

Preconception Counseling and Clinical Management of Pregnancy with Diabetes

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Presenter



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Champion Course**

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Learning Objectives

Participants will be able

1. Explain the importance of preconception counseling for women with diabetes of childbearing age
2. Summarize the importance of glucose management before, during, and after pregnancy
3. Identify the diabetes/hypertensive/cholesterol medications contraindicated during pregnancy
4. Discuss follow-up of women with gestational diabetes post pregnancy

Missed Opportunity to Improve Care



- Healthy People 2000 goal
 - Preconception and inter-conception care for all women (begin at age 12 to 13 yrs.)
- In 2011 45% of pregnancies were unintended (Finer 2016)
- Survey of women with diabetes
 - 52% recall counseling about glycemic control
 - 37% about contraceptive advice

Finer & Zolna. (2016)

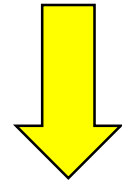
Preconception Visit

- Control medical condition
- Immunizations
- Check meds
- Check nutritional issues
- Occupational/environmental issues
- Tobacco and substance abuse
- Other high risk behaviors
- Maternal health issues
- FH and genetic history
- Social issues

Preconception Glycemia Recommendations

- Patient's HGB A1c needs to be as close to normal as possible before conception
 - Recommend at least 3-6 months
- Recommend contraception until acceptable A1c target reached
 - Prevent unplanned pregnancy
 - Discontinue all contraindicated medications
 - Repeat eye exam during 1st trimester
 - Consider insulin pump therapy to optimize control (will typically require specialty care to manage)

HGB
A1c



6-7% or lower
without
hypoglycemia

American Diabetes Association. (2020).
ACOG Practice Bulletin. (2018).

Preconception

- Labs targeted
 - Routine rubella, rapid plasma reagin, hepatitis B virus, HIV testing and Pap smear, cervical cultures, blood typing
- Diabetes- specific management should include A1C, thyroid-stimulating hormone, creatinine, 24 hour urine protein and EKG
- Eye exam

American Diabetes Association. (2020).
ACOG Practice Bulletin. (2018).

Medication Check

- Discontinue:
 - ACE-I and ARBs
 - Previously category D late pregnancy (positive evidence of risk) **and now contraindicated in 1st trimester**
 - Statin therapy: Previously category X (contraindicated in pregnancy)

Preconception Counseling for Diabetics:

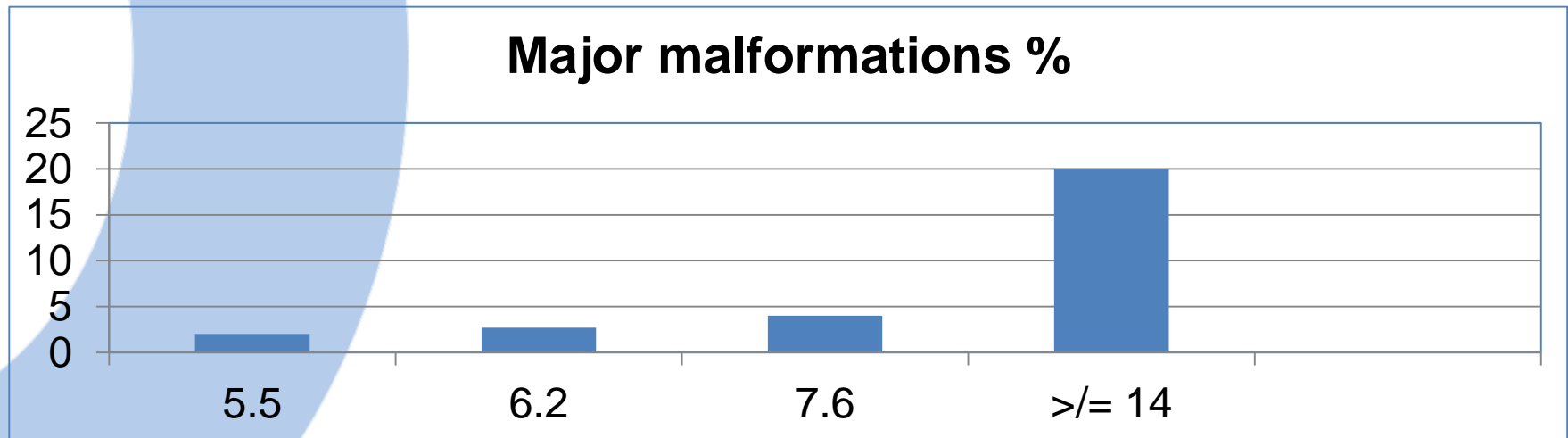


- Adequate glucose control
- Decrease maternal morbidity
- Prevent spontaneous abortion and fetal malformation
- Prevent fetal macrosomia
- Prevent neonatal morbidity

American Diabetes Association. (2020).
ACOG Practice Bulletin. (2018).

Historical Perspective

- Prior to discovery of insulin in 1922
 - Diabetic maternal mortality rate was up to 44%
 - Perinatal death rate approached 60%
- 30-60% spontaneous miscarriage if DM uncontrolled



Guerin et. al. (2007)

Major Congenital Anomaly Rate

- If HGB A1c normal at conception – near normal risk of fetal complications (Hod, 1991)
- A1c > 7%
 - Major congenital anomaly doubles to 5%
 - All major organs being at risk
- A1c > 8.6%
 - Major congenital anomaly increase to >23% in some studies

Hod et al. (1991)

Fetal Complications (all types of DM)

- Preconception hyperglycemia – Major malformations
 - CNS
 - Neural tube defects
 - Sacral agenesis/Anencephalus/Hydrocephalus/Microcephaly
 - Cardiovascular
 - Transposition of great vessels
 - Ventricular septal/Atrial septal defect
 - Genitourinary
 - Renal agenesis/Hydronephrosis/Ureteral duplication
 - Gastrointestinal
 - Duodenal atresia /Anorectal atresia

Hod et al. (1991)

Preconception Counseling



- A1C- level B evidence
- Reducing the risk of congenital anomalies with an emphasis on achieving A1C <6.5%, if this can be achieved without hypoglycemia.
- Ultimate goal is 6% without hypoglycemia

American Diabetes Association. (2020).
ACOG Practice Bulletin. (2018).

Maternal Complications (overt DM)

- Preconception hyperglycemia
 - Increased risk of worsening retinopathy
 - Including blindness
 - Increased risk of hypertension
 - Including Preeclampsia or gestational hypertension
 - Increased risk of worsening nephropathy
 - Increased risk of progression to end stage renal disease if serum Cr > 1.5 mg/dL

ACOG Practice Bulletin. (2018).

Complication - Retinopathy

- Prospective studies suggest pregnancy in DM1 pts may aggravate retinopathy.
 - ¼ progress
- Rapid correction of poor glycemia during 1st trimester may significantly worsen retinopathy.
- Hypertension also a risk factor for progression of retinopathy in pregnancy.
 - Complications may include permanent blindness.
 - Usually background retinopathy that occurs during pregnancy regresses after baby is born.

ACOG Practice Bulletin. (2018).

Retinopathy

Recommendations

- Perform baseline dilated eye exam prior to conception
 - Treat with laser photocoagulation if needed
 - Severe pre-proliferative diabetic retinopathy
- If proliferative retinopathy present, pregnancy should be delayed until treatment done
- Repeat dilated exam during 1st trimester



<http://www.macula.us/non-proliferative-diabetic-retinopathy.html>

ACOG Practice Bulletin. (2018).

Complication - Hypertension

- Strong correlation between pre-conception HGB A1c and development of HTN
 - It is an independent risk factor for preeclampsia
 - Baby ASA 81 mg daily starting at 12 weeks gestation
- Target blood pressure: 110-129 / 65-79 mmHg
 - *Pregnancy may target less than 150 / 100 mmHg*
 - Lower BP may be associated with impaired fetal growth during pregnancy CAUTION
 - Chronic diuretic use during pregnancy has been associated with restricted maternal plasma volume, which may reduce uteroplacental perfusion

Hypertension in Pregnancy Task Force Report. (2013).

Complication - Hypertension

- Treat with:
 - Methyldopa (category B/C)
 - Labetalol (Category C)
 - Nifedipine/Procardia (Category C)
- Can continue HCTZ if already taking
 - Not recommended to start HCTZ in pregnancy
 - HCTZ – Category B



Hypertension in Pregnancy Task Force Report. (2013).

<https://www.nursetheory.com/best-blood-pressure-monitors/>

Type 1 DM

- Increased risk of hypoglycemia in the first trimester
- Frequent hypoglycemia can be associated with intrauterine growth restriction
- In addition, rapid implementation of tight glycemic control in the setting of retinopathy is associated with worsening of retinopathy
- Insulin resistance drops rapidly with delivery of the placenta, and women become very insulin sensitive, requiring much less insulin than in the prepartum period

American Diabetes Association. (2020).

Type 2 DM

- Pregestational type 2 diabetes is often associated with obesity
- Weight gain during pregnancy for overweight women is 15–25 lb and for obese women is 10–20 lb.
- Glycemic control is often easier to achieve
- Hypertension and other comorbidities often render pregestational type 2 diabetes as high or higher risk than pregestational type 1 diabetes

American Diabetes Association. (2020).

GESTATIONAL DIABETES

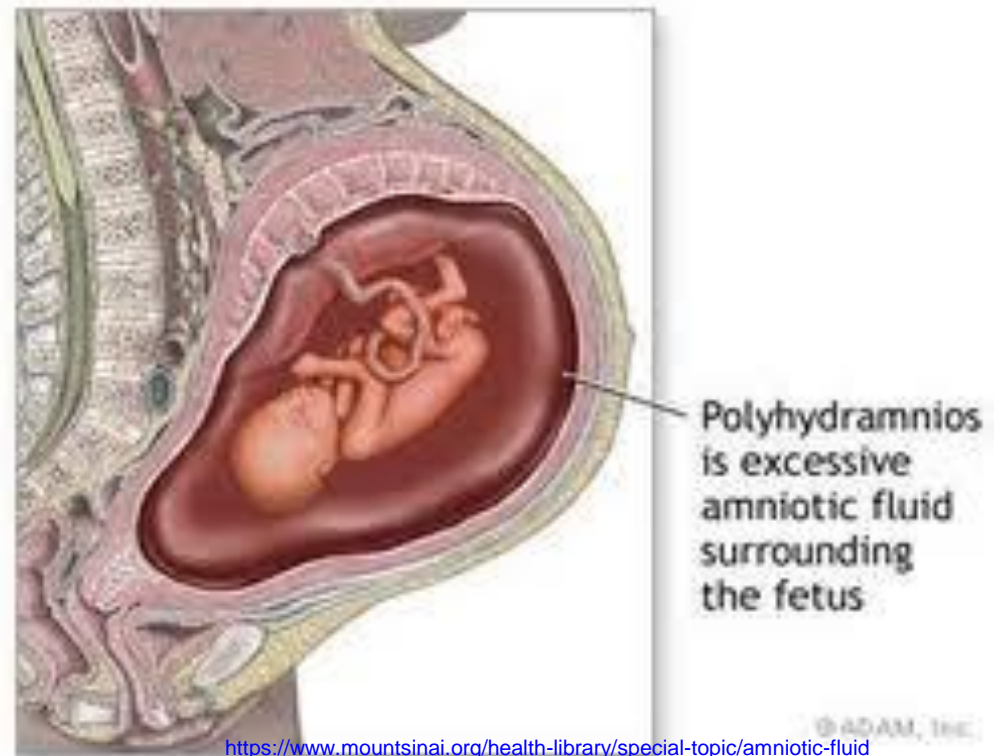
Fetal Complications (GDM)

- Macrosomia (17.9% vs. 5.6% for control)
- Shoulder dystocia
- Brachial plexus injury
- Polycythemia (13.3% vs. 4.7% in control)
- Hyperbilirubinemia (16.5% vs. 8.2% in control)
- Hypoglycemia
- Asphyxiation
- Long term risk of metabolic syndrome/obesity/DM in child and mother
- IUFD

Hod et al. (1991).

Maternal Complications (GDM)

- Cesarean delivery
- Vaginal tear
- Polyhydramnios
- Hypertension
- Preeclampsia
- Long term risk of permanent DM2



Hod et al. (1991).

Risk Factors for Gestational DM

- Older age (>25 yrs)
- Overweight or obese (BMI \geq 25)
- Previous delivery of large-for-gestational-age baby (greater than 9 pounds)
- Previous delivery of small-for-gestational-age baby (less than 6 pounds)
- Maternal birth weight: > 9 lbs. or < 6 lbs.
- History of multiple pregnancies
- Family history of DM
- History of glucose intolerance or GDM
- Polycystic Ovarian Syndrome (PCOS)

(continued on next slide)

ACOG Practice Bulletin. (2018).

Risk Factors for Gestational DM, cont'd



- Unexplained miscarriage or birth defects
- Members of high-risk ethnic group: Black, Native American, Hispanic, Asian-American, or Pacific Islander
- Essential hypertension or Pregnancy- Related HTN
- Current steroid use
- Being treated for HIV

WITH ANY RISK FACTORS, PATIENT SHOULD BE SCREENED AT THE FIRST PRENATAL VISIT

ALL PREGNANT PATIENTS ARE SCREENED AT 24-28 WEEKS

ACOG Practice Bulletin. (2018).

Gestational Diabetes (GDM)

- Goals, recommendations, treatments options mirror those with preexisting diabetes
 - GDM: Defined as glucose intolerance that first develops or is recognized during pregnancy
 - Complicates 2 to 14% of all pregnancies- regional differences
 - Most cases resolve with delivery
 - Increased risk of developing overt type 2 diabetes
 - 1/3 of patients will have impaired glucose metabolism or overt DM after index pregnancy
 - 15 to 70% risk within 10 to 20 years (depending on other risk factors)

ACOG Practice Bulletin. (2018).

Two-Step Screening

- 1 hr GTT: 50 gm glucola \geq 130 mg/dL or 140 mg/dL
 - 135 mg/dL*
 - 130 mg/dL = 20-25% of women + detects 90% GDM
 - 140 mg/dL = 14-18% of women + detects 80% GDM
 - If > 200 -> no need for 3 hr GTT
- 3 hr GTT: 100 gm glucola greater or equal to:
 - 95 FBS
 - 80 one hour
 - 155 two-hour
 - 140 mg/dL three hour
 - \geq Two values abnormal -> GDM

Treatment GDM

- Once diagnosed: Initially everyone is A1GDM
 - Nutrition: diabetic diet
 - Finger sticks QID
 - Fasting and postprandials
 - Weekly appts
 - Assess need for medications
- Medical nutrition therapy, exercise, and glucose monitoring
 - Total of 70 to 85% of women diagnosed with GDM can control GDM with lifestyle modification alone

ACOG Practice Bulletin. (2018).

Dietary Guidelines

- Patients should:
 - Meet with Registered Dietitian (RD)
 - Keep a daily food diary
 - Do NOT skip meals; have snacks if needed
 - NO alcohol, NO smoking, LIMIT (or eliminate) caffeine
 - NO weight loss
 - Count carbohydrates (do not eliminate)=33-40%
- Prenatal vitamin (folic acid 400-800 mcg, calcium, iron)
 - Daily urine ketone testing may be advised (i.e. Ketostix) to check for sufficient nutritional intake

Exercise in Pregnancy

- Moderate exercise is recommended even for women who did not exercise before becoming pregnant
 - No evidence to show any increased rates of preterm birth or low weight children
- ACOG recommends 20-30 minutes of moderate intensity aerobic exercise on most days of the week
- Overweight or obese women with GDM, exercise improves glycemic control
 - 30 minutes of moderate intensity aerobic exercise 5 days a week recommended as part of treatment plan

American College of Obstetricians and Gynecologists. (2015)

TREATMENT OF DIABETES DURING PREGNANCY

ACOG/ADA Glycemic Targets

- Fasting glucose: ≤ 95 mg/dL* or ≤ 90 **mg/dL
- Preprandial glucose: 60 to 99 mg/dL (<100 mg/dL)
- 1 hr postprandial glucose: ≤ 140 mg/dL
- 2 hr postprandial glucose: ≤ 120 mg/dL
- Average mean capillary glucose: 100 mg/dL
 - * Carpenter Coustan Criteria serum or plasma
 - ** NDDG plasma

HGB A1c
Target < 6%

American College of Obstetricians and Gynecologists. (2018)
American Diabetes Association. (2020)

ACOG vs ADA targets

- ACOG:
 - Fasting < 90 mg/dL
 - preprandial < 105 mg/dL
 - 1-h postprandial < 130–140 mg/dL
 - 2-h postprandial < 120 mg/dL

- ADA:
 - Fasting <105 mg/dL
 - 1-h postprandial < 155 mg/dL
 - 2-h postprandial < 130 mg/dL

- Targets based on clinical experience, individualizing care

American College of Obstetricians and Gynecologists. (2018)
American Diabetes Association. (2020)

Patient Self-Monitoring

- Advise consistent blood glucose monitoring.
 - Patient should record all readings and bring in for every visit.
 - Patient will need 2 meters (primary and back-up), lancets and test strips (6 per day – may be adjusted by high-risk OB specialist)
 - In addition to testing supplies, patient may require training on how to use meter, etc.
 - Possible recommended testing times (to be determined and adjusted by high-risk OB): options
 - Before each meal and before bed
 - FBS and one to two hours after each meal

Treatment for GDM

- **First line treatment: Insulin**
- **Doses: 0.7-1.0 units/kg daily**
 - **NPH BID**
 - **Aspart or Lispro prior to meals**
- **Weekly logs to adjust regimen as needed**

American College of Obstetricians and Gynecologists. (2018)
American Diabetes Association. (2020)

Insulin Therapy Options

- Most evidence supports NPH/Regular
- Analog insulin use
 - Detemir (Levemir®): previously category B
 - Glargine (Lantus®): previously category C
 - Aspart (NovoLog®): previously category B
 - Lispro (Humalog®): previously category B
 - Discuss with “high risk” OB to determine your MTF’s gestational glycemic protocol
- Patient may require teaching, frequent BG monitoring, and frequent titration (esp. as pregnancy progresses)

Insulin Therapy

- Recommend switching type 2 patients to insulin prior to conception, if possible
- Starting total daily doses:
 - Up to 12 weeks gestation: 0.7 units/kg
 - 12 to 26 weeks gestation: 0.8 units/kg
 - 26 to 36 weeks gestation: 0.9 units/kg
 - 36 weeks gestation to term: 1.0 to 1.2 units/kg
 - Obese patients (more insulin resistant) may need up to 1.5 to 2.0 units/kg/day

Most common insulin regimen

- Calculate total insulin: 1st tri = 0.7units/kg
 - Assume 70kg patient = 49 units
 - 2/3 in am = 32 units
 - 1/3 regular = 11 units Regular before breakfast
 - 2/3 NPH = 22 units NPH in am
 - 1/3 pm = 16 units
 - 1/2 regular = 8 units Regular before dinner
 - 1/2 NPH = 8 units NPH before bed

Hypoglycemia <60mg/dL

- Greatest risk with insulin use
 - 19% to 44% of patients treated with intensive insulin therapy during pregnancy
- Patient must be instructed on prevention, recognition hypoglycemia and treatment
- Recommended treatment for hypoglycemia:
 - “Rule of 15”: For BG < 60 mg/dl, eat or drink 15 grams of “quick carbs,” retest in 15 minutes (retreat if needed)
 - For severe hypoglycemia: Glucagon emergency kit
 - Approved for emergency use in pregnancy (category B)

Heller et al. (2010).

Oral Medications for GDM

- Glyburide sulfonylurea binds to pancreatic beta cell adenosine triphosphate calcium channel receptors
 - Increases insulin secretion and insulin sensitivity peripheral tissues
 - Don't use if allergic to sulfa
 - Previously category B/C
- Metformin biguanide inhibits hepatic gluconeogenesis, glucose absorption and stimulates glucose uptake in peripheral tissues
 - Previously category B

Oral med facts

Glyburide	Metformin
20-40% require insulin	50% require insulin
2.5 mg- 20 mg divided doses	Use infertility in 1 st trimester limited info reduces pregnancy loss
Can go up to 30 mg	Use with PCOS
Long term outcomes not studied	Long term outcomes not studied

American College of Obstetricians and Gynecologists. (2018).

Treatment for GDM

- **When pharmacologic treatment of GDM is indicated, insulin is considered the first-line treatment for diabetes in pregnancy**
- **In women who decline insulin therapy or in whom the provider believes the patient will be unable to safely administer insulin, metformin is a reasonable second-line choice**

American College of Obstetricians and Gynecologists. (2018).

Antepartum testing

- Increase risk of fetal demise with poor control in pregestational DM
- Typically start antepartum testing at 32 weeks for any patient with A2GDM or pre-gestational diabetes



American College of Obstetricians and Gynecologists. (2018).

Delivery of Diabetics

- Beyond 40 weeks: 10% in the expectant group had shoulder dystocia
- Induced at 38-39 weeks: 1.4% had shoulder dystocia
- Typically induce at 39 weeks
- When to do a cesarean delivery to prevent shoulder dystocia
 - at 4,500 g 1:588 CD
 - at 4,000 g 1:962 CD
- ACOG recommends 4,500 g



American College of Obstetricians and Gynecologists. (2018).

Intrapartum Recommendations

- Blood Glucose goal: <80 mg/dL
- D5LR or D5NS at 100 to 125 mL/hr
- Check blood sugars every 1 to 2 hours
- Insulin Drip: 15 units insulin/150 mL LR or NS
- Be familiar with your OB providers preference in labor

Creasy. (2014)

Lactation

- Immediate nutritional and immunological benefits of breastfeeding for the baby
- There may also be a longer-term metabolic benefit to both mother and offspring, though data are mixed
- Check medications impact on breastfeeding before ordering
 - Glyburide ok
 - Metformin does have risk of hypoglycemia in baby

American College of Obstetricians and Gynecologists. (2018)
American Diabetes Association. (2020)

Postpartum GDM

Follow-up for GDM



GDM may represent undiagnosed DM2 and even DM1

- Screen for DM 4-12 weeks postpartum
 - 75 g glucose challenge with 2 hour reading
 - Elevated FBS ≥ 126 mg/dL diabetic
 - ≥ 200 mg/dL diabetic
 - Impaired FBS 110-125 mg/dL
 - Impaired 2 hr pp ≥ 140 -199 mg/dL

American College of Obstetricians and Gynecologists. (2018)
American Diabetes Association. (2020)

Postpartum GDM

Follow-up for GDM

Post-partum GDM education should include teaching on:

- Importance of life-long diabetes screening every 1-3 yrs
- Importance of exercise, weight management and healthy eating
- Breastfeeding: benefits include weight reduction and neonatal risk reduction, mother will need extra calories
- Increased risk of diabetes for child (and appropriate risk-reduction strategies)
- Interconception counseling contraception, folic acid, normalize A1C, early GDM screening

Case Study #1

- Your colleague, a PCP, comes to you (the Diabetes Champion) to report on a 29-yr old patient with type 2 diabetes who has just tested positive for pregnancy, estimated 6 weeks gestation
- The patient takes an ACE inhibitor (BP is well controlled), statin for high LDL, and metformin BID; last A1C (5 mos. ago) was 7.1%. Last dilated eye exam was 11 months ago (no signs of retinopathy)
- What immediate actions do you advise the provider take in this situation?

Recommendations

■ Suggested answers:

Immediate referral to high-risk OB

D/C ace inhibitor and statin and add different HTN med

Advise patient to check BG- FBS or before meals and 1-2 hours after each meal, and to record foods eaten in log book.

Prescribe extra BG meter with extra test strips and lancets

- Referral for repeat dilated eye exam
- Order for updated A1c

Case Study #2

Your patient, a 32 yr-old Hispanic female G5 P4004, is 35 weeks gestation. She has gestational diabetes A2 on split dose NPH and aspart insulin, diagnosed at 26 weeks. She has been seeing the OB specialist, but admits to missing several of the last appointments because “they are too demanding.”

- What are the priorities for this patient . . .
 - Now and before delivery?
 - Immediately following delivery?
 - For postpartum follow-up (6-12 weeks) and beyond?

Answers to Consider

■ Now:

- Importance of keeping appointments
- Inquire about the barriers
- Is the patient checking BG as directed, having high/low readings?
- Educate patient about neonatal hypoglycemia and macrosomia
- APFT at 32 weeks
- IOL at 39 weeks

■ Following delivery:

- Discuss changes to medication regimen
- Assure patient that treatment plan will not always be this strenuous (there is a light at the end of the tunnel; “hang in there”)
- Consider breastfeeding

Answers to Consider

- Post-partum Follow-Up:
 - 75 GTT to check for overt 2 DM 4-12 weeks postpartum
 - Discuss Birth Control
 - Discuss risk (mother and child) of diabetes and risk reduction strategies (i.e. lifestyle modifications, etc.)

Case Study #3

21 yo G0 using nothing for contraception with known T1 DM x 10 years presents to PCM saying she wants to get pregnant

- What do you recommend?

Answers to Consider

- A1C level
 - Remember you want it < 6 x 3 months prior to conception
 - Get good glucose control, consider pump
- Eye exam
- PNV/folic acid
- DC any medications that are unsafe in pregnancy

Case Study #4

- 35 yo G4P4 with newly diagnosed diabetes was started on Metformin. Due to elevated blood pressures, you also decide to start her on an ACE-I
 - What else should you discuss?
- Every Woman, Every Time!
 - Birth Control

Summary

- ALL women of childbearing age with diabetes should receive pre-pregnancy counseling
 - Preconception care significantly lowers major and minor anomalies
 - Recommend contraception until DM controlled
 - Excellent control is especially important during the first 8 weeks when major fetal organs are forming
 - Suboptimal control at end of pregnancy results in macrosomia and neonatal hypoglycemia and maternal HTN disease of pregnancy
 - GDM screening recommended for all; goals and treatments mirror those for patients with preexisting DM

Summary, cont'd

- Women with DM or GDM who are pregnant should be referred to specialty care (high-risk OB) for management
 - Patient education/understanding and commitment is vital
 - Obtain ophthalmology screening and treatment
 - Discontinue all contraindicated medication or convert to appropriate category medication
 - Strongly consider switching insulin therapy early
 - Aim for HGB A1c target of <6.0% without significant hypoglycemia (educate patient on hypoglycemia)
- A successful pregnancy is very possible if diabetes is under excellent control prior to and during pregnancy

Patient Education Resources



Patient Handout (2-pg PDF) on GDM (from CDC)

<http://www.cdc.gov/diabetes/pubs/pdf/gestationalDiabetes.pdf>

Patient booklet on GDM (English)

http://diabetes.niddk.nih.gov/dm/pubs/gestational/gestationalDM_508.pdf

Patient booklet on GDM (Spanish)

http://diabetes.niddk.nih.gov/spanish/pubs/gestational_ez/Gestational_SP_508.pdf

Got Diabetes? Thinking about having a Baby? (Booklet from CDC)

http://www.cdc.gov/ncbddd/pregnancy_gateway/documents/Got_diabetes_508.pdf

Pre-Existing Diabetes and Pregnancy (handout from CDC)

http://www.cdc.gov/pregnancy/documents/DiabetesDefects_Cleared.pdf

What I Need to Know about Preparing for Pregnancy if I Have Diabetes.

<http://www.diabetes.niddk.nih.gov/dm/pubs/pregnancy/>

- [Perinatology.com](http://www.perinatology.com). Gestational diabetes: calculation of caloric requirements and initial insulin dose. Available at: <http://www.perinatology.com/calculators/GDM.htm>. Retrieved May 21, 2013. (Level III)
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