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NUMBERS WOMEN WITH DIABETES SHOULD KNOW BEFORE A PREGNANCY

By Suzanne Y. Bush, MD, FACOG, NCMP
& Laura Ambler, DO

DOI: <http://dx.doi.org/10.17125/plaid.2015.53>

BACKGROUND

Pregnancies with diabetes mellitus (DM) are increasing in the United States [1, 2]. The prevalence of DM in 2014 is estimated at 387 million people; by 2035 this number will rise to 592 million [2]. More than 21 million live births were affected by diabetes during pregnancy in 2013 [2]. Much has been written for the physician about the importance of medical care before a woman becomes pregnant to achieve the best results for both mom and baby. Physicians refer to the care before pregnancy as preconception counseling. Many countries, including the United States, have guidelines for the care of women with diabetes. These guidelines agree that preconception counseling should be routine for all women with both type 1 and type 2 diabetes mellitus, but some studies have found that only 50% of women receive this vital care [3]. We propose a simple way that a woman with diabetes can advocate for a healthy pregnancy by knowing 5 numbers. These 5 numbers can make a positive difference in a mother's health and that of her unborn baby. Although these 5 numbers are not all there is to know before becoming pregnant, knowing these 5 numbers can help start the conversation with physicians and begin the journey to the very best a woman can be before a pregnancy.



1 HEMOGLOBIN A1C

Hemoglobin carries oxygen in the red blood cells. When a person's blood sugar is consistently high, sugar molecules attach to hemoglobin. In a blood sample, hemoglobin A1C is a percentage of hemoglobin molecules that have sugar molecules attached. Higher hemoglobin A1C numbers represent higher average blood sugars. Unfortunately, higher average blood sugar levels are also related to higher rates of malformations and birth defects in women with diabetes. The optimal hemoglobin A1C prior to pregnancy is less than 7% [1, 4]. Ideally, a woman planning a pregnancy should aim for a hemoglobin A1C of approximately 6.1% [4], which represents an average daily blood sugar of 128 mg/dL. Severe birth defects occur when blood glucose is and has been high. Therefore, a hemoglobin A1C greater than 10% is considered a contraindication to pregnancy [3], meaning that pregnancy is not recommended because the risk of birth defects is too high.

Daily blood glucose monitoring is essential to reach target hemoglobin A1C levels as well as exerting daily control over blood sugar. Ideal blood glucose levels are 80 - 110 mg/dL before meals and no more than 175 mg/dL after meals. During pregnancy, blood glucose control should be even tighter, with an ideal blood glucose level before meals of no more than 95mg/dl and no more than 120 mg/dl after meals.

Diabetes often becomes harder to control during pregnancy, requiring changes in medication regimens and diet. In order to ensure that adequate control of blood glucose can be achieved, it is important to make sure that the pre-pregnancy medication regimen is ideal. In addition, many medications have not been tested for use during pregnancy. The only medication that is widely known to be safe during pregnancy is insulin. However, glyburide and metformin have been promising in clinical studies and are often used, especially in women who were using these medications prior to pregnancy. Since the safety profiles of other medications are not well known, it is important to modify medication regimens prior to pregnancy to allow for both good control of blood sugar and safety to the developing fetus [3].

2 BMI < 27

BMI, or body mass index, is a calculation based on a person's weight and height. It is a way to express the size of a person's body and relate that size to health outcomes. A body mass index of 21 - 24 is considered normal, while 25 - 29 is considered overweight. Any body mass index of 30 and above is considered obese. Obesity is related to poor pregnancy outcomes, including increased rates of miscarriage, preeclampsia, and still birth. As such, a target BMI of less than 27 prior to pregnancy is considered ideal.

Diet should also be diversified prior to conception to include complex carbohydrates, lean proteins, and high fiber foods. Caloric intake for a non-pregnant female that leads a relatively sedentary lifestyle is approximately 1,600 calories per day. As a woman's activity level increases, her caloric needs increase as well. Contrary to popular belief, a woman does not "eat for two" during pregnancy. In fact, daily caloric requirements increase about 300 calories for pregnant women.

3 BLOOD PRESSURE < 130/80

High blood pressure is very common in diabetic women, especially those with type 2 Diabetes. Blood pressure control can become more difficult during pregnancy. Women who already have high blood pressure are at greater risk for pregnancy complications such as small birth weight, poor growth, placental problems, and preeclampsia. Preeclampsia is a special type of high blood pressure problem of pregnancy. The symptoms include headaches, chest pain, pain in the right upper part of the abdomen, vision changes, and swelling in the hands and feet. Untreated, preeclampsia can progress to eclampsia, in which a woman has seizures. The only cure for preeclampsia and eclampsia is delivery, often prematurely. In order to decrease risk for these conditions in diabetic women, blood pressure control is essential. Women who are considering a pregnancy should aim for a blood pressure less than 130/80.

Many women who already have chronic hypertension become pregnant. Angiotensin-converting enzyme inhibitors (ACE inhibitors) are common blood pressure

medications used in diabetic women because these drugs have been shown to protect the kidneys in women with diabetes. However, these drugs can cause serious birth defects, especially related to the kidneys. It is recommended to discontinue ACE inhibitors in women considering pregnancy, and opt for other blood pressure medications that are safe such as nifedipine, labetalol, hydralazine, and methyldopa.

4 FOLIC ACID = 0.4 MG DAILY

Folic acid is a B vitamin that aids in the synthesis of DNA, the genetic material in each cell. Since cells are rapidly dividing and growing during pregnancy, folic acid is essential to normal development of the embryo. Folic acid has been shown to prevent a birth defect known as spina bifida or neural tube defect. In very early pregnancy, often before a woman becomes pregnant, the neural tube closes. The tube gives rise to the nervous system. If it does not close properly, the spinal column may be open, which may cause devastating effects depending on where the spinal cord is open. Women who are considering a pregnancy should begin taking folic acid about two months prior to becoming pregnant. However, the dose is related to risk factors. In a woman with a prior history of a child with a neural tube defect, a family member with a neural tube defect, or use of prescription medications such as valproic acid, a 5 milligram dose is recommended. In women without risk factors, a 0.4 milligram dose is considered appropriate. Most prenatal vitamins contain about 1 milligram of folic acid. If additional supplementation is recommended, then folic acid can be purchased separately in any pharmacy. The primary physician or obstetrician can help determine if additional folic acid is needed.

5 BODY SYSTEMS TO BE CHECKED

Many sources recommend management of persons with diabetes by a multidisciplinary team. Whether there is a team of doctors or just a couple of physicians involved in care, help communication between physicians by providing each with the information on each body system. Before you get pregnant, your primary diabetes specialist or primary care doctor may be leading your team, but once you are pregnant, your obstetrician will need the information from each specialist to lead the team through your pregnancy.

REPRODUCTIVE AND ENDOCRINE SYSTEM

A woman considering a pregnancy should have her cervical cancer screening up to date. This may include a Pap smear and/or HPV (human papilloma virus) testing as well as testing for sexually transmitted disease. A Pap smear screens for cells on the cervix infected with a virus known as the human papilloma virus. This is the virus that causes cervical cancer. During pregnancy, the immune system does not work as well and these cells can grow unchecked, developing in pre-cancerous or even cancerous cells. By having a Pap smear and receiving treatment for an abnormal Pap smear before pregnancy, extra procedures during pregnancy can be prevented. In addition, some sexually transmitted diseases such as HIV, herpes, and chlamydia can be transmitted to the fetus either during the pregnancy or the birthing process, with devastating results. Testing prior to conception allows these conditions to be treated or managed in order to increase the chance of a healthy delivery.

In any woman, a thorough obstetrical history covering all prior births, miscarriages, and abortions is essential to health care planning prior to conception. A history of complications during pregnancies gives the provider an indication of what complications are likely to occur during subsequent pregnancies.

With type 1 diabetics, screening for thyroid conditions is essential. Type 1 diabetes is an auto-immune condition, which means that any person with type 1 diabetes is at higher risk for development of another autoimmune condition. By testing for thyroid disease prior to pregnancy, these diseases can be managed to prevent birth defects in the developing baby.

KIDNEY

Many people with diabetes, especially those with a history of poorly controlled blood sugars, have some form of nephropathy, or problems with their kidneys. This is often determined by measuring blood levels of creatinine. A normal creatinine is approximately 0.6 to 1.1 mg/dL for non-pregnant women. Creatinine levels of 2.2 mg/dL are concerning, and pregnancy is not recommended without a referral to a nephrologist [4]. A pregnancy can cause permanent damage to the kidneys and other complications in the pregnancy that can lead to premature birth.



VISION

Long standing diabetes often results in retinopathy, especially in people with diabetes with poor glucose control. Since diabetes in pregnancy can often be more difficult to control, it is important for women with diabetes considering pregnancy to see an ophthalmologist for an eye exam, including the retina [4]. Often, it does not worsen, but knowing the baseline is important, should problems develop during the pregnancy.

HEART

During pregnancy, the work of the heart increases by approximately 50%. In order to ensure the heart can handle this increase in work, an assessment of cardiovascular health is a key component of caring for yourself prior to pregnancy. A previous stroke, heart attack, or a history of blood clots causes increased risk during pregnancy. Pregnant women and women in the postpartum period are at a much higher risk of blood clots. Blood clots are not only dangerous to pregnant women, but also the fe-

tus, as blood clots can develop in the placental circulation and cause fetal death. If there is a history of heart attack, stroke, or blood clots, the doctor may start a medication to prevent blood clots very early in the pregnancy. Also, some people with diabetes take statins to lower high cholesterol. Statin medications should be stopped before considering a pregnancy [4].

NERVES

Peripheral neuropathy, a condition in which a person has painful nerve sensation from nerves in his/her hands or feet, is often the result of poorly controlled diabetes. This painful and debilitating condition can become worse during pregnancy as blood glucose becomes more difficult to control. Assessment of this condition prior to pregnancy can help to limit increased damage as well as differentiate from nerve damage prior to pregnancy from complications of the pregnancy itself.

CONCLUSION:

Even with the best planning and surveillance before conception, not every complication can be anticipated or prevented. During a pregnancy, the complications of diabetes can progress, and often, that progression is out of anyone's control. By becoming an advocate, the patient can help her team of doctors deliver the best care. Communication is very important and requires a vital link between the providers by knowing the following:

1. Hemoglobin A1C is below 7% [4].
2. Body Mass Index (BMI) is less than 27.
3. Blood pressure is less than 130/80. If medication is required to control blood pressure, know that the medicines are safe for a pregnancy.
4. Folic Acid intake is 0.4 mg every day.
5. Five Body Systems to check: Reproductive, Kidney, Vision, Heart, and Nervous systems need up to date evaluation by a physician, and the status of diabetes effects on these systems must be known.

If these numbers are not known, reliable methods of preventing pregnancy is strongly recommended until optimal health is acquired. Again, the importance of well-controlled blood glucose is essential to a healthy pregnancy. The old football adage, the best offense is a good defense, applies here. Knowing these 5 numbers ensures the patient is on the way to the healthiest pregnancy and baby possible.

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