Strategies for Successful Identification and Management of Diabetes in Pregnancy

Jean E. Howe, MD, MPH
Northern Navajo Medical Center
Shiprock, NM
Disclosures:

- No conflicts of interest
- Generic names for medications
- Acknowledge off-label uses
Objectives

- Review current guidelines for the **screening** and **diagnosis** of diabetes in pregnancy

- Discuss the role of multi-disciplinary teams in the **management** of diabetes in pregnancy

- Identify strategies for **postpartum** and **pre-conception** care
Case scenario

- Ann is a 38 yo G7P6 who presents at 13 wks gestation for prenatal care
- OB history includes 3 infants > 9 pounds
- Last NSVD 10 lb. 8 oz.
- Difficult labor: baby’s head came out, shoulders “got stuck”
Classification of Diabetes

Non-Pregnant

- Type I: Insulin Dependent
  (Absolute insulin deficiency)

- Type II: Non-Insulin Dependent
  (Relative insulin deficiency)
Classification of Diabetes in Pregnancy

- Gestational: Carbohydrate intolerance with likely onset during pregnancy

- Pre-gestational (or Overt Diabetes): Carbohydrate intolerance with likely onset prior to pregnancy
What is Gestational Diabetes (GDM)?

- Pregnancy is characterized by insulin resistance and hyperinsulinemia.
- **Placental hormones** (growth hormone, cortisol, placental lactogen, progesterone) plus more adipose stores, more calories, and less exercise all boost fetal nutrition.
- GDM occurs when maternal pancreatic function isn’t sufficient to overcome insulin resistance.
White’s Classification – Gestational

- A1 Diet Controlled GDM
- A2 Medication Controlled GDM
White’s Classification – Pre-Gestational

- B  Onset <10 years earlier; age > 20
- C  Onset <20 years earlier or age < 20
- D  Onset >20 years earlier or age <10
- R  Retinopathy
- F  Nephropathy
- H  Heart Disease
- T  Transplant

An alternative approach is to classify based on presence or absence of vascular disease.
Complications of Diabetes in Pregnancy

- **GDM**
  - Macrosomia and related problems
    (maternal and fetal)

- **Pre-gestational Diabetes**
  - Anomalies
  - Macrosomia
  - Placental insufficiency
    - Fetal Growth Restriction
    - Fetal Compromise
Risk Factors for GDM

- Family history of diabetes
- Overweight
- Age greater than 25 years
- Previous delivery of a baby greater than 9 pounds [4.1 kg]
- Personal history of abnormal glucose tolerance
- Member of an ethnic group with high rates of type 2 diabetes
- Previous unexplained perinatal loss or congenital anomaly
- Maternal birthweight greater than 9 pounds [4.1 kg] or less than 6 pounds [2.7 kg]
- Glycosuria at the first prenatal visit
- Polycystic ovary syndrome
- Current use of glucocorticoids
- Essential hypertension or pregnancy-related hypertension
Screening

- By Risk Factors (only 10% of women screen out)
To defer screening must meet all of the following:
  - Age < 25 years
  - Normal weight before pregnancy (BMI less than 25 kg/m²)
  - Member of an ethnic group with a low prevalence of GDM (NOT Hispanic American, African-American, Native American, South or East Asian, Pacific Islander)
  - No first degree relative with diabetes mellitus
  - No history of abnormal glucose tolerance
  - No history of poor obstetric outcome

- UNIVERSAL SCREENING
  (The more practical approach...)
Traditional Screening – Step 1

- 50 gram glucola load (fasting not required)
- Serum glucose ONE HOUR later
- Routinely done at 24 – 28 weeks
- Normal <140 (or < 135 or <130)
Traditional Screening Step 2 – Diagnostic Testing

3 hour Glucose Tolerance Test (3° GTT)

- 3 day prep of unrestricted carbohydrate diet - optional
- Fasting glucose after over 8 hrs with no oral intake other than water
- 100 gram glucose load
- Post-glucola glucose levels after 1, 2, & 3 hrs
- Withhold glucola if Fasting level is significantly elevated
GDM Diagnosis

- **O’Sullivan Criteria (1964)**
  - Derived mathematically as 2 SD above mean
  - Validated for their predictive value for future diabetes in the mother (not on pregnancy outcomes)

- **NDDG (1979)**
  - Adjusted O’Sullivan cut-offs up 14% as labs had stopped using venous whole blood

- **Carpenter-Coustan Criteria (1982)**
  - Lowered cut-points based on different interpretation of O’Sullivan criteria in context of enzymatic assay for measurements
# 3 hour GTT Normal Results

<table>
<thead>
<tr>
<th></th>
<th>NDDG</th>
<th>Carpenter/Coustan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting</td>
<td>&lt;105</td>
<td>&lt;95</td>
</tr>
<tr>
<td>1 hour</td>
<td>&lt;190</td>
<td>&lt;180</td>
</tr>
<tr>
<td>2 hour</td>
<td>&lt;165</td>
<td>&lt;155</td>
</tr>
<tr>
<td>3 hour</td>
<td>&lt;145</td>
<td>&lt;140</td>
</tr>
</tbody>
</table>
3 hour GTT Results

• Diagnostic if:
  ◦ Abnormal fasting OR
  ◦ Two or more abnormal values

• “Impaired Glucose Tolerance”
  ◦ Single abnormal post-glucola value

** Be cautious with IGT, many are/will be GDM
Gestational Diabetes Mellitus

Gestational diabetes mellitus (GDM) is one of the most common medical complications of pregnancy. However, debate continues to surround the diagnosis and treatment of GDM despite several recent large-scale studies addressing these issues. The purposes of this document are the following: 1) provide a brief overview of the understanding of GDM, 2) review management guidelines that have been validated by appropriately conducted clinical research, and 3) identify gaps in current knowledge toward which future research can be directed.
So is this really the best approach?

- Traditional screening is based on data about maternal risk later in life.
- Requires lots of steps, and blood draws.
- Risk of delays in diagnosis, lost to follow-up, etc.

The approach to screening in pregnancy should be supported by evidence related to pregnancy outcomes.
Hyperglycemia and Pregnancy Outcomes (HAPO) Study

- 25,505 pregnant women
- 15 centers in 9 countries
- 75-g OGTT at 24 to 32 weeks
- Blinded if….

  Fasting plasma glucose < 105 mg and 2-hour plasma glucose < 200 mg

HAPO Primary outcomes

- Birth weight > 90th percentile
- Primary cesarean delivery
- Clinically neonatal hypoglycemia
- Cord-blood C-peptide > 90th percentile
HAPO Secondary outcomes

- Delivery < 37 weeks
- Shoulder dystocia
- Birth injury
- Intensive neonatal care
- Hyperbilirubinemia
- Preeclampsia
HAPO Results

- 23,316 participants with blinded data
- Fasting glucose: 6.9 mmol/L ± 1 SD
- 1-hour: 30.9 mmol/L ± 1 SD
- 2-hour: 23.5 mmol/L ± 1 SD
Frequency of Primary Outcomes across the Glucose Categories

A. Birth Weight >90th Percentile
B. Primary Cesarean Section
C. Clinical Neonatal Hypoglycemia
D. Cord-Blood Serum C Peptide >90th Percentile
HAPO Results

- No obvious thresholds at which risks increased

- Significant associations were also observed for secondary outcomes, though weaker
HAPO CONCLUSIONS

Strong, continuous associations

Maternal glucose levels below those diagnostic of diabetes

- Birth weight
- Cord-blood serum C-peptide levels
IADPSG

International Association of Diabetes and Pregnancy Study Group, 2008-2009

- 220 delegates
  - ACOG
  - WHO
  - ADA
  - European Association for the Study of Diabetes
  - International Diabetes Federation
  - CDC
  - Diabetes research experts

- Chose thresholds somewhat arbitrarily given no apparent inflection points
- OR of at least 1.75 for adverse outcomes in the HAPO study
ADA / IADPSG system

- At first visit:
  Evaluate for Pre-existing Diabetes Mellitus

- Add to 1st prenatal labs:
  - A1C
  - Random Plasma Glucose
  - Fasting Plasma Glucose
1st Prenatal Lab Results

- Overt Diabetes
  - A1C > 6.5%
  - FBS > 126 mg/dl
  - Random glucose > 200 (+ confirmation)

- Gestational Diabetes
  - FBS > 92 mg/dl
Elevated but non-diagnostic levels

- If A1C 5.7 - 6.4%
- If Random Glucose 140-199 mg/dL

→ Obtain a fasting glucose
If \( \geq 92 \text{ mg/dL} \) then GDM

→ In some settings, a 2 hr GTT may be considered at this time
Case Continued

- Ann’s A1C was 5.6.
- She does not have pre-gestational diabetes.
ADA / IADPSG system

- At 24-28 wks, a Fasting 75 gm Oral Glucose Tolerance Test is Administered
- Only one elevated value needed to diagnose GDM

- Fasting $\geq$ 92 mg/dL
- 1 hr $\geq$ 180 mg/dL
- 2 hr $\geq$ 153 mg/dL
Standards of Medical Care in Diabetes—2011

Table 6

Screening for and diagnosis of GDM

Perform a 75-g OGTT, with plasma glucose measurement fasting and at 1 and 2 h, at 24-28 weeks of gestation in women not previously diagnosed with overt diabetes.

The OGTT should be performed in the morning after an overnight fast of at least 8 h.

The diagnosis of GDM is made when any of the following plasma glucose values are exceeded:

- Fasting ≥92 mg/dl (5.1 mmol/l)
- 1 h ≥180 mg/dl (10.0 mmol/l)
- 2 h ≥153 mg/dl (8.5 mmol/l)
Are these criteria really that revolutionary?

<table>
<thead>
<tr>
<th></th>
<th>Carpenter &amp; Coustan</th>
<th>ADA / IADPSG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting</td>
<td>95</td>
<td>Fasting</td>
</tr>
<tr>
<td>1 hr</td>
<td>180</td>
<td>1 hr</td>
</tr>
<tr>
<td>2 hr</td>
<td>155</td>
<td>2 hr</td>
</tr>
</tbody>
</table>

Two abnormal values       One abnormal value
Does finding and treating GDM matter?

- RCT of treatment of GDM diagnosed at 24 – 34 weeks.
- **Intervention Group (490)** (dietary advice, glucose monitoring, PRN insulin tx)
- **Routine Care Group (510)**
- With intervention, significantly lower composite rates of perinatal complications (death, shoulder dystocia, fracture, nerve palsy) (1 vs. 4 %)
- Also lower rates of macrosomia (10 vs. 21 %)
- Higher induction rates in intervention group but similar C/S rates (31 vs. 32 %)
- Improved mood and health status postpartum in intervention group

Crowther, CA et al. NEJM 2005
Landon et al 2009

- A multicenter, randomized trial of treatment for mild gestational diabetes

- RCT 958 women

- Reduced the risks of fetal overgrowth, shoulder dystocia, cesarean delivery, and hypertensive disorders

New ADA criteria effective?

- St. Carlos Study Group (N= ~3,200)
- Diagnosis: 35.5% vs. 10.6%
- Decrease in GHTN, prematurity, cesarean delivery, SGA, LGA, Apgar 1-min score <7, admission to neonatal intensive care
- Cost savings of €14,358.06 per 100 women using IADPSG versus CC

Duran et al Diabetes Care September 2014 vol. 37 no. 9 2442-2450
New ADA criteria effective?

- **N= 25,674**
- **Dx by NDDG 8.4% and IADPSG 18.9%**
- **IADPSG significantly lower rates of:**
  - Cesarean delivery, macrosomia, neonatal hypoglycemia, and perinatal death
- **Highest rates of cesarean delivery and macrosomia were in untreated mild GDM**

New ADA criteria effective?

- Retrospектив: before / after study
- CC(17%) vs IADPSG (27%) ($P < .001$)
- No significant difference LGA
- IADPSG significantly higher primary cesarean delivery: 16% vs 20% ($P < .001$)
- No significant differences in other outcomes

Feldman Obstetrics / Gynecology 2016
Case Continued

- Ann’s 2-hour glucose tolerance test results:

<table>
<thead>
<tr>
<th>Time</th>
<th>Value (mg/dL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FBS</td>
<td>98</td>
</tr>
<tr>
<td>1 hour</td>
<td>198</td>
</tr>
<tr>
<td>2 hour</td>
<td>189</td>
</tr>
</tbody>
</table>
Management of Diabetes in Pregnancy
The “Team”

- Case Manager
- Diabetes Educator
- Nutritionist
- Exercise Specialist
- Maternity Care Provider
- Antenatal Testing Staff
- Ultrasound Technologist
- Traditional Healer
- Lactation and Family Planning Educators
Glucose Monitoring

- Glucometer with supplies

- Goals
  - Fasting <95
  - 1 hour postprandial <130
    - OR
  - 2 hour postprandial <120
Glucose Monitoring

- 2 Roles:
  - Immediate feedback on meal choices
  - Identify those who need further intervention for control
Initiating Therapy

- Medical Nutrition Therapy (MNT)
  - 50 – 90% can be managed with MNT alone
  - Meal plan meeting minimum pregnancy needs
  - Limit carbohydrates to 35 – 45% of total caloric intake
  - Utilize complex carbohydrates
  - Culturally appropriate food choices

- Exercise
  - Lowers fasting and postprandial glucose levels
  - Aerobic, 30 minutes, 5x/week
Pregnancy Weight Gain Chart in Pounds

Pre-pregnancy BMI < 18.5, 28-40 pounds
If your pre-pregnancy BMI is less than 18.5, then the recommended weight gain range for your pregnancy is 28 to 40 pounds. The blue area shows the weight gain recommendation.

Pre-pregnancy Weight: ____________________________
BMI (Body Mass Index): __________________________

Pounds Gained

Weeks Pregnant

You should not gain more than this line

You should not gain less than this line

You have gained too little weight if:
- Your weight gain is below the blue area of the chart
- You weight less during your first trimester of pregnancy (from conception through week 13 of pregnancy) than you did before you became pregnant OR you have lost more than 2 pounds between week 13 of your pregnancy and delivery

You have gained too much weight if:
- Your weight gain is above the blue area on the chart
- You have gained more than 7 pounds per month (1 month equals 4 weeks)

Talk to your health care provider if you fall above or below the recommended weight

Initiating Therapy

- Medical Nutrition Therapy (MNT)
- Exercise
- Insulin: The Gold Standard
  - Preferred is a combined regimen of long acting and rapid-acting agents
- Oral Agents:
  - Metformin
  - Glyburide
Case continued

- Ann returns after 2 weeks of nutrition & exercise therapy with this glucose log

- FBS: 98-121
- 1 hr after breakfast: 131-203
- 1 hr after lunch: 123-129
- 1 hr after dinner: 122-128
Insulin Initiation

- Inpatient or Outpatient
- Goal is euglycemia
- Home monitoring is essential
- Calculate dosage
Insulin

- Average requirements:
  - First trimester 0.7 units/kg
  - Second trimester 0.8 units/kg
  - Third trimester 0.9 units/kg

- Given in divided doses

- May be as high as 1.5 – 2 units /kg in morbidly obese women
Insulin

Various regimens, no clear best approach:

- Novalog and NPH in am and pm combined doses
- Novalog and NPH (Novalog & NPH before breakfast; Novalog before dinner; NPH at bedtime)
- Short-Acting with NPH q 8 hours
- Short-Acting with Basal Insulin
Oral Agents: Glyburide

• Past trials/observational studies suggested efficacy
• Recent studies confirm inferiority to insulin
• ± crosses the placenta
• 16-40% may require insulin added
• 2.5 mg - 20 mg

2017 ACOG: “Not recommended as first-line pharmacologic treatment because, in most studies, it does not yield equivalent outcomes to insulin”

Not FDA approved, Class C
Oral Agents: Glyburide

- N = 10,778 privately insured
- Increased 7.4% to 64.5% (2000 to 2011)
- Most common treatment by 2007
- Glyburide use decreased by 5% for every 10-year increase in maternal age
- 7.8% switched or augmented
- Glyburide replaced insulin as the more common pharmacotherapy

Oral Agents: Glyburide

- Meta-analysis of 15 articles/2509 patients

- Glyburide vs. Insulin → Significant differences in:
  - Birth weight (109g)
  - Macrosomia risk (risk ratio 2.62)
  - Neonatal Hypoglycemia Risk (risk ratio 2.04)

- Metformin and Insulin performed best

Oral Agents: Metformin

- Multiple studies
- Start low and slow: GI side effects
- Perhaps even 250 mg day to start
- Goal 1500 – 2000 mg /d
- Need insulin too – 35-50%

Not FDA approved, Class B
Oral agents: Meta-analysis

- Metformin results in a lower rate of macrosomia than use of glyburide minus 209 g
- Metformin users are more likely to require supplemental insulin to maintain euglycemia than glyburide users
  - 4-16% vs 33%

Balsells BMJ 2015
FDA approved?

- Oral agents = not FDA approved
- Both are endorsed by ACOG and ADA with cautions

DOCUMENT:

- insulin offered as first-line and recommended therapy
- glyburide/metformin discussed, including placental transfer, unknown long-term effects, lack of FDA approval
Antenatal Management Best Practices

- Home glucose monitoring:
  - Fasting (<90-95), 1-hour post-prandial (<130-135)
  - Controlled: ≥ 80% of levels within goal

- A1GDM: fetal kick counts, deliver by 40 6/7 wks

- A2GDM:
  - Antenatal testing 32-34 wks
  - U/S for EFW at ~36 wks
  - Deliver by 39 wks
Antenatal Management Best Practices

- **Pre-Gestational**
  - Aneuploidy Screening
  - Detailed Anatomy US with fetal echo
  - Periodic growth US
  - Frequent visits and aggressive insulin titration
  - Monitor closely for pre-eclampsia (consider aspirin prophylaxis)
  - Assessment for vascular effects:
    - Renal Function, Eye Exam, EKG, TSH
Intrapartum Management

- A1GDM Routine Glucose Surveillance
- A2 / Pre-Gestational
  - Goal is euglycemia to avoid neonatal hypoglycemia
  - Monitor glucose levels q 1 – 2 hours in active labor
  - Monitor for ketonuria
  - Insulin/dextrose as needed
Insulin infusion in labor

- If euglycemic, unnecessary...
- Goal is glucose <110
- Prepare either 10 units in 100ml
  or 25 units in 250ml
    - Flush tubing
    - Start at 1 unit (10 mls) per hour
    - Check glucose levels hourly
What about Macrosomia?

• Increased risk with maternal hyperglycemia and excessive maternal weight gain (>40 pounds)

• estimated fetal weight $\geq 4800$ grams is associated with only about a 50 percent chance the infant's birthweight will be $\geq 4500$ grams
What about Macrosomia?

- Induction for “impending macrosomia” is not proven to improve outcomes and should be avoided

- Cesarean section to decrease the risk of severe shoulder dystocia may be considered if the EFW is > 4500g (or > 5000g than in non-diabetic women)
Case continued

- Ann had cervical ripening scheduled at 39 wks.
- Insulin drip in labor
- NSVD 8 lb 2 oz girl Apgars of 9 and 9
- Baby’s heel-stick glucose is 42 mg/dL
- Above 40 mg/dL hourly over the next 4 hrs.
Post Partum - General Concepts

- Non pregnant glucose “normal” levels higher

- “Honeymoon” period - insulin requirements markedly decreased

- **Lactation** has beneficial effect on glucose tolerance and subsequent development of type 2 diabetes
Postpartum Monitoring

- Placental hormones dissipate rapidly
- Revert to pre-pregnancy control promptly
- Check FBS and 1 hour PP for 24 – 48 hours
- Lactation has beneficial effects on glucose tolerance and subsequent development of type 2 diabetes
Postpartum Glucose Screening

- Current standard is 75 gram 2 hour GTT
- Diagnosis of DM by standard criteria
  - Fasting $\geq 126$ mg/dL
  - 2 hour $\geq 200$ mg/dL
  - Impaired Fasting Glucose $\geq 100$ and $< 126$
  - Impaired Glucose Tolerance $\geq 140$ and $< 200$
Postpartum

- Follow-up testing for Type 2 DM
  - 6 wks: 2H GTT
  - ≥ 12 wks: A1C
  - Rescreen Q3 years (minimum)

- Lactation
- Family Planning
- Healthy weight
Contraception

- IUD
- Implanon
- OCPs
- Depo-Provera
- All barrier methods
- Sterilization
## CDC Medical Eligibility Criteria for Contraception

### KEY

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No restriction (method can be used)</td>
</tr>
<tr>
<td>2</td>
<td>Advantages generally outweigh theoretical or proven risks</td>
</tr>
<tr>
<td>3</td>
<td>Theoretical or proven risks usually outweigh the advantages</td>
</tr>
<tr>
<td>4</td>
<td>Unacceptable health risk (method not to be used)</td>
</tr>
</tbody>
</table>

[www.cdc.gov/reproductivehealth/usmec](http://www.cdc.gov/reproductivehealth/usmec)
### Summary Chart of U.S. Medical Eligibility Criteria for Contraceptive Use

<table>
<thead>
<tr>
<th>Condition</th>
<th>Sub-Condition</th>
<th>Co-IUD</th>
<th>LNG-IUD</th>
<th>Implant</th>
<th>DMPPA</th>
<th>POP</th>
<th>CHC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Menarche to &lt;20 yrs.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Menarche to &gt;20 yrs.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Anomalies</td>
<td>Thalassemia</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Sickle cell disease</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Iron-deficiency anemia</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Breast disease</td>
<td>a) Undiagnosed mass</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>b) Breast disease</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>c) Breast cancer</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>d) Breast cancer</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>e) Post and no evidence of current disease</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Breastfeeding</td>
<td>a) &lt;21 days postpartum</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>b) 21 to &lt;30 days postpartum</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>c) &gt;30 days postpartum</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>d) Without other risk factors for VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>e) With other risk factors for VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>f) VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>g) VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>h) VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>i) VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>j) VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>k) VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>l) VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>m) VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>n) VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>o) VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>p) VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>q) VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>r) VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>s) VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>t) VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>u) VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>v) VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>w) VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>x) VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>y) VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>z) VTE</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

### Key:

1. No restriction (method can be used)
2. Theoretical or proven risks usually outweigh the advantages
3. Advantages generally outweigh theoretical or proven risks
4. Unacceptable health risk (method not to be used)
Recurrence Risk GDM

- 33 – 50% with subsequent pregnancies
- Some will be unrecognized type II DM
Pre-conception Counseling

- Healthy Weight
- Euglycemia
- Folic Acid
- Avoid teratogens
- Healthy behaviors
- Safer sex
Long term follow up

- > 70% in studies to 28 years postpartum
- Incidence increased most in first 5 yrs
- Plateau after 10 yrs
- Elevated fasting increased future risk

10 yr follow up: DPP

- History of GDM: Intensive Lifestyle Interventions (ILS) and metformin reduced progression to diabetes by 35% and 40%

- No GDM: ILS reduced the progression to diabetes by 30%, and metformin did not

Aroda et al. J Clin Endocrinol Metab. 2015 Apr;100(4):1646-53
Resources

• ADA

• “Sweet Success”:
  www.sweetsuccessexpress.org

• Medical Eligibility Criteria for Contraception:
  www.cdc.gov/reproductivehealth/usmec