



# Chapter 18

## Immunologic Emergencies

# Introduction (1 of 2)

- At least 1,000 Americans per year die of allergic reactions.
- Allergy-related emergencies may involve:
  - Acute airway obstruction
  - Cardiovascular collapse

# Introduction (2 of 2)

- You must be able to treat these life-threatening complications.
- Immunology is the study of the body's immune system.

# Anatomy and Physiology



- Immune system protects the body from foreign substances and organisms.
- When a foreign substance invades the body:
  - Body goes on alert.
  - Body initiates a series of responses to inactivate the invader.

# Pathophysiology: Allergic Reaction (1 of 2)



- An allergic reaction is an exaggerated immune response to any substance.
- Not caused directly by an outside stimulus
- Caused by the body's immune system
  - Releases chemicals to combat stimulus
  - Include histamines and leukotrienes

# Pathophysiology: Allergic Reaction (2 of 2)

- Caused by the body's immune system
  - Releases chemicals to combat stimulus
  - Include histamines and leukotrienes
- Allergic reaction may be mild and local, or severe and systemic.

# Pathophysiology: Anaphylaxis (1 of 2)

- Anaphylaxis is an extreme, life-threatening allergic reaction.
  - Involves multiple organ systems
  - Wheezing is one of the most common signs.



# Pathophysiology: Anaphylaxis (2 of 2)



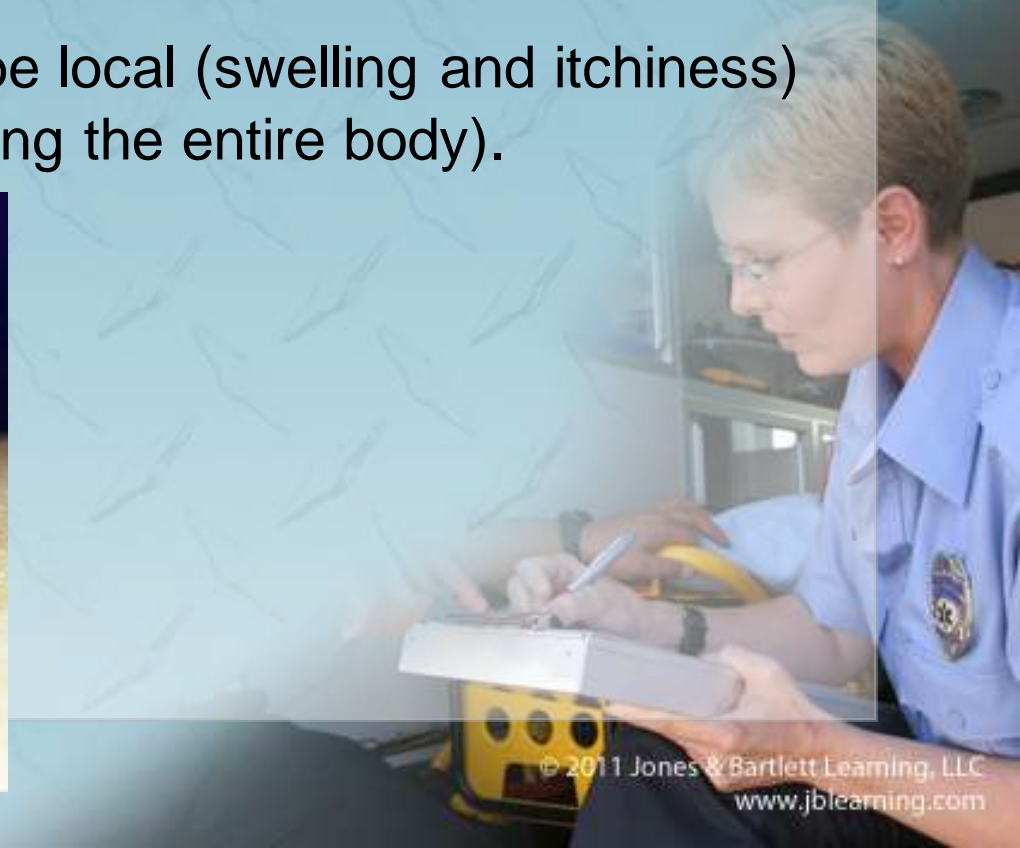
Source: ©Chuck Stewart, MD

- Urticaria (hives) is also present.
  - Consists of small areas of generalized itching or burning that appear as multiple, small, raised areas on the skin
  - You may also note hypotension as a result of hypovolemic shock.



# Common Allergens (1 of 3)

- Insect bites and stings
  - When an insect bites and injects the bite with its venom, this is called envenomation.
  - The reaction may be local (swelling and itchiness) or systemic (involving the entire body).



# Common Allergens (2 of 3)



Source: Courtesy of Carol B. Guerrero

- Medications
  - Penicillin injection may cause an immediate and severe reaction.
  - Oral penicillin may take longer.
  - A person will typically experience an allergic reaction after becoming sensitized.

# Common Allergens (3 of 3)

- Plants
  - Dusts, pollens, other plant materials
- Food
  - Reaction can be relatively slow
  - Shellfish, nuts
- Chemicals
  - Makeup, soap, latex



# Insect Stings (1 of 11)

- Death from stinging insects far outnumber deaths from snakebites.
  - Stinging organ of most insects is a small hollow spine projecting from the abdomen.
  - Venom can be injected directly into skin.

# Insect Stings (2 of 11)



Source: A. ©manfredxy/Shutterstock, Inc.



Source: B. ©Heintje Joseph T. Lee/Shutterstock, Inc.

- Honeybees cannot withdraw their stinger.
  - Fly away and die
- Wasps, hornets, and fire ants can sting multiple times.

# Insect Stings (3 of 11)

- Some ants, especially the fire ant, also strike repeatedly.
  - Often inject a particularly irritating toxin at the bite sites



Source: A. Courtesy of Scott Bauer/USDA



Source: B. © Chris Harvey/Shutterstock, Inc.

# Insect Stings (4 of 11)



Source: © Simon Krzic/Shutterstock, Inc.

- Signs and symptoms include:
  - Sudden pain
  - Swelling
  - Localized heat
  - Redness in light-skinned individuals
  - Itching and possibly a wheal



# Insect Stings (5 of 11)

- There is no specific treatment for these injuries.
  - Applying ice sometimes helps.
  - Swelling may be dramatic and frightening.
  - Local manifestations are not serious.



# Insect Stings (6 of 11)



- Stinger of the honeybee can continue to inject venom for up to 20 minutes.
- Attempt to remove the stinger by scraping the skin with the edge of a sharp, stiff object such as a credit card.



A man in a light blue shirt is looking at a patient's arm, which is resting on a white surface. The patient's arm has a small red mark, likely a sting. The background is a blurred outdoor setting with greenery.

# Insect Stings (7 of 11)

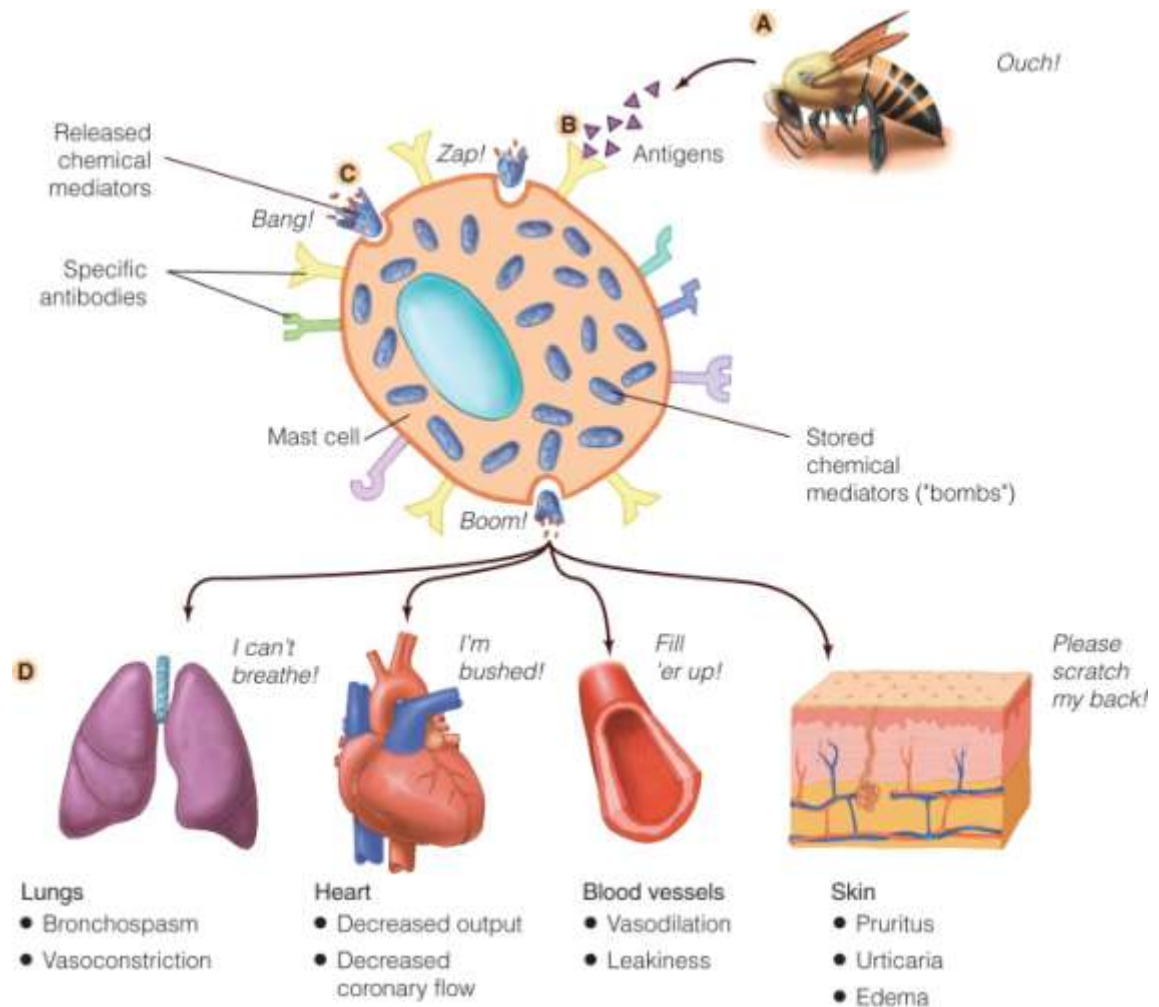
- Do not use tweezers or forceps.
- Wash the area with soap and water.
- Remove any jewelry from the area.
- Be alert for vomiting or signs of shock.
- Give oxygen if needed.
- Monitor the patient's vital signs.

A man in a light blue shirt is looking down at a document or a small object in his hands. The background is slightly blurred, showing some greenery.

# Insect Stings (8 of 11)

- About 5% of people may have anaphylactic reactions from:
  - Bees
  - Hornets
  - Yellow jackets
  - Wasps
- Account for 200 deaths per year.

# Insect Stings (9 of 11)



# Insect Stings (10 of 11)

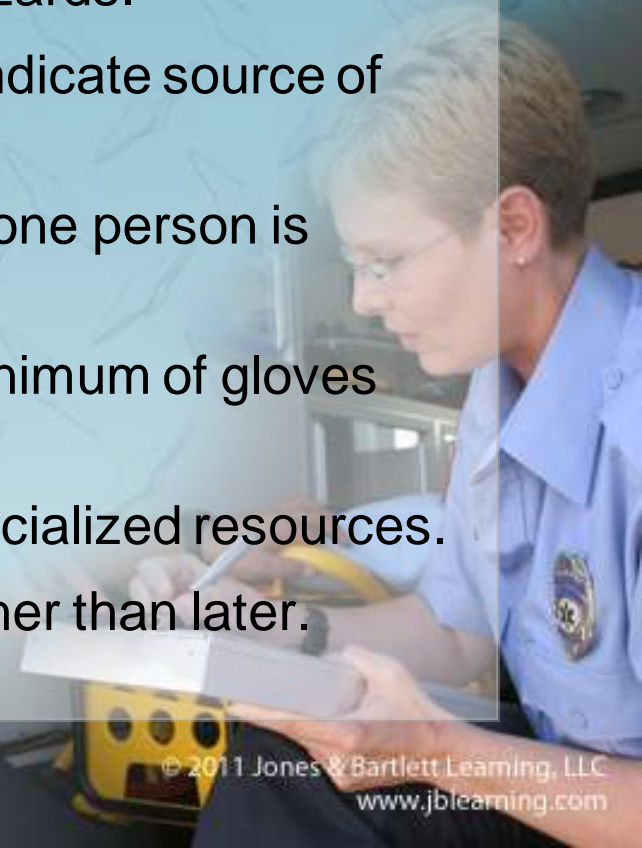
- Patients may experience:
  - Generalized itching and burning
  - Widespread urticaria
  - Wheals
  - Swelling of the lips and tongue
  - Bronchospasm and wheezing
  - Chest tightness and coughing
  - Dyspnea

# Insect Stings (11 of 11)

- Patients may experience (cont'd):
  - Anxiety
  - Abdominal cramps
  - Hypotension
  - Occasionally, respiratory failure
- If untreated, anaphylactic reaction can proceed rapidly to death.

# Patient Assessment (1 of 2)

- Scene size-up
- Scene safety
  - Identify and address environmental hazards.
  - Patient's environment or activity may indicate source of reaction.
  - Never enter a scene where more than one person is experiencing same symptoms.
  - Follow standard precautions, with a minimum of gloves and eye protection.
  - Consider the need for additional or specialized resources.
  - Call for additional resources earlier rather than later.



# Patient Assessment (2 of 2)

- Mechanism of injury/nature of illness
  - May not be an allergic reaction
  - Trauma may have occurred.
  - Determine the MOI/NOI.
  - Look for bee stingers or chemicals and other indications of a reaction.



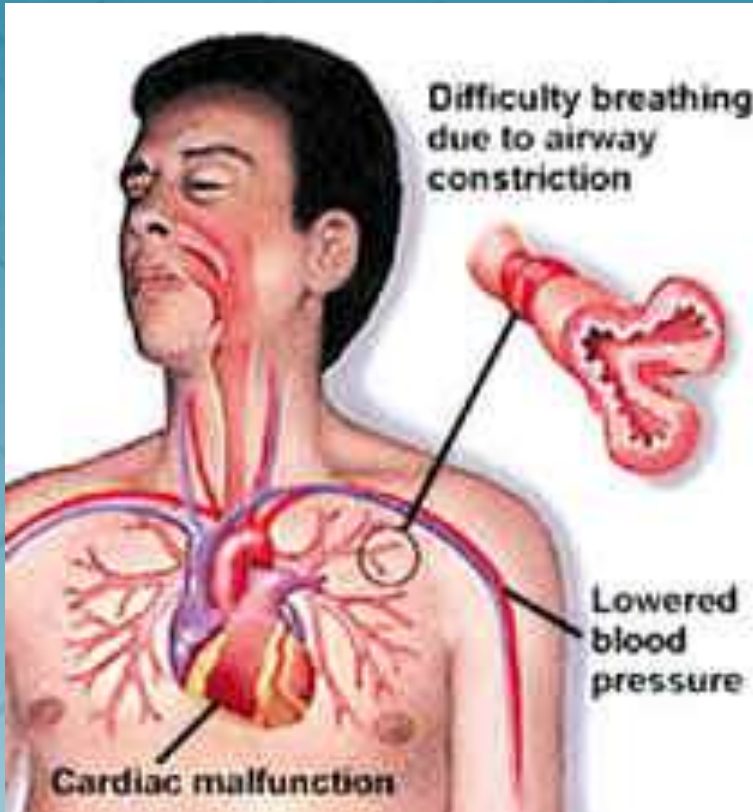


# Primary Assessment (1 of 5)

- Perform a rapid scan of the patient.
- Form a general impression.
  - May present as respiratory or cardiovascular distress in the form of shock
  - Patients will be very anxious.
  - Call for ALS backup if available.
  - Try to get information on the chief complaint.



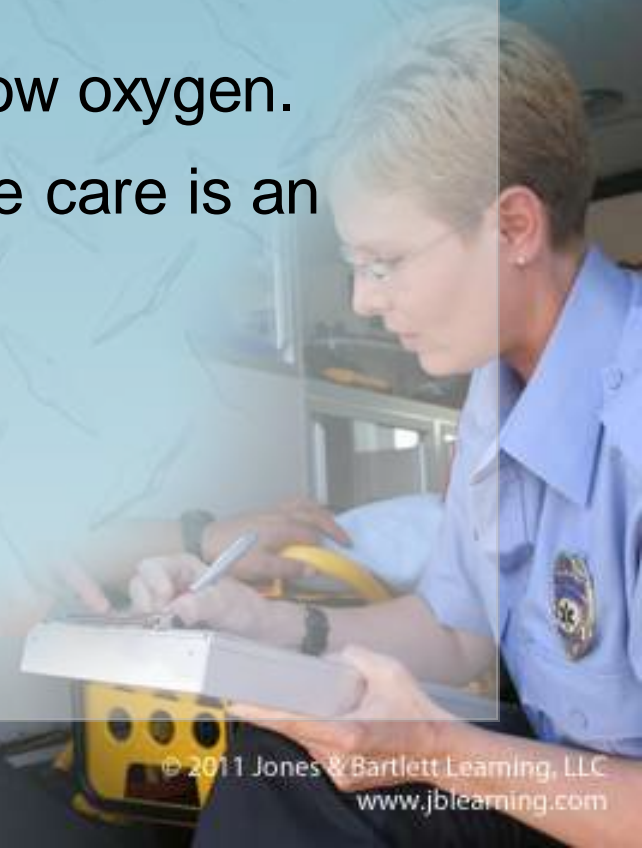
# Primary Assessment (2 of 5)



- Airway and breathing
  - Anaphylaxis can cause rapid swelling of the upper airway.
  - Only a few minutes to assess the airway and provide lifesaving measures
  - Work quickly to determine the severity of the symptoms.

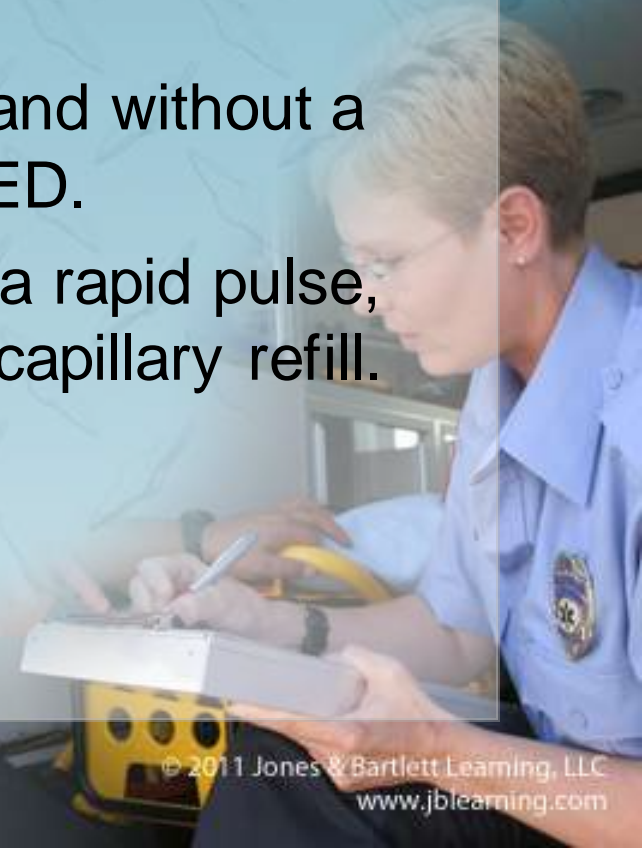
# Primary Assessment (3 of 5)

- Airway and breathing (cont'd)
  - Position conscious patients in tripod position and listen to the lungs.
  - Do not hesitate to initiate high-flow oxygen.
  - In severe situations, the definitive care is an injection of epinephrine.



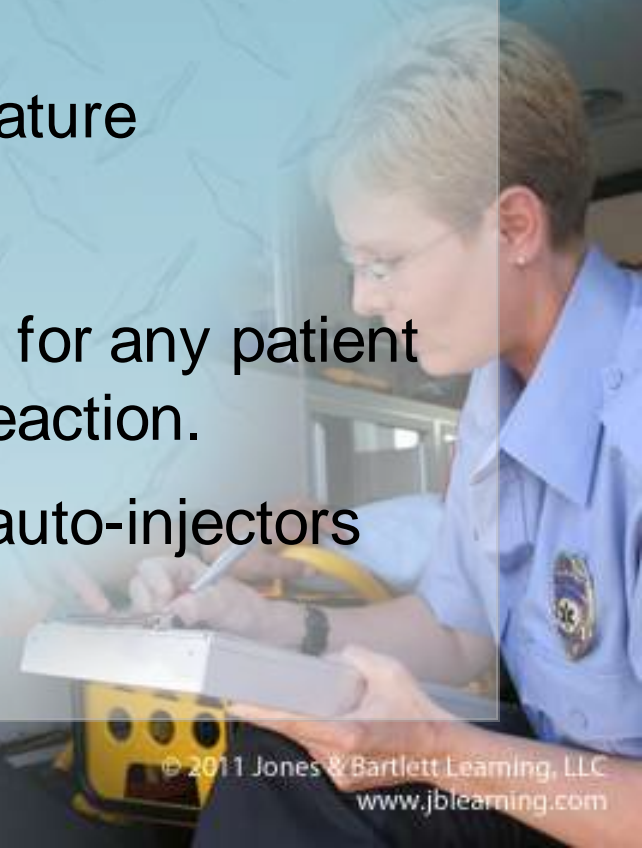
# Primary Assessment (4 of 5)

- Circulation
  - May present with hypotension
  - Palpate for radial pulse.
    - If the patient is unresponsive and without a pulse, begin BLS or use an AED.
    - If pulse is present, assess for a rapid pulse, and check skin condition and capillary refill.



# Primary Assessment (5 of 5)

- Initial treatment
  - Oxygen
  - Positioning
  - Maintaining normal body temperature
- Transport decision
  - Always provide prompt transport for any patient who may be having an allergic reaction.
  - Take along all medications and auto-injectors the patient has at the time.



# History Taking (1 of 4)

- Identify:
  - Chief complaint
  - History of present illness
  - Associated signs and symptoms
  - Pertinent negatives

# History Taking (2 of 4)

**Table 18-1** Common Signs and Symptoms of Allergic Reaction

Respiratory System	Cardiovascular System	Skin	Other Findings
<ul style="list-style-type: none"><li>Shortness of breath (dyspnea)</li><li>Sneezing or an itchy, runny nose (initially)</li><li>Tightness in the chest or throat</li><li>Irritating, persistent dry cough</li><li>Hoarseness</li><li>Respirations that become rapid, labored, or noisy</li><li>Wheezing and/or stridor (progressing to a silent chest with anaphylaxis)</li></ul>	<ul style="list-style-type: none"><li><b>Decrease in blood pressure as the blood vessels dilate (hypotension)</b></li><li><b>Increase in pulse rate (initially) (tachycardia)</b></li><li>Pale skin as the vascular system fails</li><li>Loss of consciousness and coma</li></ul>	<ul style="list-style-type: none"><li>Flushing, itching, or burning skin, especially common over the face and upper part of the chest</li><li>Urticaria over large areas of the body, may be internal or external</li><li>Swelling, especially of the face, neck, hands, feet, and/or tongue, local or generalized</li><li>Swelling and cyanosis or pallor around the lips</li><li>Warm, tingling feeling in the face, mouth, chest, feet, and hands</li></ul>	<ul style="list-style-type: none"><li>Anxiety; a sense of impending doom</li><li>Abdominal cramps</li><li>Headache</li><li>Itchy, watery eyes</li><li>Dizziness</li><li>Decreasing mental status</li></ul>

\* Key indicators of anaphylaxis are indicated by bold type.

# History Taking (3 of 4)

- SAMPLE history
- If the patient is conscious, ask the following questions:
  - Have any interventions already been completed?
  - Do you have any prescribed, preloaded medications for allergic reactions?



# History Taking (4 of 4)

- Ask the following questions (cont'd):
  - Do you have any respiratory symptoms?
  - Do you have other symptoms?
  - Have you had previous allergic reactions, asthma, or hospitalizations?
  - What were you doing or what were you exposed to before the onset of symptoms?

# Secondary Assessment (1 of 4)

- Physical examinations
  - Includes a systemic head-to-toe or focused assessment
  - Thoroughly assess breathing, including:
    - Increased work of breathing
    - Use of accessory muscles
    - Head bobbing, nostril flaring, grunting
    - Tripod positioning

# Secondary Assessment (2 of 4)

- Physical examinations (cont'd)
  - Auscultate both the trachea and the chest.
  - Wheezing may occur because of narrowing of the air passages.
  - Assess the circulatory system.
  - Assess the skin for swelling, rash, hives, or signs of the source of the reaction.

# Secondary Assessment (3 of 4)

- Vital signs
  - Assess baseline vitals:
    - Pulse
    - Respirations
    - Blood pressure
    - Skin
    - Pupils
    - Oxygen saturation

# Secondary Assessment (4 of 4)



- Vital signs (cont'd)
  - Rapid respiratory rate indicates airway obstruction.
  - Rapid respiratory and pulse indicate respiratory distress or systemic shock.
  - Pulse oximetry is a useful method to assess the patient's perfusion status.

# Reassessment (1 of 3)

- Repeat the primary assessment and reassess the patient's vital signs.
  - Deterioration of the patient's condition could be rapid and fatal.
  - Give special attention to any signs of airway compromise.
  - Monitor the patient's anxiety level.
  - Watch for signs of shock.

# Reassessment (2 of 3)

- Interventions
  - Identify how much distress the patient is in.
  - Severe reactions require epinephrine and ventilatory support.
  - Milder reactions require supportive care such as oxygen.
  - Transport to a medical facility.
  - Recheck your interventions.

# Reassessment (3 of 3)

- Communication and documentation
  - When to contact medical control depends on your assessment findings.
  - Documentation should include:
    - Signs and symptoms
    - Reasons for choosing to provide the care you did
    - Patient's response to your treatment



# Emergency Medical Care (1 of 9)

- If patient appears to be having a severe allergic (or anaphylactic) reaction:
  - Administer BLS, including oxygen.
  - Provide prompt transport to the hospital.
  - Reassess vital signs every 5 minutes (unstable patient) or 15 minutes (stable patient).

# Emergency Medical Care (2 of 9)

- Place hypotensive or shock patients in the appropriate position.
- Request ALS backup if you work in a tiered response system.
- Be prepared to maintain the airway or administer cardiopulmonary resuscitation.

# Emergency Medical Care (3 of 9)

- If a stinger is present, scrape away with a credit card.
- Applying ice may help.
- In some areas, you may be allowed to administer epinephrine or assist the patient with epinephrine administration.



# Emergency Medical Care (4 of 9)

- Epinephrine
  - Mimics the sympathetic (fight-or-flight) response
  - Causes the blood vessels to constrict
  - Reverses vasodilation and hypotension
  - Increases cardiac contractility and relieves bronchospasm
  - Rapidly reverses the effects of anaphylaxis

# Emergency Medical Care (5 of 9)

- Indications include:
  - A severe allergic reaction
  - Hypersensitivity to an exposed substance
- Remember that your EMS service may or may not allow you to assist the patient in the administration of epinephrine. Call medical control!



# Emergency Medical Care (6 of 9)



Source: Courtesy of Shionogi Pharma, Inc.

- All kits should contain a prepared, auto-injectable syringe of epinephrine.

# Emergency Medical Care (7 of 9)

- The adult EpiPen delivers 0.3 mg of epinephrine; the infant-child system delivers 0.15 mg.
- The Twinject auto-injector contains two doses of epinephrine.
- See **Skill Drills 18-1** and **18-2**.

# Emergency Medical Care (8 of 9)

- Side effects include:
  - High blood pressure
  - Increased pulse rate
  - Anxiety
  - Cardiac arrhythmias
  - Pallor
  - Dizziness





# Emergency Medical Care (9 of 9)

- Side effects include (cont'd):
  - Chest pain
  - Headache
  - Nausea
  - Vomiting



# Summary (1 of 7)

- An allergic reaction is a response to chemicals the body releases to combat certain stimuli, called allergens.
- Allergic reactions occur most often in response to five categories of stimuli: insect bites and stings, medications, food, plants, and chemicals.

# Summary (2 of 7)

- The reactions may be mild and local, involving itching, redness, and tenderness, or they may be severe and systemic, including shock and respiratory failure.

# Summary (3 of 7)

- Anaphylaxis is a life-threatening allergic reaction mounted by multiple organ systems, which must be treated with epinephrine.
- Wheezing and skin wheals can be signs of anaphylaxis.

# Summary (4 of 7)

- People allergic to bee, hornet, yellow jacket, or wasp venom often carry a kit that contains epinephrine in an auto-injector.
- All patients with suspected anaphylaxis require oxygen.

# Summary (5 of 7)

- Check patients who may be having an allergic reaction for flushing, itching, and swelling skin, hives, wheezing and stridor, persistent cough, decrease in blood pressure, weak pulse, dizziness, abdominal cramps, and headache.

# Summary (6 of 7)

- Always provide prompt transport to the hospital for any patient who is having an allergic reaction. Remember that signs and symptoms can rapidly become more severe.

# Summary (7 of 7)

- Carefully monitor the patient's vital signs en route; be especially alert for airway compromise.