Cardiac problems
- C-Section delivery more likely
- Increased risk of obesity and diabetes for child
- Preeclampsia and Gestational or worsening HTN
- Increased risk of GDM with future pregnancies and type 2 diabetes, increased cardiovascular risk

COST/BENEFIT OF INTENSE MANAGEMENT:

<table>
<thead>
<tr>
<th>Complication</th>
<th>Conventional Management</th>
<th>Intensified Management</th>
<th>Non-Diabetic Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large for Gestational Age</td>
<td>20.1%</td>
<td>13.1%</td>
<td>11.9%</td>
</tr>
<tr>
<td>Metabolic Complications:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polycythemia</td>
<td>20.0%</td>
<td>0.7%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Hyperbilirubinemia</td>
<td>20.0%</td>
<td>7.9%</td>
<td>6.4%</td>
</tr>
<tr>
<td>Hypocalcemia</td>
<td>20.0%</td>
<td>2.3%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Respiratory Complications</td>
<td>20.0%</td>
<td>2.3%</td>
<td>0.6%</td>
</tr>
<tr>
<td>Shoulder Dystocia</td>
<td>20.0%</td>
<td>2.3%</td>
<td>2.1%</td>
</tr>
<tr>
<td>Stillbirth</td>
<td>20.0%</td>
<td>2.3%</td>
<td>2.1%</td>
</tr>
<tr>
<td>NICU Admissions</td>
<td>20.0%</td>
<td>2.3%</td>
<td>2.1%</td>
</tr>
<tr>
<td>NICU LOS</td>
<td>20.0%</td>
<td>2.3%</td>
<td>2.1%</td>
</tr>
</tbody>
</table>

Langer, AMJ Obstet Gynecol, 1994

WHEN DO I TREAT GDM?

1. Use current guidelines or lower.
2. First week “free”, after that 2 or less values above limits per week...you can usually see how patterns emerging by the end of the first week
3. Follow-up weekly until control normalized, not all office visits-electronically, by phone, etc
4. Download meters and review stats, averages and standard deviations.
5. Any clear trend of highs with out clear or obvious potential to normalize through healthy eating/exercise should be medically treated asap.
Insulin is the first line agent recommended. Trials support the safety and efficacy of metformin and glyburide (both class B), both cross the placenta and long term safety data is not available.

American Diabetes Association
Standards of Medical Care Diabetes Care, 39: Supp. 1, Jan, 2016.

Dose 1 hour prior to a meal to lower postprandial glucose (pregnancy peak and half-life 2-4 hours)
Can dose more often in pregnancy and at bedtime
Hypoglycemia is a common and severe side effect, provide teaching on hypoglycemia.


A1c >6
Fasting >115
Glyburide more than 5 mg
Glyburide causing lows and not to goal

Yogev et al, Journal of MFM, 2010
MIG (NEJM, 2008)
- 751 women
- Assigned to metformin (363, Supplemental insulin -43%) or insulin
- Prefer having same treatment (Metformin 76.6% vs. 27.2%, P<0.001)
- No difference in perinatal outcomes

Metformin is an option
- Benefits in obese, insulin resistant, women
- Use xr – start at 1000mg

INSULIN FOR GDM
- Options
  - Meal Bolus - Lispro/Aspart/regular
  - Background Nph/detemir
- Similarly used in nonpregnant population
- Be more aggressive, meet tighter glucose goals and prevent hypoglycemia

GESTATIONAL DIABETES/INTERVENTIONS
IF THE WOMAN’S GDM WARRANTS MEDICAL TREATMENT ... MEANS HYPERGLYCEMIA AND RISK
- Obstetrician, NST’s, AFI’s, and BPP’s.
- Growth ultrasounds.
- Induction or C-Section at 39 weeks
- Amniocentesis prior to delivery if before 38/39 weeks
- Meter correlations, A1C labs.
*Monitoring/medications/insulin discontinued with delivery
  * Postpartum screening at 6–12 weeks is recommended for all women who had GDM to identify women with DM, impaired fasting glucose, or IGT.*
  * Women with impaired fasting glucose or IGT or diabetes should be referred for preventive therapy.*
  * The ADA recommends repeat testing at least every 3 years for women who had a pregnancy affected by GDM and normal results of postpartum screening.*

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Our Goal