Management of Type 1 Diabetes and Pregnancy

Kathleen M. Berkowitz, MD.

Disclaimer & Conflicts

- This webinar is considered a resource, but does not define the standard of care in California. Attendees are advised to adapt the guidelines and resources based on their local facility’s level of care and patient populations served and are also advised to not rely solely on the guidelines presented here.

- I have no conflicts to disclose.

Objectives

- Understand how to optimize pregnancy planning
- Helping the Type 1 teen transition to adult and parent under good glycemic control
- Awareness of the educational needs of the patient during pregnancy
- Optimize transitions back to her original health care team
What Are The Goals of Managing Diabetes During Pregnancy?
- Healthy Mom
  - Prevention of complications during pregnancy
  - Prevention of long term medical complications
- Healthy Baby
  - Prevention of preterm birth, fetal injury
  - Prevention of long term medical complications

What Are The Complications of Diabetes In Pregnancy?
- Maternal—Increased rates for miscarriage, urinary tract infections, preterm labor, preeclampsia and cesarean section
- Fetal—Increased risks for malformation, stillbirth, birth trauma and neonatal metabolic complications

How Do You Decrease The Risks of Complications?
- Recognition of Disease
  - Risk Factors Assessed
  - Screening Performed At Appropriate Time
  - Stepwise Management
  - TEAM APPROACH
  - Diet, Exercise, Home Glucose Monitoring
  - Medication—Oral or Injectable?
  - Recognition of Rational Goals of Therapy
- BONUS POINTS for Raising Awareness of Long Term Health Risks and Strategies to Decrease Those Risks
Preparing for Pregnancy

- Planning for pregnancy means planning NOT to become pregnant until goals are met
- Determine baseline medical status
- Optimize medication regimens
- Achieve glycemic control
- Achieve pregnancy
- DON’T DELAY organizing the team approach to caring for this patient!

Practicalities

Practicalities

Practicalities
Pre-pregnancy Contraception

- 52% of pregnancies in the U.S. are unplanned*
- Poor glycemic control in the pre-conceptual period is associated with increased risks for miscarriage and malformation**
- Women with medical complications need to be planning to be pregnant, or planning not to be pregnant
- Contraceptive options depend upon co-existing medical complications and timeline to desired conception

*Finer et al. Contraception 2011(11);84(5):478-85

Contraceptive Options

- The copper IUD does NOT increase risk for pelvic inflammatory disease
- The birth control pill does NOT increase BMI during the first year of use
- May see some blood glucose fluctuations with combination pills
- Combined hormonal methods include pills, patches, rings
- Long-Acting Reversible Contraception (LARC) methods have the highest efficacy, but may delay conception
- Depo-Provera, Mirena, Copper I, Implanon
- CDC recommends the use of ANY method in diabetic women without vascular disease. Women with vascular disease, or diabetes duration >20 years, should avoid combined hormonal methods, depo-provera and chose other methods

MMWR Recomm Rep 2010; 59 (RR-4):1-86.

Congenital Malformations
Common to Infants of Diabetic Mothers

<table>
<thead>
<tr>
<th>Anomaly</th>
<th>Incidence in General Population</th>
<th>Incidence in Type 1 Diabetic Population</th>
<th>Gestational Age at Occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caudal Regression Syndrome</td>
<td>1/5-10,000</td>
<td>1 in 350</td>
<td>3</td>
</tr>
<tr>
<td>Neural Tube Defects</td>
<td>2.1%</td>
<td>3.1%</td>
<td>4-6</td>
</tr>
<tr>
<td>Cardiac Defects</td>
<td>1/100</td>
<td>3.19%**</td>
<td>5-6</td>
</tr>
<tr>
<td>Renal Agenesis</td>
<td>3.6/1000</td>
<td>7.5/1000</td>
<td>6-8</td>
</tr>
</tbody>
</table>

Prevention Of Diabetic Teratogenesis: Preconception Glycemic Control

<table>
<thead>
<tr>
<th>Study Group</th>
<th>No.</th>
<th>Malformations</th>
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<tbody>
<tr>
<td>Preconception Control</td>
<td>126</td>
<td>0.5%</td>
</tr>
<tr>
<td>Late Entry (6-8 weeks)</td>
<td>292</td>
<td>7.5%</td>
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<tr>
<td>Non-Diabetic</td>
<td>420</td>
<td>1.4%</td>
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</tbody>
</table>

Fuhrmann, Diabetes Care 6:219, 1983

The Effect Of Preconceptual Care On The Rate Of Diabetic Embryopathy

<table>
<thead>
<tr>
<th>Study</th>
<th>Malformations, Late Entry to Care</th>
<th>Malformations, Early Entry to Care</th>
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</thead>
<tbody>
<tr>
<td>Fuhrmann et al</td>
<td>7.5%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Steel et al</td>
<td>10.4%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Kitzmiller et al</td>
<td>10.9%</td>
<td>1.2%</td>
</tr>
<tr>
<td>Mills et al</td>
<td>9.0%</td>
<td>4.9%</td>
</tr>
</tbody>
</table>


Glycemic Thresholds For Spontaneous Abortion And Congenital Malformations In IDDM

<table>
<thead>
<tr>
<th>Fasting Sugars</th>
<th>Anomaly</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-149</td>
<td>100-149</td>
</tr>
<tr>
<td>&gt;150</td>
<td>&lt;100</td>
</tr>
</tbody>
</table>

Rosen Obstet Gynecol 1994; 84(4):1, 515-520
Prevention of Teratogenesis

- Provide pre-conception counseling that addresses the importance of tight control in reducing the risk of congenital anomalies with an emphasis on achieving a HgA1c <7%, if this can be achieved without hypoglycemia.
- Potentially teratogenic medications (ACE inhibitors, statins, etc.) should be avoided in sexually active women of childbearing age who are not using contraception.
- Women with pre-gestational diabetes should have a baseline ophthalmologic exam in the first trimester and then be monitored each trimester as indicated by the baseline level of retinopathy.
- Folic acid supplementation may decrease risk for neural tube defects and other major fetal malformations.
  - At least 600 mcg daily.

Diabetes Care 2015; 38 (Suppl.1): 577-579

Classification of Pre-gestational Diabetes by History of Disease: WHITE’S CLASSIFICATION

<table>
<thead>
<tr>
<th>Class</th>
<th>Age Onset</th>
<th>Duration</th>
<th>Vascular Disease</th>
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<tbody>
<tr>
<td>B</td>
<td>&gt;20</td>
<td>&lt;10</td>
<td>No</td>
</tr>
<tr>
<td>C</td>
<td>10-19</td>
<td>10-19</td>
<td>No</td>
</tr>
<tr>
<td>D</td>
<td>&lt;10</td>
<td>&gt;20</td>
<td>Microalbumin, background retinopathy</td>
</tr>
<tr>
<td>F</td>
<td>Any</td>
<td>Any</td>
<td>Nephropathy</td>
</tr>
<tr>
<td>R</td>
<td>Any</td>
<td>Any</td>
<td>Retinopathy</td>
</tr>
<tr>
<td>H</td>
<td>Any</td>
<td>Any</td>
<td>Cardiac</td>
</tr>
</tbody>
</table>


Retinopathy

- If the patient has no retinopathy at baseline, the development of proliferative retinopathy during pregnancy is rare.
- Rapid normalization of glycemic control is associated with worsening eye disease.
- Inadequate blood pressure control is associated with worsening retinopathy.
- Treatment during pregnancy is the same as in the non-pregnant patient.
Nephropathy

- >400 MG Proteinuria/24 HOURS, Reduced Creatinine clearance
- Creatinine > 1.4
- 5% IUFD (intrauterine fetal demise), 60% preterm delivery, 40% IUGR (intrauterine growth restriction)*
- On dialysis, 50% IUFD, >90% preterm delivery, IUGR*
- 70% worsening renal function during pregnancy*
- Risk of renal failure low when creatinine is <2.5
- Use of ACE, ARB is contra-indicated in pregnancy

Williams et al British Medical Journal 2008;336:211-215

Coronary Artery Disease

- Maternal mortality rates exceed 50%
- If patient survived Myocardial Infarction (MI) and became pregnant over 6 months later, mortality rates are lower (<20%).
- If MI occurs early in pregnancy, mortality rates >60%
- Chronic Hypertension: Can be treated with beta-blockers, calcium channel blockers or methyl-dopa (Aldomet)

Risk Assessment In Diabetics Contemplating Pregnancy

- Diabetes History
- Obstetric History
- Family Pedigree
- Use of Medications
- Smoking and Alcohol
- Glycemic Control
Initial Studies To Perform On The Pre-Pregnant Diabetic

- TSH, Lipid Panel, HgA1C
- Dilated Eye Examination
- If hypertension or proteinuria, immediately evaluate
- Blood Pressure, Urine protein/creatinine ratio or 24 hour urine collection for proteinuria
- EKG (if hypertension is present or age ≥ 35)
- Assess risk factors for congestive heart disease
- Review eating, physical activity patterns
- Determine patient’s ability to actively participate and manage the intensified regimen of surveillance and glucose monitoring.

ADA Consensus Statement Diabetes Care 31(5), May 2008

Stepwise Management

- All patients need a TEAM APPROACH, involving diabetes nurse educator, nutritionist, experienced health care provider, co-ordination with primary care MD
- Start all patients with education on the pregnancy requirements for diet, exercise and home glucose monitoring
- Food plan is the basis upon which glycemic control rests
- Teach patients to “plan ahead” rather than “look back”
- Patients who are taking detemir or glargine should be transitioned to NPH insulin twice or three times daily, preferably prior to pregnancy
- Rapid acting insulin analogs (lispro, aspart) may produce better post-prandial control with less hypoglycemia
- See February lecture for insulin pump management

What Are Rational Goals for Glycemic Control?

- What is Normal During Pregnancy?
- Normal mean glucose: 71-78 mg/dl
- Normal fasting glucose: 56-60 mg/dl
- Normal one hour post meal: 115 mg/dl
- Lean women (BMI 21) with 20-25 pound weight gain in pregnancy

What Are Rational Goals for Glycemic Control?

- What glucose levels are associated with optimal maternal and fetal outcomes?
- Mean daily glucose: <110 mg/dl
- Pre-meal and fasting glucose: 60-99 mg/dl
- Post meal: 100-129 mg/dl
- Overnight: 60-99 mg/dl
- HgA1c <6%

Managing Pre-existing Diabetes for Pregnancy, 2008 ADA Consensus Panel Statement.

What Are Rational Goals for Glycemic Control?

- There are three categories of patients
- Those whose fasting and post meal values are in a range where the majority of studies show low complication rates
- Those whose values are consistently in a range where complication rates are increased
- Those whose values fall in the “battleground” — some studies show benefits to tighter control, some show no benefit
- HAPO study shows that rates of complications increase in a continuous fashion, making it hard to define a specific “best” number for control
- TIP: Team must define the goals they wish to reach and communicate those goals consistently with the patient.

The First Trimester

- Fatigue
- Increased glucose variability, increased insulin sensitivity is common at 10-14 weeks
- Hyperemesis is common 9-14 weeks, peaking usually at 12 weeks
- Viability: FHR should be present by 6-7 weeks gestation
Hypoglycemia in the First Trimester

- Better glucose control, ironically, increases risk for symptomatic hypoglycemia
- Up to 40% of women will experience symptomatic hypoglycemia during the first trimester
- Nausea, decreased appetite, fatigue

Tips:
- Use short-acting insulins, frequently
- Review use of glucagon, train family members to assist in severe episodes of symptomatic hypoglycemia
- Bracelets, necklaces, tattoos
- Cellphones: Nice places to stash your contact information, but useless to emergency responders if you have a password protected device.

Cultural Attitudes Towards Wearable Medical Identification Items

- "My diabetes is under control. I accept the very real and bothersome daily limitations it imposes on me, I realise the dangers of complications and try to act accordingly. I have primed my boss and first-aid people in my workplace, I have stashes of jelly babies everywhere, I have a mental map of where in my daily routine I can crash out if I need to. But while I live with the condition I am emphatically not prepared to let it define me (and that is precisely why I feel I can live with it). Wearing an ID is branding myself with the condition and I have an instinctive and elemental distaste for it."

Anonymous forum post found: http://www.diabetes.co.uk/forum/thread.do-you-wear-a-diabetes-id-bracelet.28909/

The Second Trimester

- Screening for fetal anomalies
- Ultrasound, serum screening protocols
- Work/life/pregnancy balance
- Psychosocial needs
- Increasing insulin resistance
- What worked last week, doesn’t work this week
Ultrasound for Identification of Fetal Anomalies

- **First Trimester:** Thickened Nuchal Translucency (NT) may indicate increased risk for fetal cardiac anomaly
- **Second Trimester:**
  - Major anomalies are present in 1-3% of the population
  - Minor anomalies are present in 3-5% of the population
  - Most major anomalies can be detected with second trimester ultrasound
  - Usually, about 20 weeks to optimize visualization of fetal structures
  - Detection rates vary from 14-61%, depending on the anomaly and the experience and training of the sonographer
- **TIP:** Patients should be counseled that ultrasound will fail to detect some anomalies and that some defects may not be detectable until the third trimester
  - Microcephaly, growth restriction, brain abnormalities, renal anomalies

Serum screening

- Assessment of maternal serum can identify individuals with increased risks for neural tube defects, gastroschisis, cleft lip/palate
- Genetic testing with cell-free fetal DNA will NOT identify these risks
- A combination of first and second trimester ultrasound and serum screening tests will identify most major anomalies.

Work/Life/Pregnancy Balance

- Patients have now been working intensively at achieving glucose control (or, listening to us complain at them about lack of good glucose control) for months.
  - And their fingers are sore.
  - And their insurance isn’t covering the cost of all those strips.
  - This is the mid-point of the marathon, but the big hill is coming up
  - Discussion with your patient about upcoming festive events, “cheating” strategies, need to continue frequent glucose testing.
  - If a patient is unaware of the upcoming increase in insulin need, she is likely to get frustrated and cut back on nutrition in order to minimize glucose values
  - Don’t change the diet; change the insulin dose!
Increases in Insulin Resistance

- 10-14 weeks gestation: Increased insulin sensitivity
- 14-18 weeks gestation: Fatty diabetic period of insulin sensitivity
- 20-24 weeks gestation: Very large increases in insulin resistance begin and can continue until well into the third trimester
- Inform patient of these expected changes and that they are due to pregnancy, not due to "being sicker" with diabetes
- Encourage use of post-meal monitoring
- Extremely important for patients using carb:insulin ratios to determine the correct pre-meal dose of short acting insulin.
- Pre-meal sliding scales are not useful for viewing insulin resistance.
- Post-meal glucose assessments MUST occur to optimize fetal and maternal outcomes.
- Poor glycemic control in second and third trimester affect fetal growth rates and increases risks for macrosomia to develop.

Pre-prandial Vs Post-prandial Glucose Monitoring: Neonatal Outcome In Gestational Diabetic Pregnancies

<table>
<thead>
<tr>
<th></th>
<th>Pre-Prandial Monitoring</th>
<th>Post-Prandial Monitoring</th>
<th>RR (CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birthweight</td>
<td>3440 grams +/- 434</td>
<td>3469 grams +/- 668</td>
<td></td>
</tr>
<tr>
<td>LGA</td>
<td>42%</td>
<td>12%</td>
<td>3.5 (1.3-9.5)</td>
</tr>
<tr>
<td>Shoulder Dystocia</td>
<td>18%</td>
<td>3%</td>
<td>6.0 (0.8-47.1)</td>
</tr>
<tr>
<td>Neonatal Hypoglycemia</td>
<td>21%</td>
<td>3%</td>
<td>7.0 (0.9-53.0)</td>
</tr>
</tbody>
</table>


Increasing Insulin Resistance

- Most type 1 diabetic patients will experience a doubling, even tripling of their daily insulin needs
- On average, type 1 diabetic women experience about a 0.9 unit/kg increase in insulin needs during the first trimester
- Second and third trimester, these need increase, on average, about 140%
- Because glucose is cleared relatively rapidly after a meal, the pre-meal values will not reflect these increased insulin needs
- TIP: Look for patterns
- Post-meal variability should be treated first with diet modifications
- Change short-acting insulin, carb:insulin ratios, NPH based on intensive review of diet log, glucose meter
- Non-judgmental counseling!!!
When Should a Pregnant Diabetic Be Hospitalized for Glucose Control?

- Anytime there is concern for development of DKA
- Anytime there is inability to eat or drink
- Anytime she does not have access to insulin in the outpatient setting

Hospitalization for Intensive Education?

- Set goals prior to admission
- This requires a team approach and recognition of shared goals for hospitalization
  - Education: Diet, exercise, home glucose monitoring, insulin administration
  - Access to care: Referral to diabetic educator, specialized health care provider
  - Acquisition of the basics: Insulin, syringes, needles, home glucose monitoring

My Goals for Discharge

- Ability to use home glucose monitor
- Ability to draw up and self-inject insulin
- Education in dietary needs
- Ability to recognize and treat symptoms of hypoglycemia
- Fasting sugars <140 mg/dl
- Post meals <200 mg/dl
- Ability to return to specialized health care providers within one week of discharge AND
- Ability to communicate with specialized health care providers 24/7 after discharge

The Third Trimester

- Infections, DKA risks
- Fetal monitoring to prevent stillbirth
- Evaluations for pre-eclampsia
- Treatment of preterm labor
- Assessment of fetal size
- Discussion of delivery route and timing
**Infections and DKA risk**

- Patients who feel ill need MORE oversight of glucose levels and MORE contact with their healthcare providers, but often feel too ill to do so.
- TIP: If you are too ill to eat, you are too ill to be an outpatient.
- Most common cause of DKA is urinary tract infection.
- Incompletely treated urinary tract infection may progress to pyelonephritis, sepsis syndrome, acute respiratory distress syndrome (ARDS).
- Second most common cause of DKA is upper respiratory infection.
- All pregnant diabetic women should have the flu shot annually.
- Early treatment of infection may prevent DKA.
- Early treatment of DKA may prevent stillbirth.

**Treatment of DKA During Pregnancy**

- Labs: Arterial blood gas (ABG), glucose, serum ketones, electrolyte levels to be assessed every 1-2 hours.
- Insulin: Low-dose, intravenous.
  - Loading 0.2-0.4 units/kg
  - Maintenance 2-10 units/hour
- Fluids: Isotonic NaCl will need at least 1 liter in 1st hour, 500-1000 mL/hr next 2-4 hours, then 250 mL/hr until dehydration 80% repleted.
- Glucose: Start D5NS when glucose < 250 mg/dl.
- Potassium: 15-20 mEq/hr may be required, depending on initial K+ level.
- Bicarb: Only if pH < 7.1.

ACOG Practice Bulletin #60, March 2005

**Stillbirth, Perinatal And Neonatal Mortality In Babies Born To Women With Type 1 And Type 2 Diabetes In England, Wales and Northern Ireland, 2002-2003**

<table>
<thead>
<tr>
<th></th>
<th>Type 1 (N =1706)</th>
<th>Type 2 (N =650)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency (%)</td>
<td>Rate (C.I.)</td>
</tr>
<tr>
<td>Stillbirth</td>
<td>44 (25.8)</td>
<td>(18.3-33.3)</td>
</tr>
<tr>
<td>Perinatal Death</td>
<td>54 (31.7)</td>
<td>(23.3-40.0)</td>
</tr>
<tr>
<td>Neonatal Death</td>
<td>15 (9.1)</td>
<td>(4.9-14.3)</td>
</tr>
<tr>
<td>Total</td>
<td>114 (66.8)</td>
<td>46 (70.8)</td>
</tr>
</tbody>
</table>

Antepartum Testing Surveillance

- Twice weekly monitoring, starting generally at 32-34 weeks gestation
- Testing should consist of Non-Stress Test (NST) twice weekly, Amniotic Fluid Index (AFI) evaluations 1-2 times a week
- Contraction stress tests, biophysical profiles, Doppler studies of various fetal vessels are NOT needed for routine surveillance
- Using this approach, stillbirth rates approach "0"
- 1.7/1000, compared with 1.3/1000 in the unmonitored, low risk population*
- Some third trimester losses in type 1 diabetics are due to congenital anomalies

*Rosenstein et al. AJOG 2012 Apr;206(4):309.e1-.e7

Preterm Labor

- Patient presenting with symptoms of preterm labor
- Cervical length exam, Fetal Fibronectin (fFN) testing, digital vaginal exam, contraction monitoring
- Urine Analysis (UA), Group B Streptococcus (GBS), Complete Blood Count (CBC)
- If these evaluations reveal increased risk for preterm delivery, beta-methasone administration is recommended
- DO NOT give beta-methasone to patients with suspected DKA or suspected infection
- Women with diabetes will experience 33-48% increases in glucose levels 1-5 days after administration of beta-methasone*
- Type 1 patients requiring beta-methasone administration should be cared for in a hospital setting that can provide intensive glucose monitoring and the use of an insulin drip by a team trained in obstetric glucose management

*Refuerzo et al Am J Perinatol 2012 May; 29(5):335-8

Pre-eclampsia

- Rates of pre-eclampsia for women with type 1 diabetes are double to triple that of the low risk population
- Absolute risk depends upon BMI, age, vascular complications, glucose control and weight gain
- US Preventative Task Force recommends use of baby aspirin during pregnancy to reduce risk for development of pre-eclampsia*
- ACOG recommends it only with additional clinical history or vascular complications
- If pre-eclampsia is noted at or beyond 36-37 weeks gestation, delivery is indicated
- If pre-eclampsia develops <37 weeks gestation, delivery is indicated if severe features of disease are present
- Beta-methasone administration should be considered

*US Preventative Task Force. Low Dose Aspirin to Prevent Pre-eclampsia: Preventive Medication, September 2014
Optimal Timing of Delivery

- Risk of stillbirth in well-controlled Type 1 diabetic patient with twice weekly antepartum testing is very low
- Optimal timing of delivery:
  - Well controlled diabetes (Type 1, 2 or GDM): Late preterm and early term birth NOT indicated (wait until at least 39 weeks gestation
  - Pre-gestational diabetes with vascular complications: early term/term
  - 37-40 weeks gestation
  - Poorly controlled diabetes (Type 1, 2 or GDM)
    - Individualize management
  - Route of Delivery:
    - If EFW is >4500 grams, cesarean delivery should be recommended for the diabetic patient. If EFW<4500 grams

Shoulder Dystocia

- Decrease Birth Trauma?
  - In order to prevent one case of permanent brachial plexus injury in the diabetic patient with a fetus EFW>4500 grams, you must perform at least 330 cesarean sections**
  - The process of performing 330 cesarean sections will result in collateral maternal injuries
  - You will cause 3-5 maternal injuries for every case of brachial plexus palsy prevented

*US Preventative Task force Summary of Recommendations 2003
**Rouse et al AJOG Volume 181(2) Aug 1999; pp 332-338
Assessment of Fetal Size

- Ultrasound is NOT an accurate indicator of fetal size.
- Most studies show 10-15% error range in estimation of fetal size.
- Meaning, an ultrasound report stating EFW is 4000 grams really means the fetal size could be anywhere from 3400-4600 grams (7 ½ to 10 pounds).
- Use of algorithms looking at ratios of head to body, head to shoulder are useless.
- ACOG does not recommend using ultrasound as a screening tool to prevent shoulder dystocia.
- “The diagnosis of fetal macrosomia is imprecise. For suspected fetal macrosomia, the accuracy of estimated fetal weight using ultrasound biometry is no better than that obtained with clinical palpation/Leopold maneuvers.”
- ACOG Committee Opinion 48.

During Labor

- Maternal needs for insulin decrease significantly during labor.
- If delivery is scheduled:
  - Schedule for AM.
  - Allow patient to eat and ambulate during the early phases of labor.
  - Have her bring her own glucose meter for use in the hospital.
- Hydration is important.
- Frequent assessment of glucose levels.
- Frequent doses, when needed, of short acting insulin.
- Insulin pump patients should remove the pump and be placed on an insulin drip in labor.

Glycemic Control In Labor

- Goals: 80-110 mg/dl, avoidance of ketosis.
- Will decrease risk of neonatal metabolic complications such as hypoglycemia.
- Check glucose levels frequently.
- For BS<100 mg/dl, continue DS 1/2NS; no insulin needed.
- For BS>120, 2-4 units regular insulin bolus OR insulin drip.
  - Better glucose control but requires availability of sophisticated resources ($$$).
- TIP: Even if target glucose levels are maintained in labor, most hospitals require special care nursery admission for the infant of a type 1 diabetic mother.
**Labor And The Diabetic Patient**

- Schedule elective deliveries in the AM
- Avoid prolonged inductions
  - High failure rates
  - Increased neonatal jaundice
  - Increased maternal ketosis
- Frequent monitoring of maternal blood sugar
  - Maternal insulin requirement usually decrease
- Adequate hydration to avoid ketosis

**The “Fourth Trimester”**

- Changing insulin sensitivity
- Breastfeeding
- Birth control
- Transition back to original health care team

**Decreases in Insulin Requirements**

- Breastfeeding Type 1 diabetic women have lower basal insulin needs than non-breastfeeding Type 1 patients during the first 8 weeks postpartum
- Breastfeeding group also has higher mean number of hypoglycemic episodes*
- Insulin requirements will decrease to 50-60% of pre-pregnancy requirements for the first few days postpartum, with some women achieving a short period of insulin independence**
- Tip: Clearly document the pre-pregnancy requirements and level of glucose control in the admission H&P. Use specialized obstetric team to assess insulin requirements postpartum.
- Options include insulin drip, sliding scale
- See patient within 1-2 weeks of discharge to monitor glucose levels
- Main focus of care switches from preventing hyperglycemia to preventing hypoglycemia, especially for breastfeeding women

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**Achong et al, Diabetes Care 2014 Feb;37(2):364-71
Transition Back to Original Care Team

- Obstetric teams have narrowly focused goals and require intensive resource funding
- Reserve this team for pre-conception, pregnancy, and immediate postpartum management
- Transition patient back to original healthcare provider or arrange for referral to trained provider if patient did not have one prior to pregnancy
- Communication of pregnancy outcome, complications, recommendations for birth control to be transmitted to the accepting healthcare provider