



DAKOTA DIABETES
COALITION

The Dakota Diabetes Coalition is proud to offer a regular column on diabetes and related concerns every other Friday.



Dr. Johnson is a family practice doctor in Grand Forks with a special interest in diabetes -- and a special knack for writing. As a member of the Dakota Diabetes Coalition, he has generously made himself available to answer questions through our listserv. If you have comments, or questions for Dr. Johnson to address in future columns, please contact gailhand@qwest.net

Visit the Coalition's website!

<http://www.ndhealth.gov/diabetescoalition/>

Start with pre-conception counseling

Pregnancy with DM differs from gestational diabetes

Two weeks ago, our column featured a case that was well-received, so we'll have another one this week to illustrate some common principles of Diabetes Management.

Let's meet the mom-to-be

Our patient is a 31-year old white female with type 2 diabetes of 4 years duration. Currently, she has a BMI of 29, her blood pressure is controlled to 127/76 without medication, and she takes Lipitor (atorvastatin) 20 mg daily for dyslipidemia. She is on Metformin 500 mg BID and detemir insulin (Levemir) 22 units daily for her diabetes.

She is active, working out at the health club twice a week for 30 minutes a session, and she walks 30 to 60 minutes twice a week. She has no known complications, and she has had a normal dilated eye exam 4 months ago. She last saw her diabetes educator and dietitian about a year ago.

Her A1C at today's visit is 6.9. Microalbumin is normal. She is not anemic. Chemistry panel, including liver and kidney function tests, is

normal. Pregnancy issues have always been discussed at clinic visits, and although she has not actively pursued pregnancy, she is considering stopping her birth control. Generally, an A1C of <7 is recommended for the pre-conception period (3 to 6 months) and during pregnancy, without significant hypoglycemia. In our office, we often attempt a pre-conception A1C of <6.5.

This patient was advised to go off her Lipitor if she was actively pursuing pregnancy, as statin drugs are FDA Category X (contraindicated in pregnancy, likely harm to the fetus).

Six weeks later, the patient returned, having missed her menses. The pregnancy test in the office was positive. A repeat A1C was done, which was 6.9. She had been off Lipitor since her last visit, and was continuing on Metformin and detemir (Levemir) as previously prescribed. Metformin is often utilized in young women with type 2 diabetes. In addition to the glucose control offered by the drug, it is thought to enhance fertility by reducing insulin resistance and helps reduce the incidence of spontaneous abortion (miscarriage). Most often, it is continued through the first trimester, and then discontinued. Metformin is a category B drug, thought to be safe, but no controlled studies exist. Metformin is usually not sufficient to maintain adequate glucose levels throughout the pregnancy, as insulin resistance increases, sometimes dramatically. As in most cases, Metformin was continued into the 12th week of pregnancy.

What else should be done for this patient?

An important point to remember is that these patients are NOT gestational diabetics. Although some of the treatment guidelines are the same, these patients deal with diabetes management before the pregnancy, during the entire pregnancy, and for the duration of their lifetime after the pregnancy, not just the last 8-12 weeks of gestation. In this case, her Levemir was continued, as she had done well with her control to this point. Some clinicians may place any pregnant patient on insulin on a regimen to include Human NPH, as there is more clinical experience with it. This must be balanced against the chance of any potential diabetes control issues that go along with a change in an insulin program.

All insulin is OK for babies who are breastfed, which is the standard recommendation. The FDA safety categories of insulin products are presented below:

- Aspart (Novolog) B

- Aspart protamine ("NPH" of novolog 70/30) C
- Detemir (levemir) C
- Glargine (Lantus) C
- Glulisine (Apidra) C
- Lispro (Humalog) B
- Lispro protamine ("NPH" of humalog) B
- NPH B
- Regular B

The patient was also referred to her diabetes educator and dietitian, which is appropriate for all patients at the beginning of pregnancy, or in the pre-conception counseling period. She'd had an eye exam within the last 6 months, but should have at least one more during the pregnancy, no later than the start of the third trimester. That is because diabetic retinopathy can appear and accelerate rapidly during pregnancy. Up to 4% of women with diabetes will develop retinopathy during their pregnancy.

Likewise, she was re-screened for urine Microalbumin within six months of the previous test instead of one year. There are some clinicians who recommend a 24-hour urine for protein and creatinine clearance during the pregnancy, and that may also be a reasonable and perhaps more complete alternative.

It is typical in pregnancy for insulin dosages to increase as gestation progresses. Sometimes, the dosing of insulin can increase dramatically (I have personally treated patients who need up to 240 total units per day!). Patients should be instructed to do 4 to 8 blood sugars daily, ideally testing fasting, pre-meals, 2 hour post-meals, at bedtime, and occasionally at 3:00 a.m. Targets for fasting and pre-meal are 60-90, 2 hour post-meal <120, and bedtime 100-140. Note that these are the same as Gestational Diabetes, but hitting these targets with the consistency expected in GDM can be difficult, as treatment is for 9 months, not 8 weeks. Insulin doses may need to be adjusted every few days, particularly in the last trimester.

In this case, the patient continued Levemir, but by week 22 was noting blood sugars over 150 consistently in the evenings both 2 hours post-

meal and at bedtime. The decision was made to start her on insulin aspart (Novolog) with her evening meal. Many type 2 patients who are carbohydrate counting can make good insulin adjustments based on their oral intake, and many adults with type 2 require 2 units of rapid-acting insulin per 15 gram of carbohydrate as an initial dose. Lispro (Humalog) or Human R could be used here as well, although patients using R may have more hypoglycemia than with analog insulins.

A1C's continued to be checked every 6 to 8 weeks (doing them more often is probably beyond the limit of the test, as A1C's generally reflect the last 8 to 12 weeks of glucose control). During her pregnancy, her maximum A1C was 6.9. By delivery, this patient was taking 44 units of Levemir every morning, and had advanced to a multiple daily injection program for meals, requiring 2-3 units of rapid acting (in this case, Novolog) per 15 gram of carbohydrate with meals and snacks.

Additionally, a correction factor of 1 unit to drop blood sugar 30 points was calculated for blood sugars over target. For example, if her pre-meal blood sugar was 180, and the target was 120, she would take 2 extra units in addition to her calculated meal dose. If she ate 60 grams of carbohydrate at 3 units per 15 gram, that would be 12 units of Novolog for the meal + 2 units correction factor = 14 units of Novolog. The patient vaginally delivered a healthy, 8 pound, 4-ounce baby boy at 39 weeks gestation without complications. Her insulin requirements went down dramatically within hours of delivery, which is often the case--a 50% drop in insulin dosing would not be unusual. When she completed several months of breast feeding, she returned to her previous regimen of Levemir 14 units daily with Metformin 500 mg BID. She was also restarted on her Lipitor 20 mg daily.

Aggressive management of pre-existing diabetes in pregnancy is very important to minimize the mother's risk of new or emerging diabetes complications, and to ensure a better likelihood of a successful pregnancy outcome, particularly with regard to fetal size. Although there are some limitations to the medications that can be used in a type 2 diabetes patient in pregnancy, insulin is a good safe choice that can give excellent results.

[Pregnant with Diabetes Case Study, Dr. Johnson's Column #17, March 7, 2008](#)
