Pre-Lecture

I. You are the Provider

Time: 10 minutes

Small Group Activity/Discussion

Purpose

This activity is designed to help introduce your students to the content of this chapter.

Instructor Directions

1. Direct students to read the "You are the Provider" scenario found throughout Chapter 30.
2. You may wish to assign students to a partner or a group. Direct them to review the discussion questions at the end of the scenario and prepare a response to each question. Facilitate a class dialogue centered on the discussion questions.
3. You may also assign this as an activity and ask students to hand in their comments on a separate piece of paper.

Lecture

I. Introduction

Time: 5 minutes

Slides: 2, 3

Lecture

A. Allergic and Anaphylactic Terminology

1. An allergen is a substance that produces allergic symptoms in a patient.
2. Antibody
   a. Protein the body produces in response to a foreign substance
   b. Found in the plasma (immunoglobulin)
3. An antigen is a substance the body recognizes as foreign.
4. Allergic reaction
   a. Abnormal immune response the body develops when the person is reexposed to a substance or allergen
   b. Local reactions are a limited response to specific area after being exposed to a foreign substance (insect bite).
   c. Systemic reactions occur throughout the body, possibly affecting multiple body systems.

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5. Hypersensitivity is an exaggerated or inappropriate allergic reaction after coming into contact with a substance perceived by the body to be harmful.
6. Anaphylaxis
    a. An extreme systemic form of an allergic reaction involving two or more body systems
    b. Causes death of 500 to 1,000 people in the United States each year
    c. No exact cause can be determined in up to two thirds of the patients.
    d. Diseases related to allergies (allergic rhinitis, asthma, and atopic dermatitis) increase the potential for anaphylactic reactions.
    e. If a substance is ingested it is less likely to cause an anaphylactic reaction, and if it does it is usually not fatal.
    f. If a substance is injected, the reaction is more likely to be severe.

B. You are the Provider

Slide: 4

Discussion

1. Present the case study provided on the slide:
    a. You are dispatched to a home for a 14-year-old boy who was helping his father trim bushes.
    b. You are notified that he was stung by at least four bees.
    c. The patient is conscious and alert per your dispatch center.
    d. Bee stings can cause a severe allergic reaction. *Is the patient in this scenario allergic to bees? What do you expect to see when you arrive on scene?*

II. Anatomy and Physiology

Time: 10 minutes

Slides: 5–11

Lecture

A. Normal Immune Response

1. The immune system protects the human body from substances and organisms that are considered foreign to the body.
2. Two types of systems
    a. Cellular immunity (white blood cells)
    b. Humoral immunity (antibodies in the plasma and lymph)

B. Routes of Entry for Allergies

1. Skin
    a. Injection
    b. Absorption
2. Respiratory tract
    a. Inhalation
3. Gastrointestinal tract

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a. Ingestion

C. Physiology

1. Primary response
   a. First encounter with foreign substance
   b. Cells determine if the substance is harmful.
   c. If the substance is harmful antibodies are designed and produced.
2. Sensitivity
   a. Ability to recognize the foreign substance the next time it is encountered
   b. Basophils remain in specific sites within tissue.
   c. Mast cells move throughout connective tissue, bronchi, gastrointestinal mucosa, and other vulnerable areas.
3. Chemical mediators
   a. Produced by basophils and mast cells
   b. Contain granules filled with a host of powerful substances ready to fight antigens
   c. Launch and maintain immune response by summoning more white blood cells to the area and increasing blood flow to the area by dilating the blood vessels and increasing capillary permeability
   d. Histamine
   e. Eosinophil chemotactic factor
   f. Prostaglandin and leukotrienes
   g. Platelet activating factor
   h. Serotonin
   i. Kinins and proteoglycans

Instructor note: See Table 30-3 for a full description of each mediator's physiological effects.

4. Health care providers exploit the body's ability to protect itself.
   a. Vaccines to produce immunity
   b. The body develops antibodies in response to the vaccine so it can produce an immune response to the disease.
5. Secondary response
   a. Intense response to a virus the body has encountered before, whether it be through a vaccine or previous exposure to the virus itself
6. Acquired immunity
   a. Administration of a vaccine allows the body to produce antibodies without having to experience the disease.
   b. Measles, mumps, and polio
7. Natural immunity
   a. Body encounters the antigen and experiences a full immune response with all the pathology of the disease

D. You are the Provider (continued)

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Slide: 12

Discussion

1. Continue reading the case study provided on the slide:
   a. You arrive on scene and find the child scratching his chest and arms.
   b. You remove his t-shirt and notice multiple areas of urticaria. They are small and raised on the skin.
   c. He states that he is having trouble breathing as well.
   d. *What is your next immediate treatment?*
      - Remember your ABCs. You need to provide supplemental oxygen therapy with 10 L via a nonrebreathing mask. You need to carefully watch the patient's airway and make sure it remains patent. Also, listen to the lungs.

III. Pathophysiology

Time: 5 minutes

Slides: 13, 14

Lecture

A. Abnormal Immune Reactions

1. If the immune system becomes overzealous in defending the body, the resulting problems may range in severity from hay fever to anaphylaxis.
2. The body often has these reactions to substances that should not be identified as harmful by the immune system (eg, ragweed, strawberries, penicillin).
3. Histamine
   a. One of the primary chemical mediators
   b. In most cases it causes blood vessels in the local area to dilate and the capillaries to leak; it combines with leukotrienes and white blood cells to cause hay fever symptoms (runny, itchy nose and swollen eyes).
   c. In the case of anaphylaxis, histamine release causes immediate vasodilation (flushed skin and hypotension) and increases vascular permeability, resulting in tissue swelling and fluid secretion (hives, narrowing of the airway, and increased fluids in the airway). It also causes smooth muscle contraction resulting in laryngospasm and gastrointestinal cramping. Finally, it decreases contractility of the heart (hypotension and in some cases dysrhythmias due to hypoperfusion and hypoxia).
4. Leukotrienes
   a. Compound the effects of histamine
   b. Highly potent bronchoconstrictors are released, causing dire respiratory status.
   c. Causes coronary vasoconstriction, contributing to the worsening cardiac condition and myocardial irritability

B. Clinical Symptoms of Anaphylaxis

1. Skin
   a. First symptoms include feeling warm and flushed.
   b. Pruritis (itching) causing swelling

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2. Respiratory
    a. Most common complaints
    b. Includes shortness of breath or dyspnea and tightness in the throat and chest
    c. Stridor and/or hoarseness due to upper airway swelling
3. Cardiovascular
    a. Serious complications of anaphylaxis
    b. Lowered blood pressure causing heart rate increase results in tachycardia, flushed skin, and hypotension.
4. Gastrointestinal
    a. Abdominal cramping, nausea, bloating, vomiting, abdominal distention, and profuse, watery diarrhea
5. Central nervous system
    a. Headache, dizziness, confusion, and anxiety

IV. Assessment of a Patient With Anaphylaxis

Time: 10 minutes
Slides: 15–19
Lecture

A. Scene Size-up

1. Exposure problems
    a. Gardening (bee sting), seafood restaurant (shellfish)

B. Initial Assessment

1. Level of consciousness
    a. Restless, confused, anxious, or combative patient is most likely hypoxic.
    b. As oxygen level decreases or carbon dioxide level increases the patient will have a decreased level of consciousness or be completely unresponsive.
2. Upper airway
    a. Early sign of impending airway occlusion due to swelling
    b. Listen for stridor and hoarseness
3. Lower airway
    a. Observe for tachypnea, labored breathing, accessory muscle use, abnormal retractions, and prolonged expiration.
    b. Lung sounds are a predictor for severity as well.
    c. Silent chest is an ominous finding.
4. Circulation
    a. Evaluate the skin for redness, rashes, edema, moisture, itching, and urticaria.
    b. Commonly associated with an anaphylactic reaction due to histamine release

C. Focused History and Physical Exam

1. History

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   a. Does the patient have any allergies?
   b. Previous exposure to the antigen?
   c. When in doubt, intervention takes precedence over identifying the antigen.
   d. Has treatment already been administered, including an EpiPen, taking diphenhydramine, or using an inhaler with a beta agonist or aerosolized epinephrine?
2. Vital signs
   a. Tachypnea, tachycardia, and hypotension in conjunction with flushed skin and hives
3. Physical exam
   a. Classic presentation includes respiratory symptoms and hypotension.
   b. Gastrointestinal symptoms (abnormal cramping, nausea, vomiting, and diarrhea) may be present.
   c. Cardiac monitor (dysrhythmias)

D. Detailed Physical Exam

1. Minor allergic reaction requires further examination by paramedics to confirm no other problems.
2. Involves examination of the head, face, eyes, nose, ears, mouth, neck, chest, abdomen, pelvis, all four extremities, back, and buttocks
3. Do not delay transport of patients with suspected anaphylaxis to perform a detailed physical exam on the scene.

E. Ongoing Assessment

1. Conducted typically en route
2. Reassessment of the patient, serial vital signs, and checking interventions

F. You are the Provider (continued)

Slide: 20

Discussion

1. Continue reading the case study provided on the slide:
   a. You note wheezing when you auscultate the patient's lungs.
   b. You go over SAMPLE questions with the family.
   c. The patient has never been stung by a bee before.
   d. What do you want to consider next?
   e. It is very important to find out if the patient has any allergies or history. Ask all the pertinent questions to the mother or father.

V. Management of Anaphylactic Reactions

Time: 5 minutes

Slides: 21–24

Lecture

A. Interventions

1. Remove the offending agent.

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2. Maintain the airway.
    a. Be prepared to intubate.
    b. Use an appropriate oxygen device.
    c. Early administration of epinephrine should be a priority (reverses the effects of anaphylaxis).
3. Maintain circulation
    a. Insert at least one large-bore IV catheter to give an isotonic solution at a wide open rate.
    b. Ideally, you should place two IV lines en route to the ED.
    c. 1 to 2 L should be administered; if there is no response provide up to 4 L.
4. Initiate pharmacologic therapy.
    a. Oxygen, epinephrine, antihistamines, anti-inflammatory and immunosuppressant agents, and a vasopressor
    b. Epinephrine should be administered intravenously as soon as possible if hypotension or a reaction involving the airway or respiratory system is suspected or occurring.
    c. Antihistamine administration should be considered only after epinephrine.
    d. Corticosteroids do not have an immediate effect but are useful in preventing late-phase anaphylactic reactions and should be administered early in the treatment process.
    e. Psychological support is a crucial component of management; patients and families will need your reassurances as you perform the necessary interventions.

B. You are the Provider (continued)

Slide: 25

Discussion

1. Continue reading the case study provided on the slide:
    a. The patient's vital signs are: respiratory rate of 26 breaths/min; pulse of 120 beats/min, and blood pressure of 100/40 mm Hg.
    b. You recognize that the patient is suffering from anaphylaxis.
    c. *What treatments should you consider?*
        - When the patient presents with tachypnea, tachycardia, and hypotension, as well as associated signs of flushed skin and hives, anaphylaxis should be one of your first thoughts.

VI. Management of Allergic Reactions

Time: 5 minutes

Slide: 26

Lecture

A. Two Groups

1. Patients with signs of an allergic reaction but no respiratory distress or dyspnea
    a. Drug of choice is diphenhydramine.
2. Patients with signs of an allergic reaction and dyspnea

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a. Require oxygen, epinephrine, and antihistamines.

VII. Patient Education

Time: 5 minutes

Slide: 27

Lecture

A. Prevention and Self-Preservation

1. How to avoid the antigen
2. Notify all health personnel of the allergy.
3. Wear identification tags or bracelets.
4. Carry an anaphylaxis kit.
5. Report symptoms early.

B. You are the Provider Summary

Slide: 28

Discussion

1. Continue reading the case study provided on the slide:
   a. Provide the appropriate care such as epinephrine and Benadryl, oxygen therapy, and possibly Proventil for the wheezing in the lungs.
   b. Reassess the patient frequently, especially the ABCs.
   c. Anaphylaxis is a true life-threatening emergency. You need to act quickly and proficiently.

C. Summary

1. Allergy terminology
2. Immune physiology
3. Allergy pathophysiology
4. Treatment of allergy and anaphylaxis
5. Patient education

Post-Lecture

I. Prep Kit Activities

Time: 55 minutes

Note: This section contains various student-centered end-of-chapter activities designed as enhancement to instructor's preparation. As time permits, these activities may be presented in class. They are also designed to be used as outside homework/activities.

A. Assessment in Action

Time: 20 minutes

Individual/Small Group Activity/Discussion

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Purpose

This activity is designed to assist students in gaining a further understanding of the chapter content. This activity allows students an opportunity to analyze an emergency care scenario, develop responses, and integrate what they have learned.

Instructor Directions

1. Direct students to read the "Assessment in Action" scenario located in the Prep Kit at the end of Chapter 30.
2. Direct students to read and individually answer the quiz questions at the end of the scenario. Facilitate a class review and dialogue of the answers, allowing students to correct responses as may be needed. Use the quiz question answers noted below to assist in building this review.
3. You may also wish to assign these as individual activities and ask students to turn in their comments on a separate piece of paper.

Answers to Multiple-Choice Questions

You are dispatched to the home of a 30-year-old woman who called because of an allergic reaction. When you enter the home, you see that the patient has bright red hives on her arms and upper part of the chest. She is in obvious respiratory distress. Her friend says that she is being treated for a recent strep infection. Her doctor gave her an antibiotic, and the patient has been taking it for approximately 4 days. When you ask her about allergies, she says that she was allergic to penicillin when she a teenager. She noticed her face and arms were turning red approximately 2 days ago; last night, her eyes began to swell. She called today because she felt as if her throat were closing up and she began having trouble breathing. She also complains of chest tightness. Her vital signs are a heart rate of 104 beats/min; sinus tachycardia on the monitor; pulse oximetry of 93% while breathing room air; blood pressure of 80/64 mm Hg; and a respiratory rate of 28 breaths/min.

1. A(n) _____ is an overreaction by the body's immune response to normally harmless foreign substances, which cause damage to body tissues.
   A. antigen
   B. antibody
   C. allergic reaction
   D. allergy

Answer: C. An allergic reaction is an abnormal immune response of the body when a person is reexposed to a substance or allergen. In most patients, exposure to this substance would not be a problem; in a patient with an allergy, however, a local or systemic reaction may occur.

2. In the preceding scenario, what type of reaction is the patient experiencing?
   A. Local reaction
   B. Systemic reaction

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C. Hypersensitive reaction
D. Allergen reaction

Answer: B. A systemic reaction occurs throughout the body, possibly affecting multiple body systems. It is seen, for example, when a patient who is allergic to strawberries has swelling and hives all over his or her body after eating strawberry shortcake.

3. The most common causes of anaphylaxis include all of the following, except:

A. drugs.
B. insect stings.
C. blood products.
D. IV fluids.

Answer: D. All of these products could cause an anaphylactic reaction, but IV fluids are the least common of these causes. IV fluids may be used to treat patients with anaphylaxis who also have severe hypotension, but it is not the primary treatment.

4. What are the routes of entry by which substances can invade?

A. Skin, respiratory tract, and gastrointestinal tract
B. Skin, respiratory tract, and cardiovascular system
C. Skin, cardiovascular system, and gastrointestinal tract
D. Skin, respiratory tract, and urinary tract

Answer: A. The human body is at constant risk for attack or invasion. Substances can invade through the skin, the respiratory tract, and the gastrointestinal tract. Invasion through the skin may come in the form of injection or absorption.

5. White blood cells that work to produce chemical mediators during an immune response are:

A. mast cells.
B. antibodies.
C. basophils.
D. histamines.

Answer: C. Basophils are stationed like guards in specific sites within the tissues. They produce chemical mediators during an immune response. Mast cells are on patrol through the connective tissues, bronchi, gastrointestinal mucosa, and other vulnerable border areas that act as barriers to foreign invaders.

6. When an antigen enters the body, it binds to the IgE antibodies on the mast cells. This stimulates the mast cells to release:

A. chemical mediators.
B. granules.
C. antihistamines.
D. cellular immunity.

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Answer: A. Chemical mediators cause the signs and symptoms of the allergic and anaphylactic reactions seen in the body.

7. Itching or pruritis is an early sign of an allergic reaction. What is it caused by?

   A. Vasoconstriction
   B. Vasodilation
   C. Antigens
   D. Bronchodilation

Answer: B. Pruritis (itching) is due to vasodilation and capillary leaking. The area around the eyes is often susceptible to this problem, which may cause swollen, red eyes. You may also note swelling of the hands and feet. Histamine is responsible for urticaria (hives) experienced during anaphylaxis.

8. What is the preferred route for administering epinephrine to a patient in anaphylactic shock?

   A. IV
   B. IM
   C. SQ
   D. SL

Answer: A. The IV route bypasses all barriers to absorption (ie, skin, muscles) and instills medications directly into the circulatory system; therefore, it is the preferred route for administering epinephrine to a patient in anaphylactic shock. Because blood is shunted away from the skin and muscles during shock, absorption of medications administered via the IM and SQ routes would be delayed and the medication's onset of action would be slow and unpredictable. Epinephrine is not administered via the sublingual (SL) route.

9. What is the IM adult dose of epinephrine?

   A. 1:1,000, 0.3–0.5 mg
   B. 1:10,000, 0.3–0.5 mg
   C. 1:1,000, 1 mg
   D. 1:10,000, 1 mg

Answer: A. The IM adult dose of epinephrine is 1:1,000, 0.3–0.5 mg. It should be administered early if hypotension or a reaction involving the airway or respiratory system is suspected.

Challenging Questions

You are dispatched to the local high school to treat an allergic reaction. When you arrive on scene, you find a 17-year-old girl complaining of itchiness and hives. There is no respiratory distress. Her vital signs are all within normal ranges.

10. Is this patient having an allergic reaction or an anaphylactic reaction?

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Ratioinale: This patient is experiencing an allergic reaction. Patients having allergic reactions are classified into two groups. The first group includes patients who have signs of an allergic reaction but no respiratory distress. The drug of choice is diphenhydramine (Benadryl). The second group includes patients with signs of an allergic reaction plus difficulty breathing. They require oxygen, epinephrine, and antihistamines. Whenever shortness of breath is present with signs of an allergic reaction, you should administer epinephrine and monitor the patient for the development of anaphylaxis.

B. Points to Ponder

Time: 20 minutes
Individual/Small Group Activity/Discussion

This activity addresses the affective objectives of the chapter, allowing you to help students probe the more difficult situations that they face. Use this as an opportunity to allow them to express differences of opinion and approach, while directing them to be thorough and decisive in their answers. Encourage challenges.

Purpose

To allow students an opportunity to apply critical thinking analysis to a given case study.

Instructor Directions

1. Direct students to read the "Points to Ponder" scenario found in the Prep Kit at the end of Chapter 30.
2. You may wish to assign students to a partner or a group and direct them to review the discussion question at the end of the scenario and prepare a response. Facilitate a class dialogue centered on the discussion point.
3. You may also ask students to complete this activity on their own and hand in their comments on a separate piece of paper.
4. Personally review the scenario and discussion question based on your experience and knowledge as an emergency care professional. Develop your own key points for guiding this discussion.

Scenario

You are treating a 46-year-old man for chest pain. You administer nitroglycerin and 324 mg of "baby" aspirin. En route to the hospital, you notice that the patient's skin is beginning to turn red and urticaria is developing. His lips are beginning to swell. You ask the patient about these signs, and he says that he forgot to tell you he is allergic to aspirin. His blood pressure has dropped significantly, his respiratory rate has increased, and his heart rate is increasing. How urgent is this patient's emergency, and how will you care for it?

Issues

Understanding the Pathophysiology of an Allergic or Anaphylactic Reaction, Knowing Your Treatment Protocols for an Allergic Reaction and Anaphylactic Shock

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Discussion

To understand an allergic reaction, you must understand the terms associated with allergic and anaphylactic reactions. An allergic reaction is an abnormal immune response the body develops when re-exposed to a substance or allergen. Anaphylaxis is an extreme systemic form of an allergic reaction involving two or more body systems. An allergen is a substance that produces allergic symptoms in a patient.

In this scenario, the patient is allergic to aspirin and neglected to tell you when you asked him about allergies. You administered 324 mg of aspirin orally. This patient is now becoming symptomatic to his allergy. In such situations, a patient will often present with tachypnea, tachycardia, and hypotension. When these vital signs are noted in conjunction with flushed skin and hives, anaphylaxis should be a major consideration. The more abnormal the vital signs, the more aggressively you should treat the patient.

An anaphylactic reaction is a life-threatening emergency. It takes fast recognition and even faster treatment to save the patient's life. You should first remove the agent that is causing the reaction. In this case, the patient has already ingested the aspirin. Maintaining the patient's airway is the priority regardless of the situation. Prepare to intubate if necessary. Administer epinephrine IM or IV as soon as possible if airway or respiratory compromise are present. Treat the circulation by inserting at least one large-bore IV catheter to give lactated Ringer's or normal saline. Administer an antihistamine. Antihistamines act to block the histamine 1 (H1) and 2 (H2) receptor sites. Corticosteroids are also suggested. They do not have an immediate effect but may prevent the late phase of anaphylactic reactions. Glucagon may also be indicated, especially if the patient does not respond to epinephrine or is taking a beta blocker. Glucagon increases cardiac contractility. Transport the patient to the hospital as quickly as you can. Monitor the patient's ABCs and treat him accordingly.

II. Lesson Review

Time: 10 minutes

Discussion

Note: Facilitate the review of this lesson's major topics using the review questions as direct questions or overhead transparencies. Answers are found throughout this lesson plan. Each question includes a reference to the slide where the information is covered.

1. What is an allergic reaction? (Lecture I-A)
2. What are the risk factors for allergic reactions and anaphylaxis? (Lecture I-A)
3. Overproduction of which immunoglobulin produces an allergic response? (Lecture II-C)
4. What signs and symptoms differentiate anaphylaxis from a less severe allergic reaction? (Lecture III-B)
5. What questions should be asked in the present history component of the focused history? (Lecture IV-C)
6. What are the important physical exam elements that should be assessed in a patient with a possible allergic reaction? (Lecture IV-D)

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7. What interventions are necessary for the patient experiencing an anaphylactic reaction? (Lecture V-A)
8. Epinephrine is administered for anaphylaxis to achieve what effects? (Lecture V-A)
9. What kind of drug is diphenhydramine? (Lecture V-A)
10. Why are steroids used in the treatment of allergic reactions? (Lecture V-A)

III. Assignments

Time: 5 minutes

Lecture

1. Review all materials from this lesson and be prepared for a lesson quiz to be administered (date to be determined by instructor).
2. Read Chapter 31: *Gastrointestinal Emergencies* for the next class session.

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