

**TRAINING PROTOCOL**

**EMERGENCY GLUCAGON PROVIDERS**

**(ORS 433.800 - 830; OAR 333-55-000 through 035)**

**DHS-HEALTH SERVICES**

**For Information and Copies  
Contact:**

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Revised: July 2003

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## **Introduction**

The 1997 Oregon Legislature amended ORS 400.800 - 830 (the statute allowing lay persons to administer epinephrine injections to persons experiencing severe allergic reactions) to authorize laypersons to be trained to administer glucagon injections. Glucagon injections are a potentially life-saving treatment for persons suffering from severe hypoglycemia (low blood sugar). This legislation allows for the training of persons over the age of 21 to administer glucagon to any person with hypoglycemia that has been diagnosed by a licensed health care provider. However, the most common applications will likely be to support school-aged children with diabetes.

The DHS-Health Services adopted Administrative Rules (333-55-000 through 035) to support training emergency glucagon providers. The Health Services is responsible for developing training protocols for the initial training of these emergency providers and their periodic retraining. ***This is the training protocol for glucagon.*** For a copy of the epinephrine training protocol, covered under the same statute and rules, please call (503) 731-4008. (Copies of the statute and rules can be found in the Appendix.)

## **Training Pre-Requisites**

To proceed with using this training protocol, the following requirements must be met:

1. The person providing the training must be either a physician licensed to practice in Oregon under ORS Chapter 677, a nurse practitioner licensed to practice in Oregon under ORS chapter 678, or a nurse licensed to practice in Oregon under ORS Chapter 678 who has been delegated the training task by a supervising professional; and
2. The training be provided on behalf of persons with a known diagnosis of hypoglycemia (usually a person with diabetes); and
3. The person(s) to be trained must be at least 21 years of age and can reasonably expect to have responsibility for or contact with the person with hypoglycemia described above. People likely to fall under this definition include public or private school employees, camp counselors or camp employees, youth organization staff or volunteers.

## **School Health Management Plans**

For children in school, we recommend that parents or guardians of children with diabetes notify school personnel of their child's medical needs and initiate a school health management plan. The plan can document agreements among the parents/guardian, school personnel, and medical provider about providing a safe and supportive learning environment for the child with diabetes.

It may include the following elements:

- specific actions for school personnel to perform;
- a plan for communicating with parents and the child's medical providers;
- school policies and procedures for administering medications, including parental authorization;
- procedures for handling bodily fluids as encountered with blood sugar monitoring; and
- an action plan for each child who has diabetes, which includes information about meal and snack times, blood sugar testing, medications, procedures to follow during field trips or outings, and how to handle emergency situations.

We recommend that the child's medical provider write standing orders to support the child's health management plan. (See the Appendix for an example of standing orders developed by the Multnomah County Education Service District.)

### **Using the Glucagon Training Protocol**

This training protocol may be used either for first-time certification or re-certification purposes. The following topics are covered in the protocol:

- An overview of diabetes (usually the underlying medical condition for persons who experience hypoglycemia);
- Recognition of the symptoms of hypoglycemia and common factors that lead to hypoglycemia
- Proper administration of a subcutaneous injection of glucagon for severe hypoglycemia when other treatment has failed or cannot be initiated; and
- Necessary follow-up treatment.

The training session should allow enough time for the trainee to read through the protocol, observe the procedure for administering glucagon, provide a return demonstration, ask questions, and complete the open-book evaluation tool. The trainee's past experience with giving injections and/or their current comfort level should be assessed to determine how best to demonstrate the procedure and provide a practice opportunity. If the person is presenting for re-certification, the trainer will need to determine the trainee's existing knowledge base and the degree to which certain topics within the protocol should be emphasized.

**The key training outcome is a person who will be able to recognize signs and symptoms of severe hypoglycemia and administer a subcutaneous injection of glucagon in an emergency situation.**

Emergency glucagon providers should be strongly encouraged to obtain and maintain current training in an approved First Aid and CPR course such as Medic First Aid or the American Red Cross Program.

## **Certification/Re-certification**

A Glucagon Administration Certificate can be found in the Appendix. The trainer must use their professional judgment to determine if the trainee has satisfactorily completed the training protocol. The trainer must then sign and date the certificate. (We suggest keeping a copy for the file.) The certificate is **provider-specific**, which means that the trainee may be an emergency glucagon provider for more than one individual. The certificate expires three years after the date of issuance, although annual retraining is recommended. The emergency glucagon provider is responsible to present for retraining by a licensed health professional when the certificate expires.

## **An Overview of Diabetes**

Diabetes is a lifelong disease that affects over 16 million people in the United States. Diabetes affects the way the body uses food. Normally, food is digested in the stomach and intestines, and changed into glucose, which is absorbed into the bloodstream. In persons without diabetes, the pancreas produces insulin, which allows glucose to go into cells and be used for energy. However, in persons with diabetes, this system doesn't work, and sugar builds up in the blood stream instead of entering the cells.

There are two main types of diabetes. Type 1 diabetes is the usual type found in children and young adults, and is caused when the pancreas does not make enough insulin. Because there is too little or no insulin, sugar cannot enter the cells of the body to be used for energy [6]. Type 1 diabetes is usually treated with insulin shots. Type 2 diabetes is most commonly found in adults and results when a person's cells do not respond to insulin. Type 2 diabetes may be treated with diet, oral medications, and/or insulin shots.

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 the kidneys to try to "flush" the excess levels of sugar from the body. The results of this process may result in the following immediate symptoms of diabetes: increased 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 resorts to burning its own fat

and protein for energy); irritability; flushed, dry skin; nausea and vomiting; and weakness and fatigue. Over the longer term, high blood sugar levels may cause serious complications such as blindness, kidney and heart disease. Therefore, it is important to control blood sugar levels.

Management of diabetes consists of an intricate balance between insulin, food intake, physical activity, and physical and emotional stresses the person encounters as part of life. Anything that tips this delicate balance can cause fluctuations in the blood sugar.

## **Hypoglycemia (low blood sugar)**

Hypoglycemia, or low blood sugar, is the most serious problem that can occur with blood sugar control for people with diabetes. Anyone taking insulin or diabetes pills can have blood sugar that is too low. Hypoglycemia requires immediate attention, and is the problem, which this training protocol addresses.

Hypoglycemia is usually mild and easy to treat if the symptoms are detected early, but it can become serious. **Low blood sugar comes on very quickly**, and so must be treated by the trained caregiver after recognizing the symptoms of hypoglycemia. If hypoglycemia is not treated right away, it will get worse and can become life-threatening. If the blood sugar level falls very low, a person can become unconscious and have convulsions (seizures). When blood sugar gets that low, the person must be treated promptly with administration of glucagon.

The most **common causes of low blood sugar** are the result of a lack of balance between insulin, food intake, and physical activity such as the following:

- too much diabetes medication (insulin)
- change in meal or snack times, or not enough food
- skipping or not finishing meals or snacks
- getting more physical activity or exercise than usual

Symptoms of hypoglycemia can range from mild to severe, and include any or all of the following. (It is important to note that the symptoms of hypoglycemia may vary from person to person; a given individual may not experience all of these symptoms in the order they are listed.)

### Mild Symptoms

- feel hungry
- become sweaty
- feel shaky
- feel nervous

### Moderate Symptoms

- headache
- behavior changes
- have blurred, impaired or double vision
- become crabby or confused

- drowsiness
- weakness
- difficulty talking

#### Severe Symptoms

- unresponsive (i.e., unable or unwilling to take oral feeding)
- loss of consciousness
- convulsions (seizure activity)

### **Intervention for Mild or Moderate Symptoms of Hypoglycemia**

Treat low blood sugar right away with a fast-acting source of sugar. It will not get better on its own. If the health care provider for the person with diabetes has outlined a plan for testing the blood sugar, do so before initiating treatment. Otherwise if the person is able to eat and swallow, provide

**\*one of these foods right away:**

- 4-6 ounces of fruit juice
- 4-6 ounces of *regular* soda (not sugar free or diet)
- 3 packets or 1 tablespoon of sugar (not sugar substitute) dissolved in small amount of water, (or use 1 tablespoon of honey)
- 3-4 chewable glucose tablets
- 1 tablespoon of jam or jelly

\*Recommended by the American Diabetes Association

Observe the person being treated for hypoglycemia for 15 minutes. If symptoms do not improve, repeat the same amount of food again and monitor for another 15 minutes. Test the blood sugar if recommended by the health care provider. If the next regular meal is more than an hour away, follow the second treatment with an extra snack.

### **Treatment for Severe Symptoms of Hypoglycemia**

**Prepare to treat the person for severe symptoms of hypoglycemia if any of the following occur:**

- the person is unable or unwilling to take a feeding treatment
- the person does not feel better after the second feeding treatment
- the symptoms worsen to the point of being unable to swallow
- loss of consciousness or seizures occur

Remember that symptoms of hypoglycemia may vary from person to person. If the emergency

glucagon provider is uncertain as to whether the person is experiencing high or low blood sugar, it is safer to treat for hypoglycemia than to delay treatment.

## Glucagon

Glucagon, like insulin is a hormone made in the pancreas [4]. It acts on the liver by converting glycogen to glucose. Glucagon is a safe drug and relatively free of adverse reactions except for nausea and vomiting. It is usually well tolerated and no cases of human overdose have been reported [4]. However, generalized allergic reactions, including hives, respiratory distress, and low blood pressure, have been reported in patients who received glucagon by injection [6].

Glucagon is available in a package with supplies needed for administration. This is called a **Glucagon Emergency Kit**, and can only be obtained by prescription by the child's parent/guardian. It is the responsibility of the person for whom glucagon is prescribed, or in the case of a child, the parent/guardian to provide the original and any replacement Glucagon Emergency Kits for use by the emergency glucagon provider.

The **Glucagon Emergency Kit** contains:

- a bottle of glucagon in powder form
- a syringe filled with special diluting liquid

Vials of glucagon as well as the diluting solution should be stored at room temperature (59°-86° F), and the powder should not be mixed with the diluting solution until just before it is injected during a hypoglycemic emergency. Glucagon can be given as a subcutaneous injection in the loose, fatty tissue of the arm or thigh. Any unused portion should be discarded. Glucagon solutions should not be used unless they are clear and of a water-like consistency [7].

It is advised that the glucagon emergency provider checks expiration dates on Glucagon Emergency Kits periodically. In addition, plans should be in place to assure that Glucagon Emergency Kits are readily available and in close proximity of the child or person with diabetes. Consideration of transportation activities such as field trips or other off school functions must be taken into account when planning emergency measures for possible hypoglycemia of the student with diabetes. Depending on the age of the student, it may be advisable for students to carry their own Glucagon Emergency Kits during these special activities, and glucagon emergency providers must accompany the child.

## Dosage for Administration of Glucagon

Glucagon is manufactured in 1-mg (1 unit/ml) vials. **The child's health care provider will review the individualized dose for the person with diabetes** when the prescription is obtained by the parent/guardian. The following dosages are usually recommended:



USE	DOSE	WEIGHT
Adults and Children	1 mg (1 unit)	>20 kg or 44 lb.
<u>Smaller Children</u>	0.5 mg (0.5 unit)	<20 kg or 44 lb.

## Intervention for Severe Hypoglycemia

### Equipment

1. Glucagon Emergency Kit
2. Antiseptic Solution

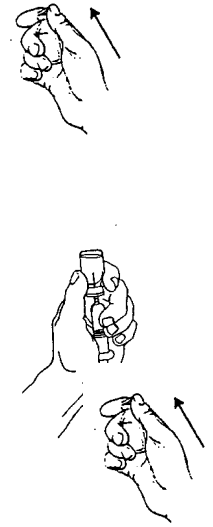
### Observation and Intervention Steps for Severe Hypoglycemia

1. Determine if the person with diabetes is having severe symptoms of hypoglycemia.
2. If the person is unwilling or unable to take oral feeding, unresponsive, unconscious or has no pulse/breath, delegate call to 9-1-1, or other emergency response system. If possible, delegate call to person's health care provider and parent/guardian also.
3. DO NOT attempt to give any food or liquid to a person who cannot swallow or is unconscious/unresponsive.
4. Obtain **Glucagon Emergency Kit** and check person's name against kit 5. Check to see if there are any special physician instructions for person and determine correct dosage for person.
5. Prepare glucagon for injection.

## **\*TO PREPARE GLUCAGON FOR INJECTION**

\*Adapted with permission from Eli Lilly and Company

1. Remove the flip-off seal from the bottle of powdered glucagon
2. Wipe rubber stopper on bottle with alcohol swab.
3. Remove the needle cover from the syringe filled with diluting fluid. **DO NOT REMOVE THE PLASTIC CLIP FROM THE SYRINGE.**
4. Insert the needle into the center of the rubber stopper on the vial of powdered glucagon.
5. Push the plunger on the syringe to inject the entire contents of the liquid solution into the vial of powdered glucagon.
6. Leave the needle on the syringe in the vial.
7. Shake bottle gently until glucagon powder dissolves and the solution becomes clear.



**Glucagon should not be used unless the solution is clear and of a water-like consistency. In the event that the glucagon solution is not clear and water-like, do not administer and monitor the person for absent pulse/respiration, or seizure activity until rescue personnel arrive.**

8. Withdraw the right amount of medication (prescribed by the person's health care provider).
  - For an adult or child over 44 lb. all of the solution from the bottle (1 mg mark on syringe) would usually be withdrawn.
  - If the dose is to be given to a small child under 44 lb. ½ of the solution from the bottle (0.5 mg mark on syringe) would usually be withdrawn.
9. Cleanse the injection site on arm or thigh with alcohol swab.
10. Insert the needle into the loose skin at the cleansed injection and administer all of the medication.

**Warning: It may be difficult to give an injection to a person who is having a seizure or is demonstrating combative behavior. In this situation, it is best to get assistance from another caregiver in restraining the limb of the person being treated.**

11. Apply light pressure at the injection site and withdraw the needle.

## Care of the Person Experiencing Hypoglycemia After Administration of Glucagon

1. Turn the person on his/her side. One of the most common side effects of glucagon is vomiting. Therefore, positioning on the side will prevent possible choking and allow for drainage of secretions in the mouth.
2. Continue to monitor for signs of absent pulse/breathing, or seizure activity.
3. Glucagon is a fast-acting drug and the person will usually improve within 15 minutes.

**Warning:** Although rare, the person may be unresponsive for other reasons, (i.e., head injury, drug overdose, high blood sugar level). In such a case, the person will NOT respond to administration of glucagon and will require immediate medical attention.

4. When the person responds and is able to eat and swallow without difficulty, feed the person a fast-acting source of sugar such as those listed on [page 6](#).

**Warning:** Many times after a person has received glucagon or experienced severe hypoglycemia, he/she may be nauseated and vomit, or be unable to keep foods/liquids down. It is best to start a person on small sips of clear liquids before providing solid foods. Examples of fast-acting clear liquids are as follows:

- sugar dissolved in water
  - regular soda pop (7-up, ginger ale, Sprite, etc.)
  - honey and water
5. Once the person is able to keep clear liquids down, provide a longer-acting source of sugar such as cheese and crackers or a meat sandwich.
  6. If emergency responders have been summoned, they will make decision if person needs to be transported to a medical facility. The person who has recovered from being treated with glucagon for hypoglycemia should receive immediate and continuing medical attention. Even though the person has revived after receiving glucagon for a severe low blood sugar reaction, the health care provider must be promptly notified to determine the cause of the reaction.
  7. The health care provider for the person who has been treated for severe hypoglycemia must be consulted for further direction

## Follow-up and Consultation After Hypoglycemic Episode

Once a person has been given emergency treatment for hypoglycemia, the emergency glucagon provider or parent/guardian should seek consultation with the person's health care provider for direction for preventing future episodes of hypoglycemia.

In the event that the **Glucagon Emergency Kit** is used for a hypoglycemic emergency, the person or parent/guardian of the child with hypoglycemia would be responsible for obtaining and providing another kit for use at school.

## Review: Assessment and Treatment of Hypoglycemia

1. Determine whether the person is experiencing symptoms of hypoglycemia
  - a. Test blood sugar if possible and if trained to do so by licensed health care provider.
  - b. Prepare to treat the person for low blood sugar.
2. For signs or symptoms of **mild or moderate** hypoglycemia:
  - a. Give feeding treatment (one fast-acting source of sugar).
  - b. Monitor for 15 minutes to see if symptoms improve.
  - c. If symptoms do not improve in 15 minutes, give a second fast-acting feeding treatment.
  - d. If the next regular meal is more than an hour away, follow the second treatment with an extra snack.
3. For signs and symptoms of **severe** hypoglycemia:
  - a. Prepare and administer glucagon according to the guidelines of this training protocol and in accordance with the physician instructions on patient's own **Glucagon Emergency Kit**.
  - b. Delegate call to 9-1-1 when person is unconscious or unresponsive, unwilling or unable to take oral feeding.
  - c. Position person on side in the event that vomiting occurs.
  - d. Continue to monitor person for signs of absent pulse/breathing, or seizure activity.
  - e. If the person responds and is able to eat and swallow, provide fast-acting sugar and longer acting source of food.
  - f. Follow-up by consulting with the person's health care provider.

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\_\_\_\_\_  
DATE

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NAME

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AFFILIATION

## Evaluation Tool

(Open book -- you may use your class notes)

1. Diabetes is caused when the pancreas does not make enough:
  - a. **water**
  - b. **insulin**
  - c. **sugar**
  
2. Insulin helps glucose enter into the cells of the body to be used for energy.  
 True                       False
  
3. List the primary "emergency" situation that can occur with blood sugar control for people with diabetes.
  1. \_\_\_\_\_
  
4. Hypoglycemia or low blood sugar usually develops slowly over a period of hours or days.  
 True                       False
  
5. The most common causes of low blood sugar are: (list 4)
  1. \_\_\_\_\_
  2. \_\_\_\_\_
  3. \_\_\_\_\_
  4. \_\_\_\_\_

6. Symptoms of hypoglycemia or low blood sugar can range from mild to severe, list symptoms as follows:

Mild Symptoms of Hypoglycemia

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Moderate Symptoms of Hypoglycemia

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Severe Symptoms of Hypoglycemia

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7. Hypoglycemia or low blood sugar should be treated promptly. For symptoms of mild or moderate symptoms, which of the following foods could be provided as one fast-acting feeding treatment? (circle all that apply)
- (a) 4-6 ounces of fruit juice
  - (b) 3-4 chewable glucose tablets
  - (c) 4-6 ounces of diet soda
  - (d) 1 tablespoons of sugar or honey dissolved in small amount of water
  - (e) a hamburger patty
  - (f) 1 tablespoons of jam or jelly
  - (g) sugar free candy
8. After providing one fast-acting feeding treatment for hypoglycemia, a person should be monitored for \_\_\_\_\_ minutes to see if symptoms improve.

9. If a person experiencing severe hypoglycemia is unconscious, it is best to put sugar cubes in his/her mouth.

\_\_\_\_\_ True                      \_\_\_\_\_ False

10. What is glucagon and how does it act on the body?

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11. If the person's physician does not otherwise order, the usual recommended doses for injected glucagon are:

Adults or Children (over 44 lb.) \_\_\_\_\_

Smaller Children (under 44 lb.) \_\_\_\_\_

12. If a person with diabetes is unable to swallow or respond when spoken to, glucagon should be promptly injected into the subcutaneous tissue of the arm or thigh.

\_\_\_\_\_ True                      \_\_\_\_\_ False

13. Glucagon should always be mixed up ahead of time before a diabetic emergency occurs.

\_\_\_\_\_ True                      \_\_\_\_\_ False

14. After administering the glucagon, which of the following should you do: (choose all that apply)

- a. Turn the person on his/her side in case vomiting occurs.
- b. Continue to observe the person for signs of absent pulse/breathing, or seizure activity.
- c. Cover the person with a blanket and allow to sleep without being disturbed.
- d. When the person responds, don't give any more food or liquids because the person may vomit.
- e. Seek consultation with person's health care provider.



## Evaluation Answer Key

1. b
2. True
3. Low blood sugar (hypoglycemia)
4. False
5.
  - 1) too much diabetes medication (insulin)
  - 2) change in meal or snack times, or not enough food
  - 3) skipping or not finishing meals or snacks
  - 4) getting more physical activity or exercise than usual
6.

<u>Mild Symptoms</u>	<u>Moderate Symptoms</u>	<u>Severe Symptoms</u>
hunger	headache	unresponsiveness
feeling sweaty	behavior changes	loss of consciousness
shakiness	blurred, impaired, or	convulsions (seizures)
nervousness	double vision	
become crabby or confused		
drowsiness		
weakness		
difficulty talking		
7. a, b, d, and f
8. 15 minutes
9. False
10. Glucagon is a hormone made in the pancreas. It acts on the liver by converting glycogen to glucose.
11. Adults or Children (over 44 lb.) 1 mg    Smaller Children (under 44 lb.) 0.5 mg
12. True
13. False
14. a, b, and e

## **Appendix**

- Emergency Glucagon Provider Certificate
- Example: Physician orders
- ORS 433.800 - 433.830
- OAR 333-55-000 through 035

## **CERTIFICATE FOR EMERGENCY GLUCAGON PROVIDERS**

Name of Emergency Glucagon Provider \_\_\_\_\_

This person participated in a training to become an emergency glucagon provider (according to OAR 333-55-000 through 035) and has safely demonstrated mixing and drawing up a glucagon-like solution, and giving a subcutaneous injection. In addition, the person has successfully completed the evaluation.

The emergency glucagon provider can only obtain doses of glucagon from the person diagnosed with hypoglycemia, or in the case of a child from the parent of guardian. Glucagon and the necessary paraphernalia for its administration must be prescribed by a health care professional with appropriate prescriptive privileges licensed under ORS chapter 677 and 678 in the State of Oregon.

This certificate expires three years after the date of issuance (below). It is the responsibility of the Emergency Glucagon Provider to present for re-certification by a licensed health care professional at that time. This certificate is in effect only for the prescribed person named above; it cannot be transferred.

The Emergency Glucagon Provider may be asked to provide copies of a current certificate to their employer, or to organizations or entities to which they volunteer.

\_\_\_\_\_  
Instructor

\_\_\_\_\_  
Date