

Diabetes Care, What You Need to Know

Danita Harrison ARNP CDE

Diabetes is a very common disease that most likely either you have or you know someone with it. Diabetes can be hard to live with since it affects our lives on a daily basis. I believe you must learn to live with diabetes, for if you take control of this disease and not let it control you; you can live a long healthy life.

What is diabetes?

Diabetes is a condition that prevents your body from properly using glucose (sugar) for energy. Ideally if our bodies are working properly the amount of energy that is needed is provided by a balance of glucose and insulin. Insulin is produced by the pancreas in the beta cells. The pancreas is located by the stomach in the abdomen. Glucose comes from the food that is eaten, primarily food that contains carbohydrates.

What type of diabetes do I have?

There are several types of diabetes, but Type 1 and Type 2 will be addressed here. The most common is Type 2 diabetes. The American Diabetes Association defines Type 2 diabetes as the “result of a progressive insulin secretory defect on the background of insulin resistance.” In other words, over time, the pancreas is not able to produce enough insulin to keep up with the body’s needs. The body also has difficult time “allowing” insulin into the cell to work correctly in order to use sugar as energy in the body. Type 2 diabetes can be treated with oral medication and/ or insulin.

Type 1 diabetes is when the Beta cells located in the pancreas quit producing insulin. People with Type 1 diabetes must take insulin, to stay alive. This type of diabetes is less common, and often occurs when a person is young and thin.

I have been told I have “pre-diabetes”, should I be concerned?

Yes, consider “pre-diabetes” a warning to adopt a better lifestyle immediately! A person without diabetes will normally have a fasting blood sugar under 100, or 2 hours after eating under 140. Pre-diabetes occurs when a fasting blood sugar ranges between 100-125 or after drinking 75 grams of glucose and have a blood sugar range of 140-199.

These blood sugar ranges are not normal since diabetes is diagnosed one of 3 ways;

1. Symptoms of diabetes such as thirst, hunger, frequent urination or weight loss and a blood sugar at anytime of over 200.
2. After fasting for at least 8 hours, a blood sugar over 126.
3. A lab test of drinking 75 grams of glucose and have a blood sugar over 200, two hours later.

While a person with “pre-diabetes” has not been diagnosed yet with diabetes, the risk for cardiovascular disease such as heart attack, stroke and development of diabetes is quite high. The best thing you can do for your health with the pre-diabetes diagnosis is lose weight and exercise daily!

What are the symptoms of diabetes?

Diabetes can go undiagnosed as a person ages, since the symptoms are often absent in the older adult. Therefore, many people are diagnosed at the time other illnesses are occurring. Symptoms of diabetes can include frequent thirst, urination, hunger and weight loss. However, many adults do not notice signs of diabetes, so they are not diagnosed until a routine lab test has been done.

After the age of 45, most people should be screened for diabetes if they are over weight or have other risk factors such as high blood pressure, high cholesterol, gave birth to a baby over 9 pounds, or relatives with diabetes, heart or blood vessel problems. The rate of diabetes is higher in the elderly African American, Hispanic, male Japanese, and Indians compared to Caucasian.

Why do I have to test my blood sugars at home?

Testing blood sugars at home is now easy and quick to do. If you have diabetes you should test your blood sugars at home, with no excuses! ***Remember, you have to manage your blood sugars!*** Self glucose monitoring helps give immediate glucose readings that can help you manage diabetes. By knowing your glucose readings, you receive immediate feedback on your current blood sugar, which can help in reaching your blood sugar goal, determine how your medication is working, help in treating low blood sugars and determine your blood sugar response to certain foods and activity. It is important to test your blood sugars on a regular basis, at a variety of times, including before and after meals! Write down your blood sugar readings and take your records to every medical visit. If you show interest in controlling your blood sugars, your health care provider will show interest as well. Most insurances provide coverage for the meter and strips to test at home. Testing blood sugars at home requires one small drop of blood and less than 1 minute to obtain a reading. Can you manage to spare less than one minute to help control your diabetes?

What is an A1c (A one C) test?

An A1c is a blood test that shows the average blood sugar for the past 2-3 months. This number is reflective of your blood sugar readings all the time including fasting, after eating and even sleeping!

A1c%	Average plasma glucose
6	135
7	170
8	205
9	240
10	275
11	310
12	345

In general your A1c should be below 7%, but do not ignore the fact people without diabetes have A1c values under 6%. Having good A1c values or good diabetes control can help reduce your risk of eye, heart, kidney and nerve damage. So in general, the

lower your A1c value is the better, but it should not be at the expense of having multiple low blood sugars.

How do I treat diabetes?

A lifestyle of keeping weight down and daily exercise, such as walking is required to help maintain your diabetes health. For some people, diabetes medications may be needed. Diabetes tends to be a progressive disease and most people eventually will require medication to treat it. There are many medications now available for the treatment of diabetes. Each type of medication may work in a variety of different ways; therefore more than one type of medication may be prescribed for the treatment of diabetes.

This list is not all inclusive of diabetes medications, nor does it list all of the possible side effects of each.

Oral agents:

Sulfonylurea class- Some examples are glyburide, glipizide, glimepiride. These medications stimulate insulin to be produced from the pancreatic cells. Sulfonylureas tend to be lower cost and are generally taken 1-2 times a day. These medications can cause low blood sugar, so they should be taken at the same time every day, before eating. These drugs are absorbed more rapidly on an empty stomach. If you have kidney or liver problems these medications may be discontinued or started at low doses.

If the tablet has “XL, SR or XR” which means extended release, do not break or cut the tablet.

Insulin Secretagogue class- These medications are known as Prandin (repaglinide) and Starlix (nateglinide). This type of medication stimulates insulin to be produced from the pancreatic cells, but they work faster and don't stay active as long as the other sulfonylurea's mentioned above. This type of medication is taken immediately prior to the meal. If a meal is missed, then the dose should be skipped also. People with liver disease should use with caution.

Biguanides class- This medication is known as metformin. Common name brands of metformin include Glucophage, and Fortamet. Metformin improves glucose tolerance in people with Type 2 diabetes. Metformin decreases the liver's production of glucose and improves the body's sensitivity to insulin. This drug is now available in generic form. A side effect of metformin is, it can decrease appetite, which causes some people to lose a modest amount of weight. This medication is usually taken 1-2 times a day. When first starting on this medication diarrhea and nausea may be experienced. Generally, starting metformin slowly can minimize this. Most people tolerate this medication very well. Metformin should not be used in people with kidney or liver problems. This drug is excreted by the kidneys. If you need a procedure or Xray that requires IV dye, you may be asked to stop metformin for several days after the test and have lab work checked. If female, ovulation may occur, therefore precautions to avoid pregnancy should be considered.

Thiazolidinedione class- These medications are known as Actos (pioglitazone) and Avandia (rosiglitazone). These medications help decrease insulin resistance by improving sensitivity to insulin in the muscle and fat tissue. It also helps modestly decrease the liver's production of glucose. These medications are usually taken 1-2 times a day. You will be asked to have lab work checked periodically to monitor liver function while on this medication. Edema and weight gain can be a potential side effect of these medications. People with liver problems and heart failure may not be candidates for this type of medication. When this medication is combined with other medications for diabetes, you may be at an increased risk for low blood sugar.

Alpha-glucosidase inhibitor class- This medication is known as Precose (acarbose) and Glyset (miglitol). These medications help slow down the breakdown of food with carbohydrates into glucose in the gut. This medication is taken just before a meal, and helps control the after eating elevation in glucose. Side effects, which may include diarrhea and flatulence are relatively common but not unbearable. Medications that require a steady absorption rate should not be taken at the same time such as digoxin, birth control, thyroid, phenytoin to name a few. To treat low blood sugar oral glucose must be used (dextrose) and you should carry it at all times. Glucose tablets are available at all pharmacies for a low cost. Sucrose (cane sugar) will not be effective.

Insulin is available for all people that have poor control of glucose levels. Insulin can be used in both Type 1 and Type 2 diabetes. There are a variety of insulin types available; and each has its own rate and length of action. Until recently, all insulin was taken via injection. Insulin injections are painless and easy to take. Insulin needs to be taken about the same time each day, generally in relationship to food intake. All insulin should be stored in the refrigerator, but the bottle that is being used may be left at room temperature up to 28 days, and then thrown away. Insulin comes in vials and preloaded pen devices. Insulin is safe to use in insulin pumps. Some of the insulin products that are available include: Humalog, Novolog, Apidra, Regular, NPH, Lantus, and Levemir.

At this time, one insulin has been approved by the FDA that does not require injections, Exubera, which is inhaled. After inhalation of Exubera, its peak effects occur in approximately 2 hours. Exubera can be used in people with Type 1 or 2 diabetes. Exubera does not take the place of all insulin and injected insulin may need to also be taken. The absorption of Exubera is affected by smoking and exposure to second hand smoke. A person with lung disease such as asthma or COPD is not recommended to use inhaled insulin.

There are new medications that have recently become available; Byetta and Symlin. Byetta (exenatide) is used for people with Type 2 diabetes. Byetta helps lower the after eating high glucose levels by enhancing the secretion of insulin in response to the food being eaten and assist in decreasing the liver's production of glucose. This medication is given by injection twice a day, before breakfast and evening meals. It must be stored in the refrigerator, but comes in a pen device which helps with dosing and ease of taking. Byetta helps slow gastric emptying so you feel full longer. By over eating, the side effect

most likely will be nausea and bloating. By eating ½ the amount of food normally eaten at a meal, helps minimize this effect. Since eating smaller amounts of food is encouraged with Byetta, most people have a modest weight loss.

Symlin (pramlintide acetate) is used for people using insulin with Type 1 or 2 diabetes. Symlin replaces some of the actions of a hormone called amylin, which is thought to be lacking in people with diabetes who use insulin. Symlin helps to lower blood sugars after the meal is eaten. Symlin must be injected no more than 15 minutes prior to every meal. Like Byetta, Symlin helps with the rate the stomach empties, decreases the amount of sugar the liver produces, and helps decrease appetite. Symlin can produce low blood sugars. Therefore the current insulin dose is reduced initially when Symlin is started. Close monitoring of blood sugars is required when starting this medication. Symlin and insulin should not be mixed together in the same syringe. Symlin can produce nausea and vomiting as a possible side effect. Weight loss is also possible with Symlin. People with gastroparesis or stomach disorders should not take either Byetta or Symlin.

Should I exercise if I have diabetes?

Yes, you should exercise daily! Exercise can help control diabetes. Exercise increases muscle mass which can help with insulin resistance and weight control. The American Diabetes Association recommends 30-45 minutes of moderate aerobic activity, 3-5 days a week, with a goal of at least 150 minutes total in a week. If there are physical limitations, these can be overcome by looking at a variety of activities such as a stationary bike, treadmill, swimming, water aerobics, walking or arm-chair exercises. If you have other health problems, then you may need to discuss plans to participate in, or start a physical exercise program with your health care provider. Remember, exercise generally helps most diseases. Many fitness centers offer exercises for the older adult that provide not only a good safe exercise program but a chance to make friends.

Before exercising check your blood sugar to make sure it is normal, at or above 100. Always carry something to treat low blood sugar with you at all times. Exercise can bring on hypoglycemia or low blood sugar (blood sugar below 70). If you experience low blood sugar on exercise days, your medication may need to be adjusted before participating or a small snack may be needed.

What is hypoglycemia or low blood sugar?

Anyone taking diabetes medication can have hypoglycemia or low blood sugar. Hypoglycemia (Low blood sugar) is a blood sugar that is lower than 70.

Symptoms may include

- sweating
- hunger
- unclear thinking
- lightheadedness
- unsteadiness
- trembling
- weakness
- nervousness

Causes of low blood sugar are usually related to one of three things; food, activity or medication. For example, if you are doing extra house work or yard work, you may be at an increased risk for developing low blood sugar due to increased activity. Skipping breakfast to eat a big lunch with friends would put you at an increased risk for low blood sugar in the morning before lunch. This is an example of food related low blood sugar. Most people will have low blood sugar occasionally if they are on diabetes medications. However, low blood sugar should be easily treated and never be allowed to get to the point of losing consciousness. Low blood sugar generally has symptoms that occur rapidly, however with aging it can be harder to feel low blood sugar. Therefore, it is important to check your blood sugar if you are having symptoms, in order to verify if your sugar is below 70 or not. If you are having these symptoms and your sugar level is above 70, there may be something else causing it and you need to see your health care provider. The only way you know if you are having a low blood sugar is to verify it with a home blood glucose test.

Treatment- If your sugar level is under 70, then you need to eat or drink 15 to 20 grams of carbohydrate. Choose **one** of the following to treat low blood sugar below 70:

- 3-4 Glucose tablets
- 4-6 oz of fruit juice
- 10 Lifesavers (chew and swallow)
- 4-6 oz of regular soda (NOT diet)
- 8 oz of milk

After treating a low blood sugar, wait 15-20 minutes then recheck your blood sugar reading to make sure your blood sugar has returned to normal, generally above 100.

Anyone taking diabetes medications should at *all times carry sugar* on your person such as glucose tablets or hard candy

Using other food items such as bread or candy bars are not recommended to treat low blood sugar, since they take longer to digest and have extra calories not needed.

Older adults are at a higher risk for low blood sugar due to kidney changes, irregular food intake, multiple medications, inadequate fluid intake, and changes in intestinal absorption. You need to ask your health care provider what is the lowest you should keep your glucose readings. You may be asked to keep your blood sugars slightly higher to help avoid the risk of having low blood sugar. If you have low blood sugar during the night, get up and treat it immediately. Do not try to go back to sleep without treating it. Always retest your blood sugar one hour after treating it in the middle of the night. Keep glucose at your bedside at all times that you can reach easily. Glucose tablets and hard candy work well since they don't require refrigeration to keep at the bedside.

I never eat sweets, so why are my blood sugars high and I can't lose weight?

Food issues are probably one of the most frequently asked questions since food is used every day and there are so many choices. Many people need to make better food choices;

be it amount or the type of food eaten to have a healthier lifestyle. While genetics can play a roll in obesity you are still responsible for what and how much you eat. There are no “miracles” to losing weight, other than increase physical activity (burning up energy) and decreasing the amount of calories eaten (energy intake). The human body needs a variety of food sources; meat, fruit, starch, and vegetables to be healthy. Any diet that leaves out an entire food group is probably a bad idea. So please at least consider this thought when attempting to change your dietary intake.

Carbohydrates are the main contributor of glucose to your diet. Carbohydrates are an excellent food source for energy and should not be avoided totally. While limiting sweets and desserts is a good habit, do not forget other sources of carbohydrates such as bread, pasta (noodles/rice), milk, fruit and grains. Most of us eat too many carbohydrates, and this affects the blood sugar directly. That is why you have been asked to limit your portions of pasta, fruit, juice and milk on a daily basis.

While it is vitally important to watch the carbohydrate intake, it is also important not to forget the other nutrients. Protein is needed for muscle and tissue growth, and is a possible energy supply. Some of our protein comes from meat, dairy, beans, nuts, seeds and legumes. Eating protein has minimal effects on blood sugars.

A variety of vegetables is needed to obtain the vitamins and minerals needed. Most vegetables are excellent sources of fiber and are relatively low in calories. The majority of vegetables do not contribute to blood sugars. Vegetables generally can be eaten relatively freely except for a few starchy vegetables. Some starchy vegetables contain carbohydrates such as peas, potatoes and corn to name a few. Starchy vegetables are healthy, but need to be measured and counted as carbohydrates.

Fats are also a needed food nutrient, but in very small amounts. Unfortunately, the typical American diet has too much fat. Too much fat contributes to the development of Type 2 diabetes, heart disease and obesity. Many of our protein sources naturally have fat in them such as meat, nuts, seeds, dairy and eggs, therefore the need to add extra fat to the diet is generally very limited. Fat and protein do not contribute directly to the blood glucose level; they do contribute calories and should be eaten in moderation. Fat has three times as many calories per gram when compared to protein and carbohydrates.

I think the key to any diet/lifestyle change is an awareness of what and how much is actually eaten on any given day. A successful weight loss tool that is affordable for every one is the food record or diary. (The cost is a piece of paper and a pen). A food diary can help you identify all of the carbohydrates that are eaten, and unknowingly raise the glucose level. It can also help you identify areas where too much or the wrong foods are eaten as well. So my challenge to you, is to get out your measuring cups/spoons and **measure everything** that goes into your mouth for at least 4 days! It will require measuring your cereal, milk, corn, mashed potatoes, etc... Don't forget to include snacks, even if it is 1 or 2 pretzels. Write down everything including sugar free items in your diary.

Example:

Breakfast	oatmeal packet *
	¾ cup milk *
	1 cup juice *
	Coffee- cream
snack	3 graham crackers *
	Sugar free cocoa*
Lunch	Tuna salad sandwich*
	Chips- 21 *
	Diet soda
	Apple- medium *

Then please “lookup” the foods to see what has carbohydrates. Don’t forget to look up the calories and portion sizes too! There are many resources that are available to look up carbohydrates and other nutrient values that are free on the internet or at your local library. Note in the example, the * sign beside the foods, indicates that food item had carbohydrates. Read the food labels on the boxes and cans; all have portion sizes, and the amount of carbohydrates, but don’t get so focused on carbohydrates, that calories are forgotten. Calorie intake should not be ignored for most adults. Remember too many calories, regardless of what the food is, will make one too fat!

Learning about food can be complicated, so if you are still having trouble with managing your diabetes, ask your health care provider to recommend a **registered dietitian**. Good luck!

How often do I need an eye exam since I have diabetes?

Every person should have a dilated eye exam soon after being diagnosed with diabetes. After the initial exam, generally a yearly dilated exam is recommended. If eye problems are seen at the exam, then you may be asked to be seen more frequently. Glaucoma, cataracts and retinopathy are more common in people with diabetes, so it is important to have regular eye exams. You can not see or feel these changes, so regular exams are recommended. Diabetic retinopathy involves blood vessel changes in the back of the eye that only your optometrist or ophthalmologist can see. Diabetic retinopathy is thought to be one of the most common causes of blindness, and needs to be taken seriously. There is treatment available to help decrease the damage of retinopathy, but prevention is the best way by having good diabetes control.

How do I know if I have kidney damage (nephropathy) from my diabetes?

Diabetes can cause damage to the kidneys, (nephropathy) that can not be felt. A simple urine test called a microalbuminuria test should be done yearly, which can be done right in your health care provider’s office. A blood test called a serum creatinine can also be done annually to test for the glomerular filtration rate (GFR). The GFR test can be used to help determine how well your kidneys are working.

Unfortunately it is estimated 20-40% of people with diabetes have kidney damage. Having good blood sugar and blood pressure control can help decrease the rate of kidney damage. There are two types of blood pressure medications that have been shown to help

reduce the risk of kidney damage and of heart disease as well. These types of blood pressure medications are called ACE inhibitors or ARB's. If you can not tolerate one, the other one is generally well tolerated. Controlling blood pressure is vitally important to helping maintain kidney function. To reduce the risk of kidney and heart damage, many people may need to take several blood pressure medications at the same time. It is vitally important to take your blood pressure medication daily to protect your kidneys.

My feet hurt, is it from diabetes?

Diabetes can cause a condition called neuropathy. Neuropathy is nerve damage which most commonly is caused from diabetes. Symptoms of neuropathy can range from barely noticeable to severe pain. Generally people will complain about their feet feeling cold, numb or tingling off and on. On rare occasions, the symptoms of neuropathy can progress to feeling like electrical shocks, shooting or burning pain. Neuropathy pain generally starts in the toes and feet and occasionally will go to the hands. Neuropathy can affect all organs. This condition can get worse over time, and there is no good treatment to prevent neuropathy except having good control of your blood sugars. There are medications that can be used to help control neuropathy pain. A person with neuropathy in their feet needs to be very careful to protect the feet. Wear protective shoes, which are proper fitting (do not pinch the toes or bunions). If you notice red areas or callous, most likely it is caused from your shoe rubbing, and the shoe does not fit correctly. In this case my best advice is; throw the shoes away and get new ones! Having diabetic neuropathy puts you at a high risk for development of foot ulcers, which can lead to amputation. A cute or expensive pair of shoes is not worth losing your foot over! Every time you see health care providers, take your shoes and socks off, so your feet can be examined.

If you ever notice a sore or open area on your foot, immediately seek medical help.

What if I have the flu and diabetes?

It is important to maintain hydration during an illness. It is important to drink at least 4-8 ounces of calorie free liquids every hour. Examples of calorie free drinks include diet soft drink, water, and broth. Liquids with sodium and electrolytes should be drunk every 3 hours. Bouillon, canned clear broth, Gatorade, and Pedilyte are some examples of fluids with electrolytes. If you have a fluid restriction due to heart or kidney problems please check with your health care provider on the amount of fluid you should take.

Blood sugars frequently are elevated with illness; therefore monitor your blood sugars every 2-4 hours during illness. It is important to write down your blood sugars during this time, since if you need medical assistance, you may be asked about your blood sugar readings. If you are vomiting and not tolerating fluids with high blood sugars you may be asked to complete a urine test for ketones at home.

Insulin and/ or most diabetes pills are still needed even if you are ill. If you take insulin, skipping insulin totally may cause a condition called ketosis. In general, insulin will be required during your illness. On occasion if an illness persists, insulin may be needed by

people that normally take oral medication for diabetes. If taking metformin and are seriously ill, metformin may be stopped temporarily.

If vomiting can not be controlled, you may need to go to the emergency room.

Due to nausea, soft foods are frequently tolerated better during an illness. Attempting to take 45-50 grams of carbohydrate every 2-3 hours is a general guideline.

Examples of 15 grams of carbohydrate:

½ cup clear juice such as apple
½ cup regular soda
1 slice toast
6 saltine crackers
1 cup Sports drink (Gatorade)
½ cup regular gelatin
½ cup Cream of Wheat
3 squares Graham crackers
1 full Popsicle Bar

When do I call my health care provider or go to the emergency room?

- Vomiting lasting longer than 6 hours, or vomiting more than 3-4 times in a row without keeping anything down in-between.
- Moderate to large ketones.
- Blood sugar level over 300 on 2 consecutive measurements, 1 hour or more apart.
- After you have received glucagon injection.

If you are ill do not hesitate to call your health care provider for instruction.

I have been told to go to diabetes education, do I have to go?

Yes, diabetes is a condition that will be with you for the rest of your life, take the time to learn about it. You need to learn to manage your life style with a chronic disease called diabetes. Look for a Certified Diabetes Educator (CDE) to be assured of quality diabetes education. CDE's offer classes to individual's and groups for the purpose of learning to take care of yourself and managing your disease. Your family is welcome and encouraged to attend education sessions with you. While your spouse or significant other may do the cooking, you are responsible for what and how much you eat, so you need to see the dietitian too. Medicare and many insurance companies now help pay for diabetes education, since it is so important. Remember, you are in control of your diet, activity and medication, so it is up to you to learn how to manage diabetes.

Just for thought.

Diabetes is a relentless disease that never gives a break or holiday. Unfortunately, it must be managed 24 hours a day, but fortunately we have many wonderful treatments and ways to help us manage it and make our lives easier. If you have a healthy lifestyle that

uses diet and exercise as the backbone to diabetes management, and take your medications, I am confident you will do great!

References:

American Diabetes Association Clinical Practice Recommendations 2006

www.diabetes.org/diabetescare

A Core Curriculum for Diabetes Education