

# Treatment of Severe Allergic Reaction

Protocol Training Manual

*Updated 12/2024*

Oregon Health Authority, Public Health Division



## Credits

Astrid Newell, MD and the late Beth Epstein, MD, of the Oregon Department of Human Services, Public Health Division, for the development of the original training protocol and the Oregon Administrative Rules (OARs) regarding the use of epinephrine by the general public.

## Note to Trainers

This Training Manual is intended for use in conjunction with the Allergic Reaction / Epinephrine Training [slides](#) available from the Oregon Health Authority on the [OHA Lifesaving Treatment Protocols](#) webpage.

The Allergic Reaction / Epinephrine Training Slides include an **Addendum for trainers of school personnel only**, with embedded notes for the trainer. For additional details, or to train school personnel who will administer more than just epinephrine, refer to the [Medication Administration Training Manual](#) and [slides](#) from the Oregon Department of Education on the [ODE Medication Administration Resources](#) page.

For trainers/settings utilizing selective printing, the following pages may be preferred:

- Section III, p. 8, “Signs and Symptoms of Severe Allergic Response”
- Section V, p. 19-20 “Treatment Protocol”
- Section V, p. 21 “Using an Epinephrine Auto-Injector”
- Section VII pp. 19-20 and/or 22-24; assessment tool(s) per trainer discretion

Scan below to access the online Allergic Response Protocol Training Manual and Slides.



## Authorized for use by the Oregon Health Authority, Public Health Division

If you need more information related to this training protocol, please contact:

- *For the Statement of Completion/Authorization to Obtain Epinephrine cards or if this protocol is needed in an alternate format:* Jason Free at [Jason.Free@odhsoha.oregon.gov](mailto:Jason.Free@odhsoha.oregon.gov)
- *Regarding schools, school nurses:* Corinna Brower, State School Nurse Consultant [corinna.e.brower@oha.oregon.gov](mailto:corinna.e.brower@oha.oregon.gov). Phone 971-401-1424.
- *All other inquiries:* Leslie Huntington, EMS Education Coordinator [leslie.d.huntington@oha.oregon.gov](mailto:leslie.d.huntington@oha.oregon.gov).

## Table of Contents

I.	Introduction .....	I-5
II.	Background .....	II-5
	Overview of Laws and Rules .....	II-5
	Qualifications to Receive Training .....	II-6
	Training Program .....	II-6
III.	Allergic Reactions.....	III-7
	Allergy Terms Used in This Training.....	III-7
	Recognizing Severe Allergic Response .....	III-7
	Signs and Symptoms of Severe Allergic Response .....	III-8
	Identifying Individuals at Higher Risk.....	III-9
IV.	Allergens and Allergy Triggers .....	IV-10
	Overview of the Causes of Severe Allergic Response .....	IV-10
	Insect Stings and Bites .....	IV-10
	General Considerations – Insect Stings and Bites .....	IV-10
	Common Causes – Insect Stings and Bites.....	IV-11
	Normal Versus Severe Reactions – Insect Stings and Bites.....	11
	Risk Reduction – Insect Stings and Bites.....	11
	Food and Drink .....	12
	General Considerations – Food and Drink .....	12
	Common Causes – Food and Drink .....	12
	Normal Versus Severe Reactions – Food and Drink.....	12
	Risk Reduction – Food and Drink.....	14
	Medications .....	15
	General Considerations - Medication .....	15
	Common Causes - Medication .....	15
	Normal Versus Severe Reactions - Medication.....	15
	Risk Reduction – Medication .....	16
	Latex .....	16
	General Considerations - Latex.....	16
	Common Causes - Latex.....	16
		I-3

Normal Versus Severe Reactions - Latex.....	IV-17
Risk Reduction - Latex.....	IV-17
Other Causes and Situations.....	IV-17
General Considerations .....	IV-17
Less Common Causes.....	IV-17
Normal Versus Severe Reactions .....	IV-18
Risk Reduction .....	IV-18
V. Management of Severe Allergic Response .....	V-18
Treatment protocol .....	V-18
Using an Epinephrine Auto-Injector .....	21
Understanding Epinephrine.....	18
A. Description.....	18
B. Possible Side Effects of Epinephrine .....	18
C. How Epinephrine is Supplied and Stored.....	V-18
D. Understanding Auto-Injector Devices.....	V-16
VI. Preparation and Prevention.....	VI-17
VII. Summary and Review .....	VII-19
Practical Focus Activity .....	VII-21
VIII. Appendix.....	VIII-25
Resources From the American Academy of Pediatrics .....	VIII-25
State Laws.....	VIII-25
Statement of Completion Note to Trainers .....	VIII-26
Statement of Completion .....	VIII-27

## I. Introduction

Anaphylaxis is a severe, potentially fatal allergic reaction.<sup>1i</sup> Severe, systemic allergic reactions (anaphylaxis) are characteristically unexpected and rapid in onset.<sup>ii</sup> Immediate injection of epinephrine is the single factor most likely to save a life under these circumstances. Several hundreds of deaths each year are attributed to severe allergic response to insect stings and food allergies, as well to medications, latex, and other substances.<sup>iii,iv</sup>

In 1981, legislation was passed by the Oregon Legislature to provide a means of authorizing certain individuals to administer lifesaving treatment to people suffering severe insect sting reactions when a physician is not immediately available. In 1989, the Legislature expanded the scope of assistance to people having a severe allergic response to other allergens. The statute underwent minor revisions again in 1997 and 2012.

These bills were introduced at the request of the Oregon Medical Association. These statutes are intended to address situations where medical help often is not immediately available, such as school settings, camps, forests, recreational areas, and more. The following protocol for training is intended as an administrative document outlining the specific applications of the law, describing the scope of the statute and people to be trained.

## II. Background

### Overview of Laws and Rules

According to Oregon law [[ORS 433.800-830](#)], a person who meets the prescribed qualifications may obtain a prescription for pre-measured doses of epinephrine. The epinephrine may be administered to a person suffering from a severe allergic response when a licensed health care provider is not immediately available.

The Oregon Administrative Rules supporting this law [[OAR 333-055-000 to 333-055-0035](#)] stipulate those who complete the training prescribed by the Oregon Health Authority, Public Health Division, receive a Statement of Completion signed by the licensed health care professional conducting the training. This Statement of Completion includes an Authorization to Obtain Epinephrine prescription to obtain an emergency supply of epinephrine auto injectors.

---

<sup>1</sup> For this training, the terms “severe reaction,” “anaphylaxis,” “severe allergic response,” and “systemic allergic reaction” are considered functionally the same.

Completion includes an Authorization to Obtain Epinephrine prescription to obtain an emergency supply of epinephrine auto injectors.

For the prescription to be filled, the authorization must be signed by the nurse practitioner or physician responsible for the oversight of the training. This prescription may be filled up to four times in a three-year period. The training and subsequent authorization will expire three years after the date of the class as identified on the form. The individual must complete retraining to receive a new statement of completion and authorization.

## **Qualifications to Receive Training**

To qualify for this training, a person must be 18 years of age or older and must “have, or reasonably expect to have, responsibility for or contact with at least one other person as a result of the eligible person’s occupational or volunteer status.”

Individuals who are likely to fall under the definition of the law include public or private school employees, camp counselors or camp employees, youth organization staff or volunteers, forest rangers and foremen of forest workers, public or private employers/employees with demonstrated exposure to risk.

In addition to taking the required training course described above, trainees are strongly encouraged to obtain and maintain current training in first aid, CPR and blood borne pathogens courses.

## **Training Program**

The training program must be conducted by either:

1. A physician licensed to practice in Oregon
2. A nurse practitioner licensed to practice in Oregon
3. A registered nurse, as assigned by a licensed physician or nurse practitioner
4. A paramedic, as delegated by an EMS medical director defined in [OAR 333-265-0000](#).

The training must include the following subjects:

1. Recognition of the symptoms of systemic allergic response (anaphylactic reaction) to insect stings and other allergens
2. Familiarity with factors likely to cause systemic allergic response
3. Proper administration of an injection of epinephrine
4. Necessary follow-up treatment.

### III. Allergic Reactions

#### Allergy Terms Used in This Training

**Allergen:** A protein not normally found in the body that may cause an allergic response by the body upon exposure.

Examples of allergens include insect venom, food, medication, pollen, and others.

**Normal Reaction:** Exposure to an allergen either causes no reaction or causes an expected, minimal signs as a result.

**Exaggerated Reaction:** Exposure to the allergen leads to a reaction that is greater than expected response but typically remains within a single area or system of the body; increased sensitivity.

An example of exaggerated reaction after a bee sting is swelling and redness larger than a quarter, which extends beyond a major joint but stays on one side of the body.

**Severe Reaction<sup>2</sup>:** Exposure to an allergen leads to a response that involves multiple areas of the body, multiple organ systems, or the entire body. It is a life-threatening event.

A severe (systemic; anaphylactic) reaction may include breathing difficulty, circulation changes, swelling, skin changes, abdominal changes, or anxiety; see details in next section. There may be one symptom or many symptoms.

#### Recognizing Severe Allergic Response

A severe allergic response is a life-threatening condition: it can cause death due to swelling and constriction of the airway and the significant drop in blood pressure. Once someone is having an anaphylactic reaction, a critical factor in whether they live or die is how quickly they receive an injection of epinephrine.<sup>v,vi,vii</sup>

---

Epinephrine must be given promptly at the first signs of anaphylaxis.  
The decision to treat must be based on recognition of the symptoms.

---

---

<sup>2</sup> For this training, the terms “anaphylaxis,” “severe reaction,” “severe allergic response,” and “systemic allergic reaction” are considered functionally the same.

---

# Signs and Symptoms of Severe Allergic Response

Any or all of these symptoms may be present

---

## Breathing Difficulty

- Working harder to breathe
- Wheezing (high-pitched sounds with breathing)
- Coughing (see Swelling)

## Circulation Changes

- Rapid or weak pulse
- Dizziness, feeling faint, loss of consciousness (signs of low blood pressure)
- Skin pallor; blue, grey, or dusky tint on lips, inside eyelids, or on fingertips (signs of low oxygen)

## Swelling

- Puffy eyes, lips, face, or tongue
- Coughing, difficulty swallowing, or hoarse voice (signs of throat swelling)

## Skin Changes

- Hives (blotchy spots) widespread or on the torso and neck
- Itching or burning sensation, especially in the face or chest
- Sweating or flushed
- Skin tone paler or grayer than usual (see Circulation Changes)

## Abdominal Changes

- Pain
- Nausea, vomiting
- Incontinence, or diarrhea

## Anxiety

- Tense, fidgety, fearful
- Sense of impending doom





A severe allergic response can start within minutes of exposure to an allergen, or the reaction may be delayed by several hours. The reaction to an insect sting or other allergen usually occurs quickly: death has been reported to occur within minutes after a sting.<sup>viii</sup> Individuals with severe food allergies may react within seconds to several minutes after exposure to allergens.<sup>ix</sup> However, an anaphylactic reaction occasionally occurs after a delay, sometimes hours after exposure.<sup>x</sup>

Although anaphylactic reactions typically result in multiple symptoms such as hives, difficulty breathing, dizziness and/or faint feeling, reactions may vary substantially from person to person, and sometimes only one symptom is present.<sup>xi,xii</sup> People having an anaphylactic reaction often experience an increased state of anxiety. This is especially true if they have a history of a previous severe reaction.<sup>xiii</sup>

## **Identifying Individuals at Higher Risk**

Any allergic response has the potential to become serious. When a person has had an allergic reaction in the past, their next exposure to the allergen, such as bee stings or peanuts, may cause a more severe response.<sup>xiv</sup> While anyone may experience a severe allergic response, individuals with a history of previous severe reaction; a history of asthma; or a previously-known food allergy particularly peanuts or tree nuts, are most at risk for life-threatening anaphylaxis.<sup>xv,xvi</sup> These past conditions are red flags indicating the need to prevent, and manage, a severe allergic response.

Previous history of anaphylactic reactions and known exposure to potential allergens should increase the suspicion that onset of signs or symptoms represents an anaphylactic reaction. Reactions do vary from one person to the another, but they remain fairly constant in the same individual from one time to the next.<sup>xvii</sup> For that reason, it is important not only to identify people who have had previous reactions, but also to obtain a description of their previous signs and symptoms.

Knowing what to look for can improve speed of response. Allergies are common in the US: in 2021, just over one quarter of children (27.2%) and nearly one third of adults (31%) had at least one type of allergic condition.<sup>xviii,xix</sup> Severe life-threatening allergic responses are relatively rare: between 0.5% to 5% of individuals experience anaphylaxis, about 6% of anaphylaxis cases lead to mortality, and anaphylaxis accounts for about 1% of the total mortality rate in the US.<sup>xx,xxi,xxii</sup> Many of those deaths could be prevented by early recognition and immediate injection of epinephrine.<sup>xxiii</sup>

In addition to individuals with known allergic history, severe reactions can occur in people with no history of allergic reaction.<sup>xxiv</sup> Whether or not high-risk individuals are identified, it is important to take preventive measures where there is a reasonable expectation that staff, students, or clients may be exposed to allergens and/or may be

far away from medical assistance, such as in school settings, camps, tour groups, outdoor settings, etc. See allergen-specific risk reduction strategies in *Allergens and Allergy Triggers*, p10. See preparation strategies in *Preparation and Prevention*, p17.

## IV. Allergens and Allergy Triggers

### Overview of the Causes of Severe Allergic Response

---

When severe allergic reactions occur, immediate injection of epinephrine is vital. **Do not** delay treatment searching for a cause.

---

Awareness of common allergens can help people be prepared and prevent exposures. It is important to note that in many cases, no specific cause of anaphylaxis is found.<sup>xxv</sup> The most common identifiable causes of anaphylaxis are:

- Insect stings or bites (e.g., yellow jackets, wasps)
- Foods (e.g., nuts, shellfish, eggs, milk)
- Medications (e.g. penicillin)
- Latex (e.g., balloons, gloves, some types of tape)
- Certain other situations and conditions, such as atypical reactions to temperature change or exercise.

For each of these allergen types, the following section will outline general considerations; common causes; normal versus severe reactions; and risk reduction strategies.

### Insect Stings and Bites

#### A. General Considerations – Insect Stings and Bites

- About 5% of the American population has a severe allergy to insect stings or bites, and this allergy accounts for 10-20% of all cases of anaphylaxis.<sup>xxvi,xxvii,xxviii</sup>
- People are seldom able to identify the type of insect that stung or bit them. When possible, an attempt at identification should be made **after** the reaction is treated so the individual can avoid future exposure and inform their healthcare providers.
- Insects may be more likely in certain weather or seasons: bees are more likely to sting on warm bright days, particularly following a rain, while wasp stings in are more likely in summer and autumn, when populations are highest.<sup>xxix</sup>

## B. Common Causes – Insect Stings and Bites

Insects associated with allergy and anaphylaxis include<sup>xxx</sup>

Bees	Bull ants
Hornets	(rarely) Northern scorpion
Wasps	(rarely) non-venomous biting insects e.g.
Yellow jackets	horse flies, kissing bugs
Fire ants	(rarely) venomous biting insects e.g.
Jack Jumper ants	black widow spider, hobo spider

- Fatal or severe reactions to insect stings are most often due to bees, wasps, hornets, and yellow jackets. Severe allergic responses are less common with other stings or bites, but they do occur occasionally.
- The risk of serious reaction increases with multiple stings or bites. See *Special Considerations*, p.11.
- Serious allergic response does occur, but rarely, from highly venomous insects such as scorpions and black widow spiders. Reaction is more often due to toxic venom, and antivenin is needed in most cases. If a bite or sting is known to come from a highly venomous insect, observe and treat based on symptoms, and seek medical attention immediately.

## C. Normal Versus Severe Reactions – Insect Stings and Bites

### ➤ Normal Reaction

- A sting or bite in a non-allergic person produces a localized, sharp pain that varies in duration.
- Within minutes, a small, reddened area appears at the site and may enlarge to about the size of a quarter with hardening and redness. Pain and itching may accompany the redness, along with heat and swelling.
- This response usually lasts about 24 hours, although a sting on the hand or foot may produce swelling that lasts for several days.
- This reaction does not generally require professional medical attention.
- Treatment includes
  - Reassure and calm the person
  - Remove the stinger if present
  - Scrape with a plastic card or fingernail. Do not pinch the stinger, as that can release more venom into the body.
  - Only honeybees leave their stinger behind
  - Cleanse the sting site
  - Apply an ice pack for local pain relief

- Observe the person for at least 30 minutes
- If applicable, parent/guardian should be notified per facility protocol.

➤ Exaggerated Reaction (Localized Reaction)

- An exaggerated reaction may involve pain, itching and swelling that extends over an area larger than a quarter.
- The pain, itching and swelling may extend past a major joint line but limited to the affected extremity.
- Treatment includes all steps listed above; and if applicable, elevate the limb to reduce swelling.
- Note that exaggerated response may be delayed for several hours. If possible, do not leave the person unattended, and ensure the parent/guardian is informed if applicable.

➤ Severe Reaction (Anaphylaxis)

A severe, systemic, anaphylactic reaction to insect stings or bites may involve any or all of the *Signs and Symptoms of Severe Allergic Response* (p.8). Follow the *Treatment Protocol for Severe Allergic Response* (pp. 19-20); administer epinephrine and call 9-1-1.

---

### Special Considerations

---

- If a sting occurs around **the eye, nose, or throat**, the reaction may be more severe and may need **immediate medical attention**. Around the nose and throat, even minimal swelling may cause obstruction. Around the eyes, long-term damage is possible. Seek medical care for these types of stings.
- **Toxic reactions** can result from **multiple stings**, usually 10 or more, such as when a person steps on a yellow jacket nest. These types of stings need **immediate medical attention: call 9-1-1 right away**. Observe for reaction and treat as for any case of anaphylaxis. **Toxic reactions may be delayed**. Medical attention and observation are strongly recommended.

#### D. Risk Reduction – Insect Stings and Bites

Avoid as much as possible:

- Flowers, flowering trees/shrubs
- Certain colors and types of clothing (especially blue, yellow, or dark brown) or rough fabrics. Smooth, hard finish white or tan clothing is safest.
- Fragrant cosmetics, perfumes, lotions
- Walking outside without shoes

- Exposed skin (hats, long sleeved shirts, slacks, socks and shoes are recommended)
- Picnics, cooking or eating outdoors
- Areas of trash or garbage
- Known areas of insect habitat
- Becoming excited, swatting or hitting at the insect. To remove the insect, a gentle brushing motion is recommended.

## Food and Drink

### A. General Considerations – Food and Drink

- About 8% of children and 11% of adults have a food allergy, and food allergy accounts for 35%-55% of all cases of anaphylaxis. <sup>xxxix, xxxii</sup>
- Accidental ingestion of food allergens is common in children, with reported incidents about once every 2 years for 70-85% of those with known allergy. <sup>xxxiii</sup>
- **Most fatal food allergy cases have no prior history.** <sup>xxxiv, xxxv</sup>

### B. Common Causes – Food and Drink

Nearly any food can trigger an allergic reaction at any age. Foods commonly associated with severe allergic reactions include<sup>xxxvi</sup>

Peanuts	Fish
Milk	Shellfish
Eggs	Tree nuts (walnuts, pecans, almonds, hazelnuts, etc.)
Wheat	
Soy	

### C. Normal Versus Severe Reactions – Food and Drink

#### ➤ Normal Reaction

No response (normal digestion).

- Certain foods produce expected responses, such as increased gas.
- Eating unfamiliar foods may produce increased gas or other symptoms in the digestive system (stomach and intestines).
- In the normal digestive process, consuming foods repeatedly over time typically makes them easier to digest, reducing related symptoms.

➤ Exaggerated Reaction (Food Intolerance, Food Sensitivity)

Atypical reactions after eating certain food and drinks include food intolerance and food sensitivities. Both can cause discomfort and localized immune response, but neither involve the life-threatening full-body immune cascade associated with anaphylaxis.<sup>xxxvii</sup>

In both food intolerance and food sensitivity, the level of response is often **dose-dependent**, meaning the more that is consumed, the worse the reaction.

- Food intolerance is not a true allergy, but rather, an inability to digest certain foods. An example is lactose intolerance, associated with gas and bloating. Food intolerance can include some inflammation or immune response, but the reaction remains localized in the digestive tract.
- Food sensitivity is an atypical reaction that may cause discomfort outside the digestive tract. Examples include brain fog related to gluten, or joint pain after eating citrus or other acidic fruits.

Some symptoms of food intolerance or sensitivity mimic severe, systemic, anaphylactic response. If there is any doubt, **do not delay treatment**. Follow the *Treatment Protocol for Severe Allergic Response* (pp. 19-20); administer epinephrine and call 9-1-1.

➤ Severe Reaction (Anaphylaxis)

Severe food allergy is usually **not** dose dependent, meaning any exposure can lead to a serious reaction. For some individuals, a food allergen can cause anaphylactic response if even a tiny amount is touched, eaten, or inhaled.

A severe, systemic, anaphylactic reaction to food or drink may involve any or all of the *Signs and Symptoms of Severe Allergic Response* (p.8). Follow the *Treatment Protocol for Severe Allergic Response* (pp. 19-20); administer epinephrine and call 9-1-1.

#### D. Risk Reduction – Food and Drink

- Avoid exposure to foods and products that contain known allergens
- Read labels on food and skin care products for hidden ingredients, such as nut oils in lotions
- Inform food preparation personnel of known allergens, and of individuals with known food allergies when applicable
- Avoid cross-contamination of food via utensils, cutting surfaces, etc.
- Discourage lunch sharing, such as among children in a school setting.
- Encourage hand washing to prevent secondary exposure to allergens

## Medications

### A. General Considerations - Medication

- Approximately 10% of people develop a medication allergy<sup>xxxviii</sup>
- Any medication can trigger an allergic response, and a person can experience severe allergic reactions to medications even if they have previously taken the medication without incident.
- If a person is allergic to a medication or component of a medication, any route of administration may cause allergic response: oral pills, injections, topical creams, inhaled powder or sprays, and more.

### B. Common Causes - Medication

Medications more often associated with allergic reactions include<sup>xxxix</sup>

- Antibiotics: penicillins (e.g. amoxicillin), sulfonamides (e.g. Bactrim); cephalosporins (e.g. Keflex)
- Non-steroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen (Midol, Advil), naproxen (Aleve), and others.
- Medications containing acetaminophen (Tylenol, Excedrin, NyQuil, etc.)

Rarely, allergy injections may lead to an allergic reaction.

Of all drugs, penicillin is the most frequent cause of anaphylactic reactions.<sup>xl</sup>

### C. Normal Versus Severe Reactions - Medication

#### ➤ Normal Reaction

No reaction except that intended by the medication or expected minimal side effects, such as mild upset stomach.

#### ➤ Exaggerated Reaction

Symptoms that are not among expected side effects may indicate an intolerance to medication, a reaction between medications, or a medication allergy. When in doubt, **do not delay treatment**. Follow the *Treatment Protocol for Severe Allergic Response* (pp. 19-20); administer epinephrine and call 9-1-1.

#### ➤ Severe Reaction (Anaphylaxis)

A severe, systemic, anaphylactic reaction to medications may involve any or all of the *Signs and Symptoms of Severe Allergic Response* (p.8). Follow the *Treatment Protocol for Severe Allergic Response* (pp. 19-20); administer epinephrine and call 9-1-1.

---

## Special Considerations

---

- Many medications have expected side effects, such as headache, drowsiness, or bowel changes. Individuals should check with their prescriber or pharmacist and read medication information to understand which side effects are expected as a normal response, versus which signs and symptoms would be concerning.

#### **D. Risk Reduction – Medication**

- Avoid consuming or touching medications that include known allergens. Read drug information labels to identify all components of medications and ask a doctor or pharmacist about medications that contain the known allergen.
- Avoid taking medication except as prescribed, or from an original container for over-the-counter medication. Do not take unlabeled medications or medications intended for others.
- Inform healthcare personnel of known allergies prior to treatments.
- Encourage hand washing to prevent secondary exposure to allergens. If those administering medications wear gloves, gloves should be changed and hands washed between each patient/student/client.

## **Latex**

### **A. General Considerations - Latex**

- Certain groups of people are at higher risk for latex allergy. While only about 4% of the general public are impacted by latex allergy, studies have documented serious allergic reactions to latex in certain populations, including 10%-17% of healthcare workers and over 70% of patients with spina bifida.<sup>xli</sup>
- Clients, patients, or students who are medically fragile or have frequent exposure to latex may warrant additional protective planning.

### **B. Common Causes - Latex**

Latex is derived from the rubber tree plant. Alternatives to natural latex rubber are available for many items. However, latex is still present in many common items including *some types of*:

Art supplies

Balloons

Boots

Catheters

Condoms

Duct tape

Gloves

Erasers

First-aid supplies such as ace wraps, medical tape, band-aides

Tires

Swim caps



## C. Normal Versus Severe Reactions - Latex

### ➤ Normal Reaction

No reaction; any reaction to latex should be suspect.

### ➤ Exaggerated Reaction

For individuals with a sensitivity to latex, contact can produce irritation at the site of contact, such as itching or rash on the hands after wearing latex gloves, or around the mouth after blowing up a balloon.

### ➤ Severe Reaction (Anaphylaxis)

A severe, systemic, anaphylactic reaction to latex may involve any or all of the *Signs and Symptoms of Severe Allergic Response* (p.8). Follow the *Treatment Protocol for Severe Allergic Response* (pp. 19-20); administer epinephrine and call 9-1-1.

## D. Risk Reduction - Latex

- Encourage hand washing to prevent secondary exposure
- Read packaging; look for “latex free” or “contains no latex”
- Notify applicable personnel of latex allergy; may include teachers, healthcare workers, activity leaders, etc.
- Familiarize yourself with products that may contain latex in your setting, such as in the classroom, first-aid station, or healthcare facility. When possible, choose or request that latex-free alternatives be used.

## Other Causes and Situations

### A. General Considerations

- A severe allergic response may occur in any individual, at any time. Be prepared to administer epinephrine when signs of severe allergic reaction are present, even if there is no known allergy or allergen exposure.
- Many individuals are recognized as having anaphylaxis without an identified cause, also known as idiopathic anaphylaxis (“idiopathic” means “unknown cause”). Idiopathic anaphylaxis accounts for 30% to 60% of adult cases and about 10% of cases in children.<sup>xliii</sup>

### B. Less Common Causes

Some conditions associated with anaphylaxis that may require the use of epinephrine include

- Cold urticaria: hives and/or breathing difficulty after sudden temperature change
- Exercise-induced anaphylaxis: heightened immune response with vigorous activity. May be more likely to occur if certain sensitive individuals exercise after exposure to pollens or some types of food (such as wheat, eggs, and seafood).

### C. Normal Versus Severe Reactions

The signs and symptoms associated with specific conditions may differ from one individual to the next. Some individuals will have epinephrine prescribed for atypical signs, or before it would be given in other individuals.

Whether or not a specific condition is known, be prepared to respond to signs and symptoms of life-threatening reaction.

A severe, systemic, anaphylactic reaction due to any allergen, condition, or situation may involve any or all of the *Signs and Symptoms of Severe Allergic Response* (p.8). Follow the *Treatment Protocol for Severe Allergic Response* (pp. 19-20); administer epinephrine and call 9-1-1.

### D. Risk Reduction

- When possible prior to an emergency event, review individual symptoms and plans with the individual or parent/caregiver.
- Avoid associated risks.
- Maintain epinephrine training and related skills.
- Maintain training in first aid and CPR.

## V. Management of Severe Allergic Response

### Treatment protocol

Quickly recognizing the signs of severe allergic response and administering epinephrine are critical actions. While death from anaphylaxis is fortunately rare, many such deaths could be prevented with early identification and treatment. Often the person suffering the reaction is unable or unequipped to self-administer epinephrine and requires assistance. In addition to knowing how to recognize a systemic allergic reaction and how to inject epinephrine, all people meeting the criteria for severe allergic response training are strongly encouraged to take an approved First Aid / CPR training course.

---

## Treatment Protocol for Severe Allergic Response

---

1. Identify signs and symptoms to determine if the person is having a severe allergic response. See *Signs and Symptoms of Severe Allergic Response*, p.8.
  - a. Check and maintain the person's airway and breathing.
  - b. Administer CPR if necessary, in addition to epinephrine if indicated.
2. Minimize walking or movement. Have the person sit or lie down where they are unless the location poses a safety threat.
3. Select the proper auto-injector device for estimated weight or age.
  - a. If there is only one option, use what is available.
  - b. If there is no epinephrine auto-injector, immediately call 9-1-1.
4. Administer epinephrine through the device. See *Using an Epinephrine Auto-injector*, p 21.
  - a. Note the time when the auto-injector is used. If help is available, have someone set a 5-minute timer.
5. Call 9-1-1 or have someone else call. **Do not** leave the person unattended.
6. Continue to check and maintain airway and breathing.
  - a. If the person has stopped breathing and does not respond to rescue breathing, they may have severe swelling of the throat, which closes the airway. Continue CPR efforts.
7. If airway and breathing are stable, position for safety, and remove the stinger if one is present.
  - a. Avoid pinching the stinger, as this may release more venom. Use a scraping motion with a long fingernail or credit card. See Slide 42.

- b. If confused or losing consciousness, elevate legs to get more blood to brain and heart, and tilt toward side in case of nausea/vomiting.
  - c. If alert but having difficulty breathing, may try other positions (leaning forward; arms elevated).
- 8. Monitor for changes such as an improvement in breathing, increase in the person's consciousness, or a decrease in swelling.
- 9. After 5 minutes, if the person's condition does not change or worsens, and EMS is not on site, administer a second (2<sup>nd</sup>) dose of epinephrine from a new auto-injector device.
  - a. About 10% of cases will require a second dose.<sup>xliii</sup>
- 10. When EMS arrives, advise them of the person's symptoms before the auto-injector was given and any changes in the person's condition since then.
- 11. In case of asthma: If the person experiencing an anaphylactic reaction also has asthma and is having respiratory symptoms, they may benefit from the use of their own inhaler *after* receiving epinephrine.
- 12. Follow up: Any person who received epinephrine for an anaphylaxis reaction should follow up with medical care as soon as possible.
  - a. Ambulance transport to the emergency department is recommended.
  - b. After emergency treatment, individuals should notify their primary care provider and follow medical advice.

---

It is safer to administer epinephrine than delay treatment.

**When in doubt, administer epinephrine.**

This is a life-and-death decision.

---

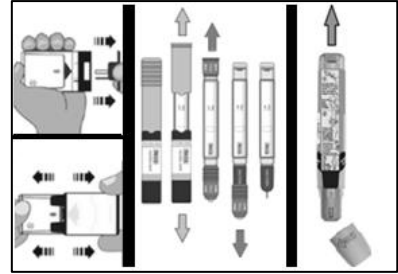
---

## Using an Epinephrine Auto-Injector

The following expands on **Treatment Protocol** step 4. Administer epinephrine.

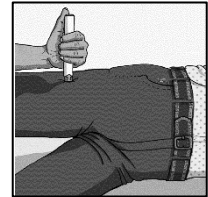
---

4.a) Remove the auto-injector from its protective case (when applicable).



4.b) Remove the safety caps of the injector.

4.c) Hold the injector firmly and keep fingers away from the tip of the device.

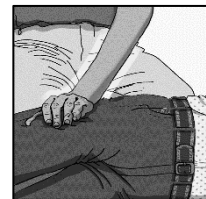


4.d) Position the device at a 90-degree angle against the thigh.

- Push hard enough to cause a click for some devices
- Push down on the trigger for other devices

4.e) Hold the device firmly against the thigh for 2-10 seconds during administration. Consult product directions.

4.f) Remove the device. Place it into its protective case (when applicable).



4.g) Massage the skin at the injection site for 10 seconds.

- Note the time when the auto-injector is used. If help is available, have someone set a 5-minute timer.

Continue to Step 5 of the **Treatment Protocol**.

---

Epinephrine auto-injectors are **not** all the same. If possible, review device-specific instructions before an emergency occurs.

---

## Understanding Epinephrine

### A. Description

- Epinephrine, also known as adrenaline, is a powerful medication, used for the treatment of severe allergic response (anaphylactic reactions). Oregon law does **not** authorize trainees to use of epinephrine for any other condition including asthma unless specifically ordered by a provider.
- Epinephrine is obtained by prescription only. In the case of a life-threatening allergic reaction, it is the most immediate and effective treatment available.
- Epinephrine acts on the body by constricting blood vessels and raising the blood pressure, relaxing the bronchial muscles and reducing tissue swelling. The actions of this drug directly oppose the life-threatening effects of anaphylaxis.
- Although epinephrine is very fast acting, its beneficial effects are short-lived (approximately 20 minutes). The life-threatening reaction may resume after epinephrine wears off, so it is vitally important to call 9-1-1 immediately.

### B. Possible Side Effects of Epinephrine

Temporary and minor side effects of epinephrine include:

Anxiety	Pallor
Headache	Rapid heart rate
Nausea, vomiting	Sweating
Nervousness	Tremor

These effects are temporary and will subside with rest and reassurance. Some of the possible side effects of epinephrine may resemble symptoms of anaphylactic shock; however, symptoms related to injection of epinephrine are temporary. Reassurance and a calm demeanor by the responder are important.

### C. How Epinephrine is Supplied and Stored

The epinephrine prescription will be filled as an auto-injector device. Oregon Administrative Rule allowed for the dispensing and use of a twin pack of epinephrine as a single prescription for an individual who has gone through this training.

A few different brands are available for use, including Auvi-Q® (from kaleo), EpiPen® (from Mylan / Viatris), and generic autoinjectors (from Amneal and Teva). It is important to know which epinephrine auto-injector you will be using since the method for administration differs between manufacturers. Practicing (using training models) can increase confidence and accuracy during an event.<sup>xliv,xlv</sup>

Epinephrine should be stored in a dark place at room temperature (between 59 – 86 degrees F). Exposure to sunlight, or to extreme heat or cold, will hasten deterioration of epinephrine more rapidly than exposure to room temperatures.

- Protect from freezing and **do not** store epinephrine in a refrigerator.
- Epinephrine must also be protected from exposure to extreme heat (for example, **do not** store it in your car's glove box).
- When transporting epinephrine doses, an insulated pack or case is recommended; **do not** carry epinephrine in a warm pocket.

Regularly inspect your supply of epinephrine. Inspect each auto-injector for the following:

- The solution should be clear and without particles. Solution that appears cloudy, discolored (brown) or with particles must be replaced.
- The auto-injector should be current and not expired.
  - Verify your setting's plans to replace doses prior to expiration, such as ordering 3 months ahead.
  - Expired autoinjectors should be discarded. Follow instructions for discarding medications. Expired medication may not retain full potency and may fail to work.
  - Doses near expiration should be replaced promptly, and expired doses discarded, to ensure epinephrine administered during an emergency has maximum effect. However, if the only epinephrine available during an emergency has expired, as long as it is still clear and without particles, it is better to give it than nothing at all.

#### D. Understanding Auto-Injector Devices

A pre-measured dose of epinephrine is delivered via an auto-injector into the middle of the outer thigh. This location is a safe site for injection. The auto-injector is designed to work through clothing for all ages.

The typical dose of epinephrine for adults is 0.3 milligrams. The epinephrine dose for children or small individuals is half the dose for an adult, based on weight: 0.15mg for people approximately 35-65 pounds.

The following table gives guidelines for choosing the adult versus the pediatric version of the epinephrine auto-injector. However, it must be emphasized: **don't delay by weighing!!** Use your best guess. A pre-measured dose of epinephrine is delivered via an auto-injector into the middle of the outer thigh. This location is a safe site for injection. The auto-injector is designed to work through clothing for all ages.

The typical dose of epinephrine for adults is 0.3 milligrams. The epinephrine dose for children or small individuals is half the dose for an adult, based on weight: 0.15mg for people approximately 35-65 pounds.

Although most auto-injectable epinephrine products are not recommended for use with small children (infants and toddlers), the risks of death from true anaphylaxis are greater than the risks for administering epinephrine to this age group.

The following table gives guidelines for choosing the adult versus the pediatric version of the epinephrine auto-injector. **Do not** delay to find the person’s exact weight (e.g., **do not** weigh them, look up records, etc.). Use your best guess.

Auto-injector name	Dose	Weight range	Approximate age
Auvi-Q® (orange/red) EpiPen® (yellow) Amneal (yellow) Teva (yellow)	0.3 mg	over 65 pounds	9-10 or older
Auvi-Q® (blue) EpiPenJr® (green) Amneal (orange) Teva (green)	0.15 mg	35-65 pounds	3 to 9-10 years
Auvi-Q (pale purple)	0.1 mg	16.5-33 pounds	Infants and toddlers

## VI. Preparation and Prevention

Advanced planning is important to reduce the risk of severe allergic response. Detailed measures to reduce risks related to specific types of allergens are listed in Section IV: Allergens and Allergy Triggers, pp. 10-18.

### General preparation and prevention

- **Verify the emergency response plan** for your setting. Review and practice it at least annually. Ensure you know:
  - **where** the epinephrine is kept
  - **what** to doRoutinely review the steps and process for all types of autoinjectors available in your setting



- **who** is trained in first aid and CPR  
Ideally – you are!
- **how** to get emergency help  
How long does it normally take EMS to respond to your location?  
Where is the nearest hospital?
- **when** are epinephrine autoinjectors re-stocked?  
who to notify that a dose was used  
who ensures doses are in date (not expired) and contain clear solution (not brown and no particles).
- Make every effort beforehand to **identify individuals at higher risk**, including those with a history of allergic reactions, and what signs and symptoms they experienced with prior reactions.
  - This information should be obtained from the individual, student, parent and/or physician as appropriate.
  - Consider standard practices for your organization or school: do enrollment or sign-up forms invite people to share relevant health and allergy information?
- In settings with consistent groups of children, ensure each child with known anaphylaxis risk has an **emergency care plan** in place.<sup>xlvi</sup>
  - If possible, collaborate with parents/guardians to ensure plans address individualized symptoms and needs.
  - See Appendix B for related resources from the American Academy of Pediatrics
- Obtain **signed permission forms** allowing emergency treatment per facility policy if applicable.
- When possible, **provide information** to individuals regarding the prevention of and preparation for anaphylaxis, such as:
  - Avoid exposure to known allergens
  - Carry their emergency epinephrine
  - Wear a Medic Alert® bracelet/necklace or other identification
  - Keep applicable plans and permission forms up-to-date

## VII. Summary and Review

Anaphylaxis is a severe, potentially fatal systemic allergic reaction. It is characteristically unexpected and rapid in onset. Immediate injection of epinephrine is the single action most likely to save a life under these circumstances.<sup>xlvi, xlviii</sup>

---

Remember, it is safer to give the epinephrine than to delay treatment while waiting for more severe symptoms!

---

### ➤ Signs and symptoms of severe allergic response

A severe allergic response can have one sign, or many signs. *Any signs* should prompt immediate intervention, including injection of epinephrine and calling 9-1-1.

Describe an example for each category of symptom. See *Signs and Symptoms of Severe Allergic Response*, p.8.

- Abdominal changes example: \_\_\_\_\_
- Anxiety example: \_\_\_\_\_
- Breathing difficulty example: \_\_\_\_\_
- Circulation changes example: \_\_\_\_\_
- Skin changes example: \_\_\_\_\_
- Swelling example: \_\_\_\_\_

### ➤ Allergic Reactions and Allergens

Onset of anaphylaxis may be from minutes to hours after contact with the allergy-causing substance. Severe reactions can occur in someone with no history of previous allergic reaction. Many cases have no identified cause.

Name one common cause in each category of allergen. See *Allergens and Allergy Triggers*, pp. 10-18.

- Insect stings: \_\_\_\_\_
- Food or drink: \_\_\_\_\_
- Medications: \_\_\_\_\_
- Latex: \_\_\_\_\_

### ➤ Treatment Protocol for Severe Allergic Response

The basic sequence of steps relies on recognition of signs and symptoms, and immediate injection of epinephrine using an auto-injector device.

The *Treatment Protocol for Severe Allergic Response* (pp. 19-20) can be briefly summarized as follows:

1. Identify signs and symptoms; maintain airway and breathing.
2. Have the person sit or lie down.
3. Select the auto-injector.
4. Administer epinephrine. Note the time.
5. Call 9-1-1.
6. Maintain airway and breathing.
7. Position for safety, and remove the stinger
8. Monitor for changes
9. Administer 2<sup>nd</sup> dose after 5 minutes, if not improved.
10. Inform EMS of symptoms, time of dose, changes.
11. Consider inhaler for persons with asthma.
12. Encourage medical care and follow-up.

Provide more details for the steps. For example:

- Step 1: Signs and symptoms include \_\_\_\_\_
- Step 3: Auto-injector dose options include \_\_\_\_\_
- Step 4: Steps of using an auto-injector include \_\_\_\_\_
- Step 6: Protecting the airway includes \_\_\_\_\_
- Step 7: Positioning examples include \_\_\_\_\_

#### ➤ Preparation and prevention

Advanced planning is important to reduce the risk of allergen exposures and severe allergic response.

Describe at least one risk-reduction strategy for an allergen that may be present in your setting. See *Allergens and Allergy Triggers*, p8.

Identify details for at least one preparation strategy applicable to your setting, and describe your role related to that strategy.

- Setting-specific emergency response plan \_\_\_\_\_
- Know/access local emergency response \_\_\_\_\_
- Ensure epinephrine autoinjectors are re-stocked properly \_\_\_\_\_
- Identify individuals at higher risk \_\_\_\_\_
- Individualized emergency care plans \_\_\_\_\_
- Provide information, education \_\_\_\_\_

## Practical Focus Activity

The **Practical Focus Activity** on the following pages is intended to assist the adult learner to identify strengths versus learning needs. It is formatted to improve comprehension, preparation, and confidence.

- The **Individual Reflection** to rate level of confidence should be conducted prior to the presentation, and again after the presentation is complete.
- The **Assessment of Understanding** should be conducted individually. It may be conducted prior to the presentation, to enhance learning focus, or after the presentation, to reinforce specific concepts.
- The **Group Debriefing** should be conducted after the presentation, to review the questions covered in the Assessment of Understanding.
- The **Optional Activity** may further assist adult learners to feel prepared and confident responding.

Additional evaluation options:

- **Training Protocol Slides** offer scenarios for discussion.
- **Summary and Review** offers questions to reinforce learning.

## Epinephrine Training Protocol Practical Focus Activity

Name \_\_\_\_\_ Date \_\_\_\_\_

### **Individual Reflection**

*Complete a. through e. before the presentation, and again after.*

Instructions: Rate your level of confidence to the following statements with a 1-5 scale.

1 = not confident at all      5 = very confident

- a. I know the difference between a normal allergic response and a severe allergic response.      *Before: 1 2 3 4 5*      *After: 1 2 3 4 5*
  
- b. I know how epinephrine will potentially reverse the effects of a severe allergic response.      *Before: 1 2 3 4 5*      *After: 1 2 3 4 5*
  
- c. I feel comfortable preparing an auto-injector for administering epinephrine.      *Before: 1 2 3 4 5*      *After: 1 2 3 4 5*
  
- d. I feel comfortable giving epinephrine.      *Before: 1 2 3 4 5*      *After: 1 2 3 4 5*
  
- e. I know what I need to do after giving a person epinephrine while I wait for emergency medical personnel to arrive.      *Before: 1 2 3 4 5*      *After: 1 2 3 4 5*

### **Assessment of Understanding**

*This activity may be performed before or after the presentation.*

Instructions: Complete questions 1 through 7 independently and without references.

1. The most common causes of a severe allergic response are listed below. Circle the causes that are most common in your volunteer work or employment situation. Then, list 3-5 specific signs and symptoms under each circled cause that will tell you when it is time to give epinephrine to a person experiencing those signs and symptoms in your environment.

Insect sting(s)

Food

Medication

Latex

2. Answer the following questions, assuming the scenario you described in the above question is happening now.
  - a. Where is the epinephrine kept in your setting (and who should retrieve it)?
  - b. Who besides yourself is trained in first aid and/or CPR? How will you get them to you?
  - c. How should the call or activation of emergency response be carried out (per agency or organizational policy)?
  - d. What brand or type of auto-injector will you be expected to use?
  
3. You just gave an auto-injector of epinephrine to a child after they experienced swelling in their face, lips and arms, difficulty breathing and a change to their skin color (blue) from an insect sting. The epinephrine decreased the swelling and the child's skin returned to its normal color. The child is breathing better. However, the child now complains of nausea and a headache. You also notice they are shaking. EMS is 15 minutes away. What should you do now?
  - a. Do nothing until EMS arrives
  - b. Monitor the child for any return of the original signs or symptoms
  - c. Give the child acetaminophen for their headache
  - d. Give a second dose of epinephrine with another auto-injector

Read the following scenario and answer the next two questions.

You are finishing the lunch hour potluck at work with several colleagues when you notice Vladdie McHivesy, one of the participants, holding their abdomen. Their lips are pale in color. Hives are present on both arms and around their neck. You ask if they are okay, and they reply with, "I might have to throw up."

4. Choose the correct statement regarding Vladdie's signs and symptoms.
  - a. All of the signs and symptoms point to a normal allergic response.
  - b. All of the signs and symptoms point to an exaggerated allergic response.
  - c. All of the signs and symptoms point to a severe allergic response.
  
5. You ask if they think they are having an allergic reaction. Vladdie states, "I'm allergic to bees, but I haven't been stung today." Based on this training, this information:
  - a. Is helpful, but not necessary for the decision to give epinephrine via an auto-injector.

- b. Is necessary because an epinephrine auto-injector cannot be used unless a person has a history of allergic reactions.
  - c. Is confirmation that Vladdie's signs are symptoms are **not** related to an allergic response, and epinephrine is not needed.
6. The adult dose of epinephrine is twice as strong as the child dose.  
True                  False
7. A responder should hold the auto-injector against the thigh for 2-10 seconds after initiating the epinephrine injection.  
True                  False

### **Group Debriefing**

*Complete this debriefing as a group after the presentation.*

Instructions: Review the answers to the above questions and clarify any missed points, assumptions, or gaps in knowledge. Refer to the training manual as needed.

1. See pp. 10-18 (*and local setting details*)
2. *local setting details*
3. See p.18.
4. See p.8.
5. See p.7 and p.10.
6. See p.16.
7. See p.21.

### **Optional activity**

Take several minutes to respond to the following questions:

- How confident do you feel in recognizing and treating an allergic response to an allergen?
- How can we help one another in becoming more confident and prepared in our response?

## VIII. Appendix

### Resources From the American Academy of Pediatrics

The following resources are available online. If you need assistance accessing these resources, please see the contact information at the front of this manual.

- [AAP Webpage- Allergy & Anaphylaxis Management in Schools](#)
- [AAP Policy- Management of Food Allergy in the School Setting](#)
- [AAP Clinical Report- Epinephrine for First-aid Management of Anaphylaxis](#)
- [AAP Clinical Report- Guidance on Completing a Written Allergy and Anaphylaxis Emergency Plan](#)
- [AAP School Health Learning Burst: Food Allergy Management in Schools](#)
- [AAAAI Stock Epinephrine Toolkit for Schools](#)
- [Allergy & Anaphylaxis Emergency Plan](#)
- AAP's HealthyChildren.org Articles for Parents & Families
  - [Food Allergy in Children](#)
  - [Anaphylaxis in Infants & Children](#)
  - [How to use an Epinephrine Auto-Injector](#)
  - [AAP Offers Customizable Allergy & Anaphylaxis Emergency Plan to Guide Effective Management](#)
  - [Create an Allergy and Anaphylaxis Emergency Plan: AAP Report Explained](#)

### State Laws

The following laws pertain to trainings for, and use of, epinephrine in Oregon. Full text is available online. If you need assistance to access these laws, please see the contact information at the front of this manual.

➤ Oregon Revised Statute (ORS)

[ORS 339.866](#) Self-Administration of Medication by Students

[ORS 339.869](#) Administration of Medication to Students

[ORS 433.800](#) Definitions for ORS 433.800 to 433.830.

[ORS 433.805](#) Policy.

[ORS 433.810](#) Duties of Oregon Health Authority; rules.

[ORS 433.815](#) Educational training.

[ORS 433.817](#) Educational training conducted by...

[ORS 433.820](#) Eligibility for training.

[ORS 433.825](#) Availability of doses of epinephrine, glucagon, and medication that treats adrenal insufficiency to trained persons



[ORS 433.830](#) Immunity of trained person and institution rendering emergency assistance

➤ Oregon Administrative Rules (OAR)

[OAR 333-055-0000](#) Purpose

[OAR 333-055-0006](#) Definitions

[OAR 333-055-0015](#) Educational Training

[OAR 333-055-0021](#) Eligibility for Training

[OAR 333-055-0030](#) Certificates of Completion of Training

[OAR 333-055-0035](#) Circumstances in Which Trained Persons May Administer Epinephrine, Glucagon, or Medication to Treat Adrenal Crisis

## Statement of Completion Note to Trainers

---

See contact information at the front of this manual to request Statement of Completion cards which include the Authorization to Obtain Epinephrine.

---

The Statement of Completion on the next page verifies training but **does not** include the Authorization to Obtain Epinephrine. This version should only be used in training situations when individuals completing training **will not** obtain doses of epinephrine. Otherwise, use Statement of Completion cards obtained from the Oregon Health Authority.

Treatment of Severe Allergic Response  
Statement of Completion

This certifies that:

*Name*

---

*Address*

---

has completed an approved training program covering recognition of symptoms of systemic reactions to allergens and proper administration of epinephrine, pursuant to ORS 433.800 to 433.830 and rules of the Oregon Health Authority, Public Health Division. Under ORS 433.825 this person is authorized to administer epinephrine in a severe allergic reaction emergency.

\_\_\_\_\_  
Signature of Authorized Trainer

\_\_\_\_\_  
Date Trained

\_\_\_\_\_  
Authorized Trainer License #

Rev. 12/2024

---

## References

- <sup>i</sup> Anagnostou K. (2018). Anaphylaxis in Children: Epidemiology, Risk Factors and Management. *Current pediatric reviews*, 14(3), 180–186.  
<https://doi.org/10.2174/1573396314666180507115115> Accessed at <https://www.eurekaselect.com/article/90217>
- <sup>ii</sup> Golden, D. B. K., Wang, J., Wasserman, S., Akin, C., Campbell, R. L., Ellis, A. K., Greenhawt, M., Lang, D. M., Ledford, D. K., Lieberman, J., Oppenheimer, J., Shaker, M. S., Wallace, D. V., Abrams, E. M., Bernstein, J. A., Chu, D. K., Horner, C. C., Rank, M. A., Stukus, D. R., Collaborators, ... Wang, J. (2024). Anaphylaxis: A 2023 practice parameter update. *Annals of allergy, asthma & immunology : official publication of the American College of Allergy, Asthma, & Immunology*, 132(2), 124–176.  
<https://doi.org/10.1016/j.anai.2023.09.015>
- <sup>iii</sup> Neugut, A. I., Ghatak, A. T., & Miller, R. L. (2001). Anaphylaxis in the United States: an investigation into its epidemiology. *Archives of internal medicine*, 161(1), 15–21.  
<https://doi.org/10.1001/archinte.161.1.15> Retrieved from <https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/646961#:~:text=Tens%20of%20thousands%20of%20anaphylactic%20reactions%20occur%20each%20year.&text=It%20is%20estimated%20that%201,suffers%20from%20an%20anaphylactic%20reaction.&text=Furthermore%2C%20the%20risk%20of%20death,500%20to%201000%20deaths%20annually.>
- <sup>iv</sup> Novembre, E., Gelsomino, M., Liotti, L., Barni, S., Mori, F., Giovannini, M., Mastrorilli, C., Pecoraro, L., Saretta, F., Castagnoli, R., Arasi, S., Caminiti, L., Klain, A., & Del Giudice, M. M. (2024). Fatal food anaphylaxis in adults and children. *Italian journal of pediatrics*, 50(1), 40. <https://doi.org/10.1186/s13052-024-01608-x>
- <sup>v</sup> Dribin, T. E., Motosue, M. S., & Campbell, R. L. (2022). Overview of Allergy and Anaphylaxis. *Emergency medicine clinics of North America*, 40(1), 1–17.  
<https://doi.org/10.1016/j.emc.2021.08.007>. Accessed at <https://www.sciencedirect.com/science/article/abs/pii/S0733862721000808?via%3DiHub>
- <sup>vi</sup> Muraro, A., Worm, M., Alviani, C., Cardona, V., DunnGalvin, A., Garvey, L. H., Riggioni, C., de Silva,

- 
- D., Angier, E., Arasi, S., Bellou, A., Beyer, K., Bijlhout, D., Bilò, M. B., Bindslev-Jensen, C., Brockow, K., Fernandez-Rivas, M., Halken, S., Jensen, B., Khaleva, E., ... European Academy of Allergy and Clinical Immunology, Food Allergy, Anaphylaxis Guidelines Group (2022). EAACI guidelines: Anaphylaxis (2021 update). *Allergy*, 77(2), 357–377. <https://doi.org/10.1111/all.15032>. Accessed at <https://onlinelibrary.wiley.com/doi/10.1111/all.15032>.
- <sup>vii</sup> Foong, R. X., Patel, N. B., Turner, P., Roberts, G. C., & Fox, A. T. (2023). Preventing food allergy fatalities. *Archives of disease in childhood*, 108(9), 698–702. <https://doi.org/10.1136/archdischild-2022-324911>
- <sup>viii</sup> Adams, K. E., Tracy, J. M., & Golden, D. B. K. (2022). Anaphylaxis to Stinging Insect Venom. *Immunology and allergy clinics of North America*, 42(1), 161–173. <https://doi.org/10.1016/j.iac.2021.09.003>
- <sup>ix</sup> Pouessel, G., Turner, P. J., Worm, M., Cardona, V., Deschildre, A., Beaudouin, E., Renaudin, J. M., Demoly, P., & Tanno, L. K. (2018). Food-induced fatal anaphylaxis: From epidemiological data to general prevention strategies. *Clinical and experimental allergy : journal of the British Society for Allergy and Clinical Immunology*, 48(12), 1584–1593. <https://doi.org/10.1111/cea.13287>
- <sup>x</sup> Poowuttikul, P., & Seth, D. (2021). Anaphylaxis in Children and Adolescents. *Immunology and allergy clinics of North America*, 41(4), 627–638. <https://doi.org/10.1016/j.iac.2021.07.009>
- <sup>xi</sup> Nunes, F. A., Zanini, F., Braga, C. S., da Silva, A. L., Fernandes, F. R., Solé, D., & Wandalsen, G. F. (2022). Incidence, triggering factors, symptoms, and treatment of anaphylaxis in a pediatric hospital. *The World Allergy Organization journal*, 15(9), 100689. <https://doi.org/10.1016/j.waojou.2022.100689>
- <sup>xii</sup> Poowuttikul, P., & Seth, D. (2021)
- <sup>xiii</sup> Tedner, S. G., Asarnoj, A., Thulin, H., Westman, M., Konradsen, J. R., & Nilsson, C. (2022). Food allergy and hypersensitivity reactions in children and adults-A review. *Journal of internal medicine*, 291(3), 283–302. <https://doi.org/10.1111/joim.13422>
- <sup>xiv</sup> Adams, K. E., Tracy, J. M., & Golden, D. B. K. (2022)
- <sup>xv</sup> Mikhail, I., Stukus, D. R., & Prince, B. T. (2021). Fatal Anaphylaxis: Epidemiology and Risk Factors. *Current allergy and asthma reports*, 21(4), 28. <https://doi.org/10.1007/s11882-021-01006-x>
- <sup>xvi</sup> Turner, P. J., Arasi, S., Ballmer-Weber, B., Baseggio Conrado, A., Deschildre, A., Gerdtts, J., Halken, S., Muraro, A., Patel, N., Van Ree, R., de Silva, D., Worm, M., Zuberbier, T.,

- 
- Roberts, G., & Global Allergy, Asthma European Network (GA2LEN) Food Allergy Guideline Group (2022). Risk factors for severe reactions in food allergy: Rapid evidence review with meta-analysis. *Allergy*, 77(9), 2634–2652. <https://doi.org/10.1111/all.15318>
- <sup>xvii</sup> Bilò, M. B., Martini, M., Tontini, C., Corsi, A., & Antonicelli, L. (2021). Anaphylaxis. *European annals of allergy and clinical immunology*, 53(1), 4–17. <https://doi.org/10.23822/EurAnnACI.1764-1489.158>
- <sup>xviii</sup> Nunes et. al. (2022)
- <sup>xix</sup> Ng AE, Boersma P. Diagnosed allergic conditions in adults: United States, 2021. NCHS Data Brief, no 460. Hyattsville, MD: National Center for Health Statistics. 2023. DOI: <https://dx.doi.org/10.15620/cdc:122809>. Retrieved from <https://www.cdc.gov/nchs//data/databriefs/db460.pdf>
- <sup>xx</sup> Dribin, T. E., Motosue, M. S., & Campbell, R. L. (2022)
- <sup>xxi</sup> Turner et.al. (2017)
- <sup>xxii</sup> Yu, R. J., Krantz, M. S., Phillips, E. J., & Stone, C. A., Jr (2021). Emerging Causes of Drug-Induced Anaphylaxis: A Review of Anaphylaxis-Associated Reports in the FDA Adverse Event Reporting System (FAERS). *The journal of allergy and clinical immunology. In practice*, 9(2), 819–829.e2. <https://doi.org/10.1016/j.jaip.2020.09.021>. Accessed at [https://www.jaci-inpractice.org/article/S2213-2198\(20\)30999-5/abstract](https://www.jaci-inpractice.org/article/S2213-2198(20)30999-5/abstract)
- <sup>xxiii</sup> Navalpakam, A., Thanaputkaiporn, N., & Poowuttikul, P. (2022). Management of Anaphylaxis. *Immunology and allergy clinics of North America*, 42(1), 65–76. <https://doi.org/10.1016/j.iac.2021.09.005>
- <sup>xxiv</sup> Gulen, T., & Akin, C. (2021). Idiopathic Anaphylaxis: a Perplexing Diagnostic Challenge for Allergists. *Current allergy and asthma reports*, 21(2), 11. <https://doi.org/10.1007/s11882-021-00988-y>
- <sup>xxv</sup> Motosue, M. S., Li, J. T., & Campbell, R. L. (2022). Anaphylaxis: Epidemiology and Differential Diagnosis. *Immunology and allergy clinics of North America*, 42(1), 13–25. <https://doi.org/10.1016/j.iac.2021.09.010>
- <sup>xxvi</sup> Adams, K. E., Tracy, J. M., & Golden, D. B. K. (2022)
- <sup>xxvii</sup> Turner et.al. (2017)
- <sup>xxviii</sup> Matysiak, J., Matuszewska, E., Packi, K., & Klupczyńska-Gabryszak, A. (2022). Diagnosis

---

of *Hymenoptera* Venom Allergy: State of the Art, Challenges, and Perspectives. *Biomedicines*, 10(9), 2170.

<https://doi.org/10.3390/biomedicines10092170>

xxix Herness J, et al. (2022) Arthropod bites and stings. *American Family Physician*.

[www.aafp.org/afp](http://www.aafp.org/afp) .

xxx Herness J, et al. (2022)

xxxi Centers for Disease Control and Prevention (2019). QuickStats: Percentage of Children Aged <18 Years with a Food or Digestive Allergy in the Past 12 Months, by Age Group — National Health Interview Survey, 2007–2018. *MMWR Morb Mortal Wkly Rep*, 68:831. DOI: [http://dx.doi.org/10.15585/mmwr.mm6838a6external icon](http://dx.doi.org/10.15585/mmwr.mm6838a6external_icon).

xxxii Gupta, R. S., Warren, C. M., Smith, B. M., Jiang, J., Blumenstock, J. A., Davis, M. M., Schleimer, R. P., & Nadeau, K. C. (2019). Prevalence and Severity of Food Allergies Among US Adults. *JAMA network open*, 2(1), e185630. <https://doi.org/10.1001/jamanetworkopen.2018.5630>

xxxiii Hicks, A., Palmer, C., Bauer, M., & Venter, C. (2021). Accidental ingestions to known allergens by food allergic children and adolescents. *Pediatric allergy and immunology : official publication of the European Society of Pediatric Allergy and Immunology*, 32(8), 1718–1729. <https://doi.org/10.1111/pai.13573>

xxxiv Bright, D. M., Stegall, H. L., & Slawson, D. C. (2023). Food Allergies: Diagnosis, Treatment, and Prevention. *American family physician*, 108(2), 159–165. Accessed at <https://www.aafp.org/pubs/afp/issues/2023/0800/food-allergies.html>

xxxv Turner et.al. (2017)

xxxvi Baseggio Conrado, A., Patel, N., & Turner, P. J. (2021). Global patterns in anaphylaxis due to specific foods: A systematic review. *The Journal of allergy and clinical immunology*, 148(6), 1515–1525.e3. <https://doi.org/10.1016/j.jaci.2021.03.048>

xxxvii Lin C. H. (2019). Food allergy: what it is and what it is not?. *Current opinion in gastroenterology*, 35(2), 114–118. <https://doi.org/10.1097/MOG.0000000000000506>

xxxviii Dilber, D. H., Ozceker, D., & Terzi, O. (2022). Drug Allergy in Children: What is the Actual Frequency of Drug Allergies?. *Sisli Etfal Hastanesi tip bulteni*, 56(4), 552–558. <https://doi.org/10.14744/SEMB.2022.65642>

xxxix Yu, R. J., Krantz, M. S., Phillips, E. J., & Stone, C. A., Jr (2021)

- 
- <sup>xi</sup> Blumenthal, K. G., Peter, J. G., Trubiano, J. A., & Phillips, E. J. (2019). Antibiotic allergy. *Lancet (London, England)*, 393(10167), 183–198. [https://doi.org/10.1016/S0140-6736\(18\)32218-9](https://doi.org/10.1016/S0140-6736(18)32218-9)
- <sup>xii</sup> Nguyen, K., Kohli, A., & Byers, M. (2022). Latex Allergy (Nursing). In *StatPearls*. StatPearls Publishing
- <sup>xiii</sup> Turner et.al. (2017)
- <sup>xiiii</sup> Patel, N., Chong, K. W., Yip, A. Y. G., Ierodiakonou, D., Bartra, J., Boyle, R. J., & Turner, P. J. (2021). Use of multiple epinephrine doses in anaphylaxis: A systematic review and meta-analysis. *The Journal of allergy and clinical immunology*, 148(5), 1307–1315. <https://doi.org/10.1016/j.jaci.2021.03.042>
- <sup>xlv</sup> Kessler, C., Edwards, E., Dissinger, E., Sye, S., Visich, T., & Grant, E. (2019). Usability and preference of epinephrine auto-injectors: Auvi-Q and EpiPen Jr. *Annals of allergy, asthma & immunology : official publication of the American College of Allergy, Asthma, & Immunology*, 123(3), 256–262. <https://doi.org/10.1016/j.anai.2019.06.005>
- <sup>xlvi</sup> Portnoy, J., Wade, R. L., & Kessler, C. (2019). Patient Carrying Time, Confidence, and Training with Epinephrine Autoinjectors: The RACE Survey. *The journal of allergy and clinical immunology. In practice*, 7(7), 2252–2261. <https://doi.org/10.1016/j.jaip.2019.03.021>
- <sup>xlvii</sup> Oregon Revised Statutes 339.866 Self-Administration of Medication by Students [ORS 339.866](#)
- <sup>xlviii</sup> Motosue, M. S., Li, J. T., & Campbell, R. L. (2022).
- <sup>xlviii</sup> Nguyen, S. M. T., Rupprecht, C. P., Haque, A., Pattanaik, D., Yusin, J., & Krishnaswamy, G. (2021). Mechanisms Governing Anaphylaxis: Inflammatory Cells, Mediators, Endothelial Gap Junctions and Beyond. *International journal of molecular sciences*, 22(15), 7785. <https://doi.org/10.3390/ijms22157785>