TOO SWEET

BY PAM KAUFMAN

It's a typical, busy afternoon in the 9-1-1 center, and the EMD call-taker, Debbie, answers a 9-1-1 call from a 43-year-old woman complaining that she feels weak and dizzy. The caller says that she has a headache and her eyes are giving her problems. She feels like she's going to pass out. As Debbie questions the caller, she learns that the caller went to the gym early in the morning and has been breathing fast and sweating profusely since. The caller sounds confused. Debbie recognizes the symptoms as a possible diabetic emergency called hypoglycemia (sometimes referred to as *insulin shock*) and quickly dispatches EMS.

INTRODUCTION

According to the American Diabetes Association (www.diabetes.org) 20.8 million children and adults in the United States have diabetes mellitus. *That's more than 7% of the population.* An estimated 14.6 million people have been diagnosed with the illness. However, another 6.2 million have the disease but are unaware that they do. It has been estimated that 54 million people are in the pre-diabetes stage and will later develop diabetes, if they live.

Emergency medical dispatchers (EMDs) frequently receive calls from people whose chief complaint is related to diabetes. Therefore, the EMD must be familiar with the definition and types of diabetes, associated emergencies, emergency care and pre-arrival instructions, complications and myths.

WHAT IS DIABETES?

Diabetes mellitus (commonly referred to as *diabetes*) is a disease in which the body does not produce adequate insulin or cannot properly use insulin. Insulin is a hormone secreted by the pancreas that is needed to transport sugar (glucose) from the bloodstream into the body's cells where it can be used as energy.

In many cases, the root cause of diabetes is unknown. However, genetics and other factors, such as obesity and lack of exercise, appear to play a role. Other causes include surgery, medication side effects, alcoholism, infections and other illnesses.

TYPES OF DIABETES

There are two general categories of diabetes: Type I diabetes, also called insulin-dependent or juvenile-onset diabetes, and Type II diabetes, also called non-insulin-dependent or adult-onset diabetes.

Type 1 diabetes is usually diagnosed in children and young adults. It results from the body's failure to produce adequate amounts of insulin. An estimated 5–10% of Americans diagnosed with diabetes have the Type 1 variety. Patients with Type 1 diabetes must take insulin injections to maintain normal levels of blood glucose.

Type 2 diabetes is the most common form of diabetes. In Type 2 diabetes, either the body does not produce enough insulin or the cells lose their ability to respond to insulin. Patients with Type 2 diabetes must take oral medications or a combination of insulin injections and oral medications to maintain normal levels of blood glucose.

Insulin is necessary for the cells of the body to be able to use glucose. Glucose is the basic fuel source for the cells in the body, and insulin facilitates the entry of glucose from the blood into the cells. When glucose accumulates in the blood instead of entering the cells, it can cause two problems: Soon, the cells will become depleted of glucose and unable to produce adequate amounts of energy. Over time, elevated blood glucose

levels can damage the eyes, kidneys, nerves and heart.

Pre-diabetes: People who later develop diabetes are said to be predisposed for the disease. The interval before diagnosis is called the "pre-diabetes" state and is more common in people who develop Type 2 diabetes. These individuals have blood glucose levels higher than normal but not yet high enough to be diagnosed as diabetes based on current strict medical guidelines. Recent research has shown that some long-term damage to the body, especially to the heart and circulatory system, may occur during the pre-diabetes state.

Gestational diabetes is found in pregnant women who have never had diabetes before but have high blood sugar levels during pregnancy. Gestational diabetes is often considered a pre-diabetes state because women who suffer gestational diabetes are at very high risk for developing diabetes mellitus later in their lives. Gestational diabetes begins when the mother's body is unable to produce and use all the insulin required to support the pregnancy. Without adequate insulin, glucose cannot enter the cells and be converted to energy. Glucose then accumulates in the blood, sometimes leading to high levels. Gestational diabetes affects approximately 4% of all pregnant women (roughly 135,000 cases each year in the U.S.).

DIABETIC EMERGENCIES

The EMD should be familiar with two basic types of diabetic emergencies: hyperglycemia and hypoglycemia.

Hyperglycemia (*hyper* meaning high and *glycemia* meaning glucose in the blood) is an elevated blood glucose level and can, in its most severe form, lead to diabetic ketoacidosis (DKA). Some older textbooks refer to DKA as *diabetic coma*. This condition occurs when there is too much glucose coupled with too little insulin in the blood. The result is that the body cells don't get enough nourishment and high levels of acid begin to build up.

Factors that cause hyperglycemia in patients with diabetes include illness and infection, eating too much sugar, not taking prescribed medications or taking certain types of medications (e.g., steroids), inadequate insulin dosage and stress.

When diabetics fail to take their insulin, a gradual rise in blood glucose levels occurs. This is usually a gradual process (i.e., slow onset) and ultimately results in DKA. Ketones and metabolic acids are a toxic by-product of the inefficient metabolism that occurs when the body cannot use the available blood sugar. The body tries to eliminate these toxins through the respiratory and urinary systems. Often, the patient may be described as breathing very deeply. Ketones can sometimes be detected on the patient's breath as a fruity or sweet smell. The patient may also be quite ill with flu-like symptoms. If this goes untreated (usually over a period of days), the patient may progress into DKA. Patients often seek medical attention prior to this occurring.

Patients suffering from hyperglycemia may present with change in level of consciousness, drowsiness, confusion, deep and fast breathing, thirst, increased urination, dehydration, fever, sweet- or fruity-smelling breath and blurred vision.

Hypoglycemia (*hypo* meaning low and *glycemia* meaning

WHAT'S NORMAL?

A normal random blood sugar result is lower than 100 mg/dL. If your random blood sugar level is higher than 100 mg/dL but lower than 199 mg/dL, you may have prediabetes. *Source:* www.mayoclinic.com

glucose in the blood) is a low blood glucose level and may lead to what is commonly called *insulin shock* or *insulin reaction*. This condition occurs when there is too much insulin in the body. The level of glucose in the blood is rapidly reduced, often causing brain cells to suffer. Severe hypoglycemia is considered a true medical emergency. Some older textbooks refer to this condition as *insulin shock*.

Factors leading to hypoglycemia include insulin excess (by taking too much medication), inadequate food intake following a normal insulin dose, heavy exercise, alcohol ingestion, onset of menstruation and the immediate period after birth.

Patients suffering from hypoglycemia may present with weakness; irritability; hunger; confusion; anxiety; bizarre, even violent, behavior; fast pulse; normal or rapid breathing; cool, pale skin; diaphoresis (excessive sweating); and seizure, in severe cases. As a general rule, the onset of the signs and symptoms of hypoglycemia is much more rapid than the onset of hyperglycemia, sometimes occurring in a matter of minutes.

It's not uncommon for onlookers to mistake diabetic patients as being intoxicated. Due to the sugar imbalance, the patient may look and act drunk.

THE DIABETIC PATIENT CALL TO THE EMD

"9-1-1, what is the address of your emergency?"

"123 Circle Drive."

"What is the telephone number from which you are calling?"

"555-1234."

"What is the problem?"

"My wife is a diabetic. I just came home from work and found her sitting on the couch in the living room. I think she's having a diabetic reaction."

"Is she conscious?"

"Yes, but she's not making sense when she talks."

As the EMD handling this medical emergency, you then ask the patient's age and turn your guidecards to the diabetic chief complaint card. Because of the high reliability of a family's reporting of an insulin reaction or diabetic problem, this guidecard should be referred to if the caller indicates it is a diabetic emergency.

You begin asking the Vital Points Questions, including:

- Can the patient answer your questions?
- Does the patient know who you are and where she is?
- Can the patient respond to you and follow simple commands?
- Is the patient on insulin? If so, when did she last take her medication?
- When did she last eat?
- Is the patient sweating profusely?

By asking these questions and obtaining the initial information from the patient's husband, you are able to establish the criteria for immediate dispatch and either dispatch EMS or send the call to the dispatcher to be dispatched. You advise the caller that EMS is being dispatched, and you proceed to ask a few more questions to obtain a clearer status:

- Is the patient able to speak in complete sentences?
- Have you or the patient taken a blood sugar reading?
- Has the patient had a seizure?

You acquire answers to these questions, and it's now time to proceed to your Pre-Arrival Instructions.

EMERGENCY CARE

Distinguishing between the two types of diabetic emergencies can be a difficult, if not impossible, task for the EMD. Your Vital Points Questions include: When did the patient last eat? Is the patient on insulin? If so, when did the patient last take their medication? The answers to these questions should help you make this determination. Someone who has eaten but has not taken their prescribed diabetes medication may be hyperglycemic due to too much glucose and not enough insulin. Someone who has not eaten but has taken his or her medication may be hypoglycemic due to too much insulin and not enough glucose.

Again, hypoglycemia that results in an altered mental status is considered a true emergency. The body requires two ingredients to live—oxygen and glucose. Glucose given to a person in insulin shock can be lifesaving.

Low blood glucose (hypoglycemia) is easier to treat than hyperglycemia, and treatment generally rewards the first aid provider with dramatic results. The patient must receive some type of quick-acting glucose, such as oral glucose, candy, fruit juice or a regular soft drink. *Giving the patient a diet soft drink will not help*, because there is no real glucose in the drink. If nothing else is available, have someone mix a couple of tablespoons of glucose (or table sugar) into a glass of water and give it to the patient to drink.

Caution should be exercised when giving glucose to the patient suffering from hypoglycemia. If the patient cannot consume the glucose on his or her own accord, there is a possibility that the patient may choke. If the patient is unresponsive or cannot swallow, giving the patient something to consume would not be indicated.

Emergency medical care for a patient suffering from hyperglycemia should be given in a hospital. Insulin needs to be given to the patient.

The rule of thumb when it's not possible to determine whether the patient is suffering from hypoglycemia or hyperglycemia is: When in doubt, give glucose.

EMD PRE-ARRIVAL INSTRUCTIONS

The primary factor with which the EMD should be concerned is maintaining the patient's airway if the level of consciousness is decreased. The pre-arrival instructions of a diabetic patient for the EMD parallel the emergency care of a diabetic patient. Those pre-arrival instructions include:

- Nothing by mouth if the patient cannot take it by him/herself;
- Give juice with table sugar added (two or three tablespoons) if the patient can take it by him/herself, and if the patient has not had a blood glucose reading of more than 120 in the past 15 minutes;
- Allow the patient to assume a position of comfort; and
- Gather the patient's medications, if any.

Upon completion of your pre-arrival instructions and if you opt to terminate the call, your final pre-arrival instruction would be: Call back if the patient gets worse.

If you opt to stay on the phone with the caller until EMS arrives, repeating some of the Vital Points Questions will help determine whether the sugar is helping the patient.

PREVENTION

Patients can take steps to help prevent diabetic emergencies. To prevent hypoglycemia, they can:

1. Consume frequent small meals;
2. Be cautious when taking substances that promote a low blood glucose or decrease the warning signs of it. Such substances include blood pressure medications known as beta-blockers, sleeping pills, sedatives and alcohol;
3. Keep glucose tablets or fast-acting carbohydrates readily available;
4. Frequently test blood glucose levels with a home glucometer; and
5. Train family, friends and co-workers to recognize the signs and symptoms of an impending hypoglycemic episode. Mental confusion and irritability are the most easily recognized clues.

To prevent hyperglycemia, patients with diabetes can:

1. Take their medications and the proper dosage;
2. Frequently test blood glucose levels with a home glucometer; and
3. Follow the diabetic chart diet advised by their doctor.

COMPLICATIONS

Many people with diabetes have other health problems, such as high blood pressure and high cholesterol, which further increase their risk for heart disease and stroke. When combined with diabetes, these risk factors add up to big trouble. And, according to the American Diabetes Association more than 65% of people with diabetes die from heart disease or stroke. With diabetes, heart attacks can occur earlier in life and more often result in death. People with diabetes can reduce their risk of heart attack and stroke by managing their diabetes, high blood pressure and cholesterol.

Diabetes is the leading cause of new blindness among adults age 20–74 years. It is also the leading cause of kidney failure. Other complications stemming from diabetes include nervous system disease, amputations and dental disease.

DIABETIC MYTHS

Myth #1: You can catch diabetes from someone else. Although it is not known exactly how some people develop diabetes, it is not contagious. There seems to be some genetic link in diabetes, particularly with Type 2, and lifestyle factors also play a part.

Myth #2: People with diabetes cannot eat sweets or chocolate. If eaten as part of a healthy meal plan, or combined with exercise, sweets and desserts can by eaten by people with diabetes. They are no more off limits to people with diabetes than they are to people without diabetes.

Myth #3: Eating too much sugar causes diabetes. Diabetes is caused by a combination of genetic and lifestyle factors. However, being overweight does increase your risk for developing Type 2 diabetes. If you have a history of diabetes in your family, eating healthy meals and getting regular exercise are suggested.

Myth #4: People with diabetes should eat special diabetic foods. A healthy meal plan for people with diabetes is the same as that for everyone—low in fat (especially in saturated and trans fat) and moderate in salt and sugar, with meals based on whole grains, vegetables and fruit. Diabetic and "dietetic" versions of sugar-containing foods offer no special benefit. They still raise blood sugar levels, are usually more expensive and can also have a laxative effect if they contain sugar alcohols.

Myth #5: If you have diabetes, you should eat only small amounts of starchy foods, such as bread, potatoes and pasta. Starchy foods are part of a healthy meal plan. Whole grain starchy foods are also a good source of fiber. Portion size is what counts. Whole grain breads, cereals, pasta, rice and starchy vegetables, such as potatoes, yams, peas and corn, can be included in meals and snacks. Again, portion size is the key. For most people with diabetes, eating three to four servings of carbohydrate-containing foods is about right.

Myth #6: People with diabetes are more likely to get colds. Diabetics are no more likely to get a cold or another illness. However, people with diabetes are advised to get flu shots because infection interferes with blood glucose management.

Myth #7: Insulin causes atherosclerosis (hardening of the arteries) and high blood pressure. Insulin does *not* cause atherosclerosis. Some lab studies provide evidence that insulin can initiate some of the early processes associated with atherosclerosis, and because of this, some physicians were fearful that insulin might aggravate the development of high blood pressure and hardening of the arteries. But it doesn't (see www.diabetes.org).

Myth #8: Insulin causes weight gain, and, because obesity is bad for you, insulin should not be taken. Studies have shown that the benefit of glucose management far exceeds the risk of weight gain (see www.diabetes.org).

Myth #9: Fruit is a healthy food; therefore, it's OK for a diabetic to eat as much of it as you wish. Fruit is a healthy food. It contains fiber and lots of vitamins and minerals. Because fruit contains carbohydrates, it needs to be included in your meal plan. Diabetics should consult with their dietician about the amount, frequency and types of fruits they should eat.

SUMMARY

Due to the prevalence of diabetes in the United States, receiving a medical emergency call in reference to a patient with diabetes is a frequent occurrence for the emergency medical dispatcher. Understanding diabetes and knowing how to assist that patient will elicit a better outcome for the patient and the EMD. ||PSC||

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RESOURCES

- APCO EMD Services Emergency Medical Dispatch Guidecards: www.apcointl.org/institute/emd_program.htm
- APCO Emergency Medical Dispatcher Course: www.apcointl.org/institute/courses/emd.htm
- American Diabetes Association: www.diabetes.org
- U.S. Department of Transportation/National Highway Traffic Safety Administration First Responder, EMT-Basic and EMT-I: National Standard Curricula: www.nhtsa.dot.gov/people/injury/ems/pub/frnsc.pdf www.nhtsa.dot.gov/people/injury/ems/pub/emtbnsc.pdf www.nhtsa.dot.gov/people/injury/ems/EMT-P/index.html
- O'Keefe MF, Limmer D: *Emergency Care*, 10th edition. Upper Saddle River, N.J.: Brady-Pearson-Prentice Hall, 2005.

CDE #22394 EXAM: TOO SWEET

1. **_____ is a disease in which the body does not produce or does not properly use insulin.**
   a. Flu
   b. Diabetes
   c. Pancreas
   d. Stroke

2 **Type 1 diabetes is usually diagnosed in children and young adults.**
   a. True
   b. False

3. **Type 2 diabetes is the most common form of diabetes.**
   a. True
   b. False

4. **Pre-diabetes is almost never present in people who develop type 2 diabetes.**
   a. True
   b. False

5. **_____ is high blood sugar and leads to diabetic coma.**
   a. Hyperglycemia
   b. Hypoglycemia
   c. Hypotension
   d. Hypertension

6. **_____ is low blood sugar and leads to insulin shock or insulin reaction.**
   a. Hypotension
   b. Hypertension
   c. Hyperglycemia
   d. Hypoglycemia

7. **Insulin shock is not considered a true emergency.**
   a. True
   b. False

8. **Patients with diabetes are often mistaken for being intoxicated.**
   a. True
   b. False

9. **The rule of thumb for emergency care of the diabetic patient is: When in doubt—give sugar!**
   a. True
   b. False

10. **Most people with diabetes have no other health problems.**
    a. True
    b. False

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