King County EMS BLS TRAINING AND EDUCATION
Continuing Education Module CBT 932D

Objectives
At the completion of this course, you will be able to:

1. Identify the key components of anaphylaxis.
2. Identify situations in which EMTs should administer epinephrine.
3. Identify the correct sequence of steps for administering epinephrine by auto-injector.

Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tr>
<td>allergen</td>
<td>A substance that causes an allergic reaction</td>
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<tr>
<td>allergic reaction</td>
<td>An altered or acquired hypersensitivity or an abnormal reaction of the body to certain drugs or biologic substances</td>
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<tr>
<td>anaphylaxis</td>
<td>An immediate, life-threatening allergic reaction</td>
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<td>auto-injector</td>
<td>Specialized equipment used for the self-administration of medications</td>
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<td>beta-blocker</td>
<td>A cardiac medication used in the treatment of angina, hypertension, and arrhythmia; it blocks the effects of epinephrine</td>
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<td>bronchoconstriction</td>
<td>Reduction of the caliber of a bronchus</td>
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<tr>
<td>epinephrine</td>
<td>A substance that occurs naturally in the body; it can also be synthesized and is used in medicine as a heart stimulant, vasoconstrictor, and bronchodilator</td>
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<tr>
<td>histamine</td>
<td>Chemical substance released by the mast cells as part of an allergic reaction; stimulates gastric secretion, bronchoconstriction, and vasodilation</td>
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<td>pulmonary edema</td>
<td>Build-up of fluid in the lungs</td>
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<td>stridor</td>
<td>A harsh or high-pitched sound heard on inspiration which may be due to an upper airway obstruction</td>
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<tr>
<td>sustained tachycardia</td>
<td>Persistent heart rate 120 per minute or greater depending on clinical settings.</td>
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<tr>
<td>sympathetic nervous system</td>
<td>Division of the autonomic nervous system concerned with processes of energy utilization and the &quot;fight or flight&quot; response</td>
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References
Seattle – King County 2010 EMT Patient Care Protocols.
Emergency Care and Transportation of the Sick and Injured, 9th ed. (AAOS)
Brady's Prehospital Emergency Care, 10th ed., Pearson Prentice Hall
Case Study
You are dispatched to a local park for a "difficulty breathing" call. Upon arrival, a very anxious woman states that her friend's son cannot breathe. She quickly leads you over to a picnic area where there are several people gathered around a young boy sitting on the ground, who appears to be in severe respiratory distress. An adult states that one of the children must have disturbed a beehive because several people were stung. The young boy seems to be the worst off. His mother indicates that he has a history of bee sting allergies, but that his bee sting kit was left at home. What should you do?

Allergic Reaction and Anaphylaxis
An allergy is the body’s exaggerated response to a foreign material, called an allergen. Common allergens are dust, pollen, and animal hair or dander. Many people suffer from the symptoms of allergies, which may include itchy, runny eyes and nose, sneezing ("hay fever"), asthma, and hives or rash. The term anaphylaxis or anaphylactic shock refers to a severe, often life-threatening allergic reaction. True anaphylaxis is very rare; many EMTs may never see a case in their entire career. Any allergen can cause anaphylaxis.

Common Allergens

<table>
<thead>
<tr>
<th>FOODS</th>
<th>Nuts (especially peanuts), shellfish, eggs, milk</th>
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<tbody>
<tr>
<td>VENOM</td>
<td>Bees, hornets, wasps, spiders, ants</td>
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<tr>
<td>DRUGS</td>
<td>Anesthetics, antibiotics, x-ray contrast dyes</td>
</tr>
<tr>
<td>OTHER</td>
<td>Latex</td>
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</table>

In most cases, a person must have been exposed to a substance at least once before becoming sensitive to it. The body releases chemicals, called histamines, into the bloodstream when it encounters that substance again. The histamines have many harmful effects, including bronchoconstriction, blood vessel dilatation and leakage, as well as swelling of soft tissues. Typically, anaphylaxis occurs within minutes after exposure to the allergen. In rare cases, symptoms can occur up to 12 hours following exposure.

Differentiating Allergic Reaction and Anaphylaxis
It is important for the EMT to differentiate between a minor or moderate allergic reaction and true anaphylaxis. Anaphylaxis is an acute reaction, which often affects several body systems. There are two primary components to life-threatening anaphylaxis: severe respiratory distress and hypotension.
Primary Components of Anaphylaxis

**SEVERE**

**RESPIRATORY DISTRESS**

Evidenced by shortness of breath, dyspnea, stridor, wheezing, cyanosis, and a decreased level of consciousness due to hypoxia and hypotension

**HYPOTENSION**

Caused by dilatation and leaking of the blood vessels compounded by hypoxia

Allergic reactions can be localized, such as a raised area on the skin from a sting or bite, or they can become systemic and affect the respiratory and circulatory systems.

In addition to these presentations, a person with anaphylaxis or an allergic reaction may also present with the following signs and symptoms:

- Hives, swelling of the skin, sometimes around the site of exposure (e.g. bee sting), but often generalized
- Abdominal cramps, vomiting, diarrhea

**Vital Signs and Anaphylaxis**

<table>
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<tr>
<th><strong>BLOOD PRESSURE</strong></th>
<th>Low if hypotensive component is present</th>
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<tbody>
<tr>
<td><strong>PULSE</strong></td>
<td>Usually elevated secondary to body’s response to stress</td>
</tr>
<tr>
<td><strong>RESPIRATIONS</strong></td>
<td>Elevated if respiratory component is present</td>
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</tbody>
</table>

A patient with a severe allergic reaction and hypotension or severe respiratory distress should be considered to be having an anaphylactic reaction. The presentation of anaphylaxis is quite variable; a patient may have all of the symptoms listed above or may have only one or two.

**Mild Allergic Reaction**

A person with a mild allergic reaction generally has stable vital signs. If anxious, he or she may have an increased heart and respiratory rate, but will not be hypotensive. Many patients with allergies complain of shortness of breath, but their distress is not severe and generally resolves quickly with oxygen and calming. The use of epinephrine is not indicated in cases of mild allergic reaction (e.g. hives only).

**Assessment of Anaphylaxis: Subjective Information**

Conduct an interview with the patient, a family member, or a bystander. Use the following questions as a guide for completing the focused history:
TABLE 4: Focused History for Patients with Anaphylaxis

- Do you have a known history of allergic reaction or anaphylaxis?
- Have you had any reactions in the past?
- What reaction did you have then? Is it different now?
- Do you have medication or a prescription for this? * Have you taken it?

*Acceptable proof of prescription includes a statement from patient, parent or guardian; copy of prescription; medic alert tag; or physician's statement.

Gather the necessary information from a family member or bystander if the patient is unresponsive, has an altered level of consciousness, or is a young child.

Assessment of Anaphylaxis

You must first perform an initial assessment and a physical exam and focused history to determine the cause and severity of the patient’s condition. Upon approaching the patient, evaluate respiratory effort and level of consciousness. Look for signs of respiratory distress, such as:

- Anxiety
- Labored breathing
- Tachypnea
- Audible wheezes
- Accessory muscle use
- Retractions
- Stridor
- Nasal flaring
- Prolonged expirations
- Diminished lung sounds

Next, evaluate the patient’s skin and look for:

- Cyanosis
- Pallor (ashen color)
- Edema (swelling)
- Hives or rashes
- Redness
- Skin moisture
- Itching/scratches

Signs and Symptoms for Anaphylaxis

<table>
<thead>
<tr>
<th>SIGNS</th>
<th>SYMPTOMS</th>
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<tr>
<td>Labored breathing</td>
<td>Short of breath</td>
</tr>
<tr>
<td>Hives or rashes</td>
<td>Dizzy or lightheaded</td>
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<tr>
<td>Decreased blood pressure</td>
<td>Itching</td>
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<tr>
<td>Rapid pulse</td>
<td>Tightness in throat and/or chest</td>
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</table>
**Indications for Use**
EMTs may deliver epinephrine via an EpiPen injector for any case of suspected anaphylaxis—respiratory distress and/or hypotension must be present.

**Seattle EMTs**
- Patient (any age) has a history of same and a prescription for epinephrine
- Patient is less than 18 years of age with no prescription, but permission is obtained from parent or legal guardian. This may be written, oral or implied.

**King County EMTs**
There are no requirements for:
- Age
- Having a prescription
- Written/oral permission (beyond standard consent)

If there is doubt about the need for EpiPen, consult with local paramedic or local medical control doctor.

**Dosage**
- Adult and children over 30 kg or 66 lbs: use EpiPen (0.3 mg)
- Child under 30 kg or 66 lbs: use EpiPen Jr. (0.15 mg)

Before administering epinephrine, you must determine the patient is experiencing significant respiratory distress and/or hypotension. Contraindications for the use of epinephrine include pulmonary edema, hypothermia, and hypertension.

**Epinephrine**
Epinephrine is a substance that occurs naturally in the body, where it plays an important role in the sympathetic nervous system, and the system responsible for the "fight or flight" response. Injected epinephrine, which is given in larger quantities than occur naturally, has the same—but magnified—effects as natural epinephrine. During anaphylaxis, epinephrine’s positive effects include:

- Dilation of the bronchioles, improving respiratory status
- Constriction of the blood vessels, improving blood pressure and perfusion
Follow manufacturer’s directions for deployment. Instructions vary by type of device.

Epinephrine for the treatment of anaphylaxis is delivered by a preloaded, measured dose device called an auto-injector. The adult auto-injector (EpiPen®) delivers 0.3 mg of epinephrine. The pediatric auto-injector (EpiPen Jr®) delivers 0.15 mg and is used for patients under 66 lbs. (30kg). When given via auto-injector, the drug takes effect in a few minutes, and lasts 10 minutes or more. The location for epinephrine injection is the lateral part of the thigh, midway between the waist and knee.

If you have any doubt about the need for an EpiPen, consult with local paramedics or local medical control physician. Follow local protocol at all times!
Administration of Epinephrine
1. Check medication date and that the EpiPen dose matches to patient’s size.

2. Remove clothing and prep area of thigh with alcohol pad.

3. Remove safety cap and locate injection site on lateral thigh.

4. Place black tip of injector against thigh and push hard until injector activates.


6. Remove injector, place in sharps container and massage site for 10 seconds.


8. Continue to provide oxygen. Ventilate if necessary.

9. Monitor and document vitals every 5 minutes.

10. Update incoming medics on patient status and response to injection.

Transport all patients who are given epinephrine via EpiPen (pre- or post-EMS arrival) to a hospital for evaluation. The mode of transport depends on clinical findings and symptoms.
**After Giving Epinephrine**
Complete the following after administrating epinephrine:

- Note the time given as well as the type of device used.
- Document the response on the incident form.
- Continue to monitor vitals, at least every 5 minutes.
- Continue to provide oxygen. Ventilate the patient if necessary.
- Continue with an ongoing assessment and evaluate the patient’s signs and symptoms.

**Update the incoming paramedic unit if the patient's condition does not improve.**

In rare cases, a single dose of epinephrine may not be enough. The patient may continue to have hypotension, along with a decreasing level of consciousness, and/or increasing breathing difficulty. If the patient’s condition does not improve, consult online medical control or paramedic unit about injection of a second dose.

Be alert to epinephrine’s effects, which, in addition to improved blood pressure and respirations, may include an increased heart rate, palpitations, and anxiety. Such symptoms usually resolve within 20 minutes. Patients over age 35 may experience cardiac symptoms. Patients taking certain medications (e.g., cardiovascular medications called beta-blockers) may be relatively resistant to the effects of epinephrine.

**Case Study**
Following your initial assessment of the young boy, you obtain a blood pressure of 70/palp and a pulse rate of 118. His respiratory distress combined with his hypotension lead you to a conclusion of severe anaphylaxis. You ask the mother for permission to administer epinephrine and she agrees. You administer 0.15mg of epinephrine via auto-injector and call for paramedic back up. You continue treating the patient by lying him down and administering oxygen by non-rebreather mask while you wait for Medic One.

**Summary**
The following list outlines some of the key steps in the administration of epinephrine:

- Utilize proper body substance isolation (BSI) measures
- Perform an initial assessment
- Obtain baseline vital signs
- Determine presence of severe anaphylaxis
- Summon medic support
- If patient has evidence of a prescription, administer epinephrine
- Provide oxygen via non-rebreather mask
- Monitor vital signs