

Chapter 21, Allergy and Anaphylaxis

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1. Introduction to Allergy and Anaphylaxis

- This chapter covers **allergy and anaphylaxis**. [\[1\]](#)
- EMTs often respond to calls involving allergic reactions. [\[5\]](#)
- Allergy-related emergencies can involve **acute airway obstruction** and **cardiovascular collapse**. [\[6\]](#)
- You must be able to treat these life-threatening complications. [\[7\]](#)
- It is important to distinguish between a usual response and an allergic reaction. [\[7\]](#)

2. Anatomy, Physiology, and Pathophysiology of Allergic Reactions

- Immunology is the study of the body's immune system. [\[8\]](#)
- The immune system protects the body from foreign substances. [\[10\]](#)
- When a foreign substance invades, the body tries to activate or inactivate it. [\[11\]](#)
- An **allergic reaction** is an **exaggerated immune response**. [\[13\]](#)
- It is caused by the body's immune system, not directly by an outside

substance. [14]

- The immune system releases chemicals to combat the stimulus. [15]
- These chemicals include **histamines and leukotrienes**. [16]
- Both contribute to an allergic reaction. [16]

Aspect	Normal Immune Response	Allergic Reaction
Cause	Foreign substance invasion	Exaggerated response to a substance [13]
Mechanism	Inactivate invader [11]	Release of chemicals [15]
Key Chemicals	N/A (combats stimulus)	Histamines, Leukotrienes [16]
Body's Role	Protects the body [10]	Exaggerated response [13]
Direct Cause	Foreign substance	Body's immune system [15]

3. Recognizing Allergic Reactions and Anaphylaxis

- Some patients may not know what is causing their reaction. [17]
- You must be able to recognize the signs and symptoms. [17]
- Maintain a high index of suspicion. [17]
- An allergic reaction can be **mild and local**. [18]
- Mild reactions are characterized by itching, redness, and tenderness. [18]
- An allergic reaction can be **severe and systemic**. [18]
- This severe systemic condition is known as **anaphylaxis**. [18]
- Anaphylaxis is an **extreme, life-threatening allergic reaction**. [19]
- It involves multiple organ systems. [20]
- Severe cases can rapidly result in shock and death. [20]

Severity	Signs and Symptoms
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Mild	Itching [18], Redness [18], Tenderness [18]
Severe	Urticaria (hives) [21], Angioedema [21], Wheezing or stridor [21], Hypotension [22], Increased capillary permeability [22], Nausea [23], Vomiting [23], Abdominal cramps [23]

4. Common Allergens and Their Characteristics

- Common allergens fall into five categories. [25]
- The first category is **food**. [25]
 - Certain foods like shellfish and peanuts are common triggers of anaphylaxis. [26]
 - Symptoms may take over 30 minutes to appear. [27]
 - Skin signs like hives may not be present. [27]
 - Reactions can be severe and involve respiratory or cardiovascular systems. [28]
- The second category is **medications**. [29]
 - Medications are the second most common source of anaphylactic reactions. [29]
 - Antibiotics like penicillin are common. [30]
 - Non-steroidal anti-inflammatory drugs (NSAIDs) are also common. [30]
 - Injected medications can cause immediate and severe reactions. [31]
 - Reactions to oral medications may take over 30 minutes. [32]
 - Oral medication reactions can also be very severe. [32]
- The third category is **plants**. [33]
 - This includes dust, pollens, and other plant material. [33]
 - Plants can cause rapid and severe allergic reactions. [33]
 - Common plant allergens include ragweed, rye grass, maple, and oak. [34]
- The fourth category is **chemicals**. [35]
 - Certain chemicals like makeup and paradine can cause reactions. [35]
 - Latex is of particular concern to healthcare providers. [36]
 - Use latex alternatives such as nitrile gloves. [37]
- The fifth category is **insect bites and stings**. [38]
 - This involves venomation, where the insect injects venom. [38]

- Reactions can be localized or severe and systemic. [38]

Category	Examples	Characteristics
Food [25]	Shellfish, peanuts [26]	Symptoms may delay, severe, respiratory/cardiovascular involvement [27]
Medications [29]	Antibiotics (penicillin), NSAIDs [30]	Immediate/severe if injected, delayed for oral [31]
Plants [33]	Ragweed, rye grass, maple, oak [34]	Rapid and severe reactions [33]
Chemicals [35]	Makeup, paradine, latex [35]	Can cause severe reactions, latex is a concern [36]
Insect Bites/Stings [38]	Bees, wasps, hornets, fire ants [39]	Localized or severe systemic, venom injection [38]

5. Insect Bites and Stings: Specific Considerations

- Insect bites and stings involve venomation. [38]
- Venomation is the injection of venom by the insect. [38]
- Reactions can be localized or severe and systemic. [38]
- Approximately 2 million Americans are allergic to bee, wasp, and hornet venom. [39]
- Allergic reactions to stings cause at least 62 deaths per year in the US. [39]
- About half of victims had no prior reaction. [40]
- Most insects have a small hollow spine stinger. [40]
- Honey bees cannot withdraw their stinger. [41]
- An embedded stinger can inject venom for up to 20 minutes. [42]
- Wasps and hornets can sting multiple times. [42]
- Fire ants strike repeatedly. [43]
- Initial signs include sudden pain, swelling, and localized heat. [44]
- Widespread urticaria, redness, itching, and a wheal may appear. [44]

- Severe cases (anaphylaxis) include stridor and bronchospasm. [45]
- Wheezing, chest tightness, coughing, and dyspnea can occur. [45]
- Anxiety, gastrointestinal complaints, and hypotension are possible. [45]
- Respiratory failure can occasionally occur. [45]
- Untreated anaphylaxis can rapidly lead to death. [45]
- More than two-thirds of anaphylaxis deaths occur within the first 30 minutes. [46]

6. Patient Assessment for Allergic Reactions

- Start with scene size-up. [47]
 - Scene safety is most important. [48]
 - The environment or recent activity may indicate the source. [48]
 - A respiratory problem dispatch report may suggest allergy. [48]
 - Rule out other causes of respiratory distress. [49]
 - Trauma may be present secondary to the medical issue. [50]
 - Follow standard precautions (gloves, eye protection). [50]
 - Consider the need for advanced life support. [51]
- Perform a **primary assessment**. [52]
 - Quickly identify and treat immediate threats. [52]
 - ABCs should be reassessed repeatedly. [53]
 - Form your general impression. [54]
 - Allergic reactions may present as respiratory or cardiovascular distress (shock). [54]
 - If the patient is anxious and in distress, call for ALS backup. [55]
 - Look for a medical identification tag if unresponsive. [56]
 - Airway and breathing are major concerns. [57]
 - Anaphylaxis can rapidly cause upper airway swelling. [57]
 - Quickly assess for increased work of breathing. [59]
 - Look for accessory muscle use, head bobbing, and tripod position. [59]
 - Check for nasal flaring and abnormal breath sounds. [60]
 - Assist the patient into a comfortable position (high Fowler's). [60]
 - Place in the supine position if signs of shock emerge. [60]
 - Assist ventilations with a BVM and high oxygen for severe distress. [61]

- Assess circulation (C). [62]
 - Some anaphylaxis patients show signs of circulatory stress (hypotension). [63]
 - Assess for signs of hypoperfusion. [64]
 - Treat for shock. [64]
 - Definitive treatment for anaphylaxis is Epi. [65]
- Make your transport decision. [66]
 - Immediate transport is needed if anaphylaxis is suspected. [66]
 - Transport if a mild reaction appears to be worsening. [66]
 - If the patient is calm, consider continuing assessment. [67]
 - Err on the side of emergency transport. [67]
- Take a history. [68]
 - Investigate the chief complaint and history of present illness. [68]
 - Identify signs and symptoms. [68]
 - Obtain a **SAMPLE history**. [69]
 - If responsive, ask specific allergy questions. [70]
 - Ask if interventions have been completed. [70]
 - Ask if the patient had a severe reaction before. [70]
 - Ask about ingestion of common food allergens. [70]
 - Inquire about gastrointestinal complaints (nausea, vomiting). [71]
- Conduct a secondary assessment. [72]
 - Perform a rapid head-to-toe exam if indicated. [73]
 - Focus the physical exam on the chief complaint area. [73]
 - Remove clothing if unconscious to look for clues. [74]
 - Look for bee stingers or signs of chemical contact. [74]
 - Look for a medical alert tag. [75]
 - Auscultate for abnormal breath sounds (wheezing, stridor). [75]
 - Inspect the skin for swelling, rashes, or urticaria. [75]
 - Check vital signs. [76]
 - Assess baseline pulse, respiratory rate, blood pressure. [76]
 - Check pupillary response and oxygen saturation. [76]
 - Skin signs may be unreliable indicators of hypoperfusion. [77]

Step	Key Actions
Scene Size-up [47]	Scene safety, identify source, standard precautions, consider ALS [48]
Primary Assessment [52]	Identify life threats, ABCs, general impression, look for medical tag [52]
Airway/Breathing [57]	Assess for swelling/distress, check work of breathing, assist ventilations [57]
Circulation [62]	Assess for hypotension/hypoperfusion, treat for shock [63]
Transport Decision [66]	Immediate if suspected anaphylaxis or worsening mild reaction [66]
History Taking [68]	Investigate chief complaint, SAMPLE history, ask specific allergy questions [68]
Secondary Assessment [72]	Physical exam (rapid or focused), look for stingers/chemicals/medical tag, auscultate breath sounds, inspect skin [73]
Vital Signs [76]	Assess pulse, respiration, blood pressure, pupils, O2 saturation [76]

7. Monitoring and Reassessment

- Monitoring devices are useful. [78]
- A pulse oximeter helps assess perfusion status. [78]
- The decision to give oxygen is based on airway, work of breathing, and lung sounds. [79]
- It should not be based solely on pulse oximetry readings. [79]
- Reassessment is crucial en route to the hospital. [80]
- Repeat the primary assessment. [80]
- Reassess vital signs. [80]

- Repeat a focused exam of the affected system. [80]
- Reassess unstable patients every five minutes. [81]
- Reassess stable patients every 15 minutes. [81]
- Watch for signs of shock and treat immediately. [81]

8. Interventions and Treatment for Allergic Reactions

- Treatment depends on the severity of the reaction. [82]
- Mild reactions may need only supportive care and monitoring. [83]
- Anaphylaxis requires more aggressive treatment. [84]
- This includes Epi and ventilatory support. [84]
- Recheck your interventions. [84]
- Transport to the emergency department is warranted even if the patient feels relief. [84]
- The medication's effect will wear off. [84]
- Symptoms will return. [84]
- Administer BLS and provide prompt transport for severe reactions. [86]
- If a stinger is present, scrape the skin with a stiff object. [87]
- Use a credit card or similar object. [88]
- Do not use tweezers or forceps. [88]
- Gently wash the area with soap or mild anesthetic. [89]
- Remove jewelry from the area before swelling starts. [90]
- Position the injection site slightly below heart level. [91]
- Apply ice or cold packs, but not directly to skin. [92]
- Limit cold application to 10 minutes at a time. [92]
- Be alert for swelling and airway issues. [93]
- Watch for other anaphylaxis signs like nausea and vomiting. [93]
- Do not give anything by mouth. [93]
- Place the patient in the supine position if indicated. [94]
- Give oxygen if needed. [94]
- Monitor vital signs. [95]
- Be prepared to provide further support. [96]

Severity of Reaction	Treatment
Mild [83]	Supportive care, monitoring [83]
Severe (Anaphylaxis) [84]	Aggressive treatment, Epi, ventilatory support, prompt transport [84]
Specific Actions (Stinger Present)	Scrape stinger, wash area, remove jewelry, position site, apply ice, monitor for swelling/airway issues, no oral intake, position supine, oxygen if needed, monitor vital signs [87]

9. Epinephrine: Mechanism and Administration

- Epinephrine (Epi) is a sympathomimetic hormone. [98]
- It mimics the sympathetic "fight or flight" response. [98]
- It causes blood vessels to constrict. [99]
- This reverses vasodilation and hypotension from anaphylaxis. [99]
- Epi also increases cardiac contractility. [100]
- It relieves bronchospasms in the lungs. [100]
- Epi can rapidly reverse the effects of anaphylaxis. [101]
- Epi is prescribed by a physician. [102]
- It comes pre-dosed in an automatic Epi injector. [102]
- Some EMS systems carry Epi. [103]
- Others allow EMS providers to help patients self-administer. [103]
- Refer to local protocols or medical control. [104]
- The adult EpiPen delivers 0.3 milligrams of Epi. [105]
- It uses a spring-loaded needle system. [105]
- The infant/child system delivers 0.15 milligrams. [106]
- Epinephrine can take effect within one minute. [108]
- It is the primary way to save someone with severe allergic reaction. [108]
- There are side effects. [108]
- Side effects include high blood pressure, increased pulse, anxiety. [109]
- Cardiac arrhythmias, pallor, dizziness can occur. [109]

- Chest pain, headache, nausea, and vomiting are possible. [109]
- Patients without respiratory compromise or hypotension should not get Epi. [110]
- Do not give Epi if they don't meet anaphylaxis criteria. [110]

10. Communication and Documentation

- Documentation is important following an allergic reaction call. [85]
- Include signs and symptoms found during assessment. [85]
- Document the reasons for the care provided. [85]
- Record the patient's response to treatment. [85]

11. Review of Key Concepts

- What causes the signs and symptoms of an allergic reaction?
 - The release of **histamine and leukotrienes**. [112]
- What are the negative effects associated with anaphylactic shock a result of?
 - **Vasodilation and bronchial constriction**. [113]
- A 23-year-old male ate peanuts, has difficulty breathing, widespread urticaria, tachycardia, and hypotension (90/60). He is wheezing. What is most suspicious?
 - An **anaphylactic reaction**. [114]
- What is a wheal?
 - A **raised, swollen, or well-defined area on the skin**. [119]
- How should you remove embedded stingers from a patient stung by hornets?
 - **Scrape them** with a stiff object. [120]
- A young male has anaphylactic shock after a scorpion sting, diminished consciousness, severely labored breathing, inspiratory stridor, and cyanosis. He has a prescribed Epi auto-injector. What should you do first if he's not breathing?
 - **Assist with the BVM**. [124]
- What is the most reliable indicator of upper airway swelling during a severe allergic reaction?
 - **Stridor**. [126]
- What is the most common trigger of anaphylaxis?
 - **Foods**. [127]

- How much does the adult EpiPen deliver?
 - **0.3 milligrams.** [\[127\]](#)
- How much does the infant/child EpiPen deliver?
 - **0.15 milligrams.** [\[127\]](#)
- When administering Epi by auto-injector, how long should the EMT hold the injector in place?
 - For **at least 10 seconds.** [\[128\]](#)