

Appendix 1 – Glucagon Training Curriculum

Glucagon Administration Protocol

1. Overview of Diabetes
2. Recognition of signs/symptoms related to hypoglycemia and common causative factors
3. Administration of glucagon injection for severe hypoglycemia
4. Necessary follow-up treatment

This protocol addresses the training of lay persons to administer glucagon injections to students experiencing severe hypoglycemia (low blood sugar). The training session must allow enough time for the trainee (trained unlicensed medication student/trained volunteer diabetes personnel) to read through the protocol, observe the procedure for administering glucagon, provide a return demonstration, ask questions, and complete the evaluation tool. The trainee's past experience with giving injections and/or their current comfort level should be assessed to determine how to best demonstrate the procedure and provide a viable practice opportunity.

TWO KEY OUTCOMES:

- **The trainee will be trained to recognize signs and symptoms of severe hypoglycemia**
- **The trainee will successfully administer an injection of glucagon in an emergency situation.**

Overview of Diabetes

Diabetes is a lifelong disease that affects over 16 million people in the United States. Diabetes affects the way body uses food. Normally, food is digested in the stomach and intestines, changed into glucose, and then absorbed into the bloodstream. At the same time, the pancreas produces insulin, allowing glucose to enter cells which is used for energy. In students with diabetes, this system is flawed, resulting in a build-up of glucose in the blood, and a lack of glucose entering cells.

There are two main types of diabetes:

Type 1 Diabetes – most often found in students and young adults. It is caused when the pancreas does not make enough insulin. With too little or no insulin, glucose cannot enter the cells of the body to be used for energy. Type 1 Diabetes is usually treated with insulin injections.

Type 2 Diabetes – most commonly found in adults, but has been seen increasing in students. It is caused when a student's cells do not respond to insulin. Type 2 Diabetes may be treated with diet, oral medication and/or insulin injections.

Both types of diabetes result in high levels of sugar in the blood. The body attempts to compensate by increasing the amount of water through kidneys to try to "flush" the excess levels of sugar from the body. This process will result in symptoms of diabetes: increase thirst; frequent urination; increased hunger (because the body isn't getting enough energy); weight loss (because the body can't get sugar into the cells and begins to burn fat and protein for energy); irritability; flushed, dry skin; nausea and vomiting; and weakness and fatigue. Over the long term, high blood sugar levels may cause serious complications such as blindness, renal disease, and cardiovascular disease. Therefore, it is important to control blood sugar levels.

GLUCAGON TRAINING: PREVENTION IS THE GOAL

The first thing you need to know is that the best way to give glucagon is to not have to give it! Preventing such a low blood sugar that glucagon is required is actually the goal. **Glucagon is only given when the student with diabetes is unconscious.** If the student is awake and talking but has a low blood sugar (you should always check blood sugar before even thinking about glucagon), a soda with sugar in it, sugar tablets, or sugar gel are all acceptable methods of rapidly bringing up a blood sugar.

Some of the things you can do before thinking about glucagon but with a student that has a low blood sugar:

- Give a glass of orange juice. Try a sip first to be sure the student can swallow without vomiting.
- Give a soda with sugar in it such as a coke or pepsi or some other brand that is readily available.
- Use sugar gel and rub it on the student's gums or inside of cheeks. The sugar gel is rapidly absorbed through the mucous membranes in the mouth.
- Give the student sugar tablets if that is what the parents sent. Sugar tablets are grainy and dry so have something available for the student to drink.

Once the student is more responsive, check another blood sugar. You will need to give the student a snack of carbohydrates and protein to be sure the blood sugar does not drop again. (Graham crackers, turkey slice, etc.)

Things that make a blood sugar low:

- Not eating the required carbohydrates.
- Exercise can reduce a blood sugar so athletes should eat a snack before engaging in athletic events.
- Taking too much insulin compared to the amount of carbohydrates eaten. You should ask the student about whether he or she used the same amount of insulin when not eating enough carbohydrates at lunch (or not eating at all).
- Not eating breakfast or other meals but continuing insulin.

Are there symptoms? Yes, but every student or adolescent reacts differently to a low blood sugar. If you have a student participating in an after school athletic event or a summer camp, you should ask the student what symptoms show when the student's blood sugar is low.