

Diabetes mellitus in the emergency services



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Diabetes mellitus is one of the most common medical issues affecting people today. There are two types of diabetes. The first is type one, it is often referred to as juvenile diabetes or insulin dependent diabetes. Patients with this type of diabetes are often diagnosed with the disorder early in life but in rare occasions it can be diagnosed as late as forty years of age. People with type one diabetes make up between ten and twenty percent of all diabetics. Men are also more common to be diagnosed with type one diabetes. While it is not fully known why people develop diabetes it is known that it is a genetic disorder and can be passed down from generation to generation. People with siblings with this disorder increase their chance of developing type one diabetes by six percent. The reason it is often called insulin dependent diabetes is because the body does not form any insulin from the beta cells of the pancreas, so therefore the patient needs to take daily insulin shots to keep their blood sugar low. Type two diabetes is often referred to as adult onset diabetes or non-insulin dependent diabetes and make up the remaining eighty to ninety percent of diabetics. Patients with this form of the disorder often do have some type of insulin production by the beta cells in the pancreas but just do not produce enough to maintain in their body. Also in some cases the patient develops a type of insulin resistance where their body does not use the insulin that is naturally produced by their body correctly or efficiently. In most cases this type of diabetes can be controlled by a strict diet or use of oral medications. The diet of a patient with type two diabetes often includes fruits, vegetables, whole grains and low-fat dairy products. Patients with type two diabetes should avoid high amounts of sugars, trans-fats and sodium. When a patient eats large amounts of calories and fat, their body then causes a spike in their blood glucose level. Type two

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diabetes can sometimes also be reversed with exercise to lose excess weight. People with family members with type two diabetes have a ten to fifteen percent increased risk of developing this disorder.

Two types of issues arise with diabetes. Sometimes the patient's blood glucose level is too high and sometimes it is too low. When it is too low it is called hypoglycemia. A patient is usually determined to be suffering from hypoglycemia when their blood glucose level is below 60mg/dL. When the body is in a state of hypoglycemia the body automatically slows insulin production and increases glucagon production by alpha cells. Often times hypoglycemia in both type one and type two diabetics is due to over medication of injected insulin. It can also be caused by exercise, malnutrition and alcohol consumption. Over time the pancreases' ability to produce glucagon is sometimes decreased making it harder to raise blood glucose levels during hypoglycemia. When a patient has a high blood glucose level it is called hyperglycemia. A patient is usually considered hyperglycemic if their blood glucose level is above 300 mg/dL. Hyperglycemia occurs because the body is unable to produce insulin to promote uptake of glucose from the cells. There are two sub-types of hyperglycemia. The first is diabetic ketoacidosis or DKA. This type of hyperglycemia is most often found in patients with type one diabetes because DKA occurs when there is little or no insulin in the body causing the blood glucose level to soar. It can be caused by untreated type one diabetes or excess glycogen production due to stress. Patients in DKA often present with a blood glucose level above 350mg/dL. Due to the lack of insulin the body then uses fats as metabolic fuels and ketoacidosis is developed. The other type of hyperglycemia is called

hyperosmolar hyperglycemic nonketotic coma. This occurs most often in patients with type two diabetes. Because patients with type two diabetes still produce some insulin, unlike in DKA the body is still able to move sugar into the cells and not have to use the fatty tissue from the body. Patients experiencing hyperosmolar hyperglycemic nonketotic coma usually have blood glucose levels of 600 and above.

Diabetes has a large impact on pre hospital emergency medicine because often when people are having hypoglycemic or hyperglycemic emergencies paramedics are the first to treat these patients. Sometimes when paramedics are dispatched to these calls the caller may not know what is exactly wrong with the patient. Patients in a hyperglycemic or hypoglycemic crisis may present in a variety of ways. The key with these kinds of patients is to keep a high index of suspicion.

Like previously stated patients having diabetic issues may present in a variety of ways. Patients suffering from hypoglycemia will often present with hunger, nausea and weakness. Due to poor cardiac output of the body the patient will often present with a rapid and weak pulse. The patient will also present with seizures or small twitches. Lastly the most common symptom is altered mental status. The patient can present in total unconsciousness, drowsiness, confusion or even aggravated and violent. Change in mental status usually comes with a quick onset because once the body is insulin deprived the brain is the first body structure to suffer because the brain uses glucose as an energy source. When the patient present with the altered mental status it can mimic many other conditions. The patient can look as if he or she is intoxicated because of their lack of coordination and aggravated

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attitude. They are sometimes so combative that it may be difficult to effectively assess them. Hypoglycemia can also mimic a stroke. Due to its effect on the nervous system the patient may present with weakness on one side for no apparent reason.

Lastly the patient may present like a person experiencing epileptic seizures. The seizures are also a result of the brain's lack of glucose. These seizures can be all types; they can be full body grand mal seizures or partial seizures that only affect certain parts of the body. It is very important that paramedics identify that these symptoms are underlying symptoms of hypoglycemia and treat the true problem correctly. Patients who are experiencing hyperglycemia have some similar symptoms to hypoglycemia but also distinguishing symptoms that are different. One of the distinguishing groups of symptoms is the "polys." These symptoms include polyuria, polydipsia and polyphagia. Polyuria is defined as excess urination, polydipsia is extreme thirst and lastly polyphagia is the feeling of extreme hunger. Like patients experiencing hypoglycemia these patients will present with tachycardia and altered LOC. One symptom that is specific to DKA is Kussmaul respirations with fruity smell to their breath. This type of breathing is when the patient had rapid and deep respirations. The reason for this is because the body is breaking down fats due to the lack of insulin the body enters into a state of metabolic acidosis. The deep respirations is the body's way to "blow off" carbon dioxide to make the body more alkalotic and return the body's pH level to normal. The patient will also present with a fruity smell on their breath when experiencing DKA. This is due to the ketones

being broken down in the body. HHNC's only distinguishing factor is the lack of kussmaul respirations and the fruity breath odor.

Many social and ethical issues can and do arise when treating patients with this condition. One social issue is that this problem occurs quite often with homeless and improvised persons. This is because they are often not able to get the proper medications and also not eat proper meals to keep their blood sugar at a normal level. Also these types of patients are sometimes known to drink alcohol and skip out on meals. The combination of malnutrition and alcohol consumption will cause diabetes to worsen significantly. One social and ethical issue is seeing through the symptoms that sometimes indicate other medical problems and determining that the patient is suffering from a diabetic emergency. Patients sometimes present identically to how a person who is severely intoxicated would. These patients can often be rude and violent. It could be very easy to mistake a hypoglycemic patient with an intoxicated individual and have the police transport them to the jail without ever obtaining a BGL check to determine the true problem. This mistake could cause the patient further internal injury and even death. The key with these types of patients is to keep a high index of suspicion. Lastly a common ethical issue is when to let these types of patients refuse care. Often times EMS will arrive and treat the patient's symptoms and bring them back to their normal state of consciousness. For many patients it is not the first time the rescue squad has had to respond to their home to reverse their hypoglycemia and do not see a need to go to the hospital. The paramedic should try to convince the patient that they should go to the hospital and explain to them the risks of refusing care, but if they still refuse and are alert

and oriented the paramedic needs to respect their decision to refuse care and document the event accordingly.

One positive thing about encountering a patient with hypoglycemia prehospital is that this issue is usually easily reversed. When treating hypoglycemia you want to first assess the patient's Airway, breathing and circulation. Patients in hypoglycemia may have decreased respirations so assisting ventilation with a BMV may be necessary. If the patient is breathing at a normal rate they should have oxygen administered to them via a nasal canula or non-rebreather to combat hypoxia. Once ABCs are taken care a blood glucose reading needs to be obtained from the patient's finger to confirm that the patient is indeed experiencing hypoglycemia. If the patient's BGL is below 60mg/dL first consider 15-30g of oral glucose to be administered only if the patient is conscious and is able to swallow. If IV access can be obtained then 25g of D50 should be administered via IV or IO. If IV access cannot be obtained 1mg of glucagon should be administered IM. The patient should also be hooked up to cardiac monitor to rule out cardiac dysrhythmias. In the case of a patient experiencing hyperglycemia first assess the patient's Airway, breathing and circulation. Patients in hyperglycemia may have decreased respirations so assisting ventilation with a BMV may be necessary. If the patient is breathing at a normal rate they should have oxygen administered to them via a nasal canula or non-rebreather to combat hypoxia. Once ABCs are taken care a blood glucose reading needs to be obtained from the patient's finger to confirm that the patient is indeed experiencing hyperglycemia. If the patient is found to be experiencing hyperglycemia with a BGL of 300mg/dL attempt to obtain IV access and

admitter a 250ml/hr fluid bolus with normal saline. This will help combat dehydration associated with hyperglycemia and help “thin out” the glucose enriched blood.

In conclusion diabetes is a true medical emergency. It should be taken very seriously but can often be treated effectively in a pre-hospital setting.

Paramedics need to keep a high index of suspicion to make sure they do not misdiagnose patients that are actually having diabetic emergencies.