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CHAPTER 3

Anaphylaxis

Anaphylaxis is a life-threatening hypersensitivity reaction that causes widespread vasodilation and increased vascular permeability leading to hypotension, impaired tissue perfusion, and altered cell metabolism. Signs and symptoms of anaphylaxis are acute and include angioedema, flushing, GI irritability, hypotension, respiratory distress, and urticarial rash. If suspected, it needs to be dealt with **immediately**. Anaphylaxis can be defined as three possible presentations:

1. Acute skin symptoms (angioedema, flushing, pruritus, urticarial rash) **plus** respiratory distress and/or hypotension
2. Involvement of **two** organ systems (as described next) after exposure to a **likely** allergen
   a. Skin symptoms (angioedema, flushing, pruritus, urticarial rash)
   b. Respiratory distress (dyspnea, wheezing, hypoxia)
   c. Hypotension (SBP <90)
   d. GI irritability (abdominal pain, vomiting)
3. Hypotension (SBP <90) after exposure to a **known** allergen

Symptoms can begin within seconds to hours after an exposure. Not all patients will fit the preceding definition(s) of anaphylaxis, and because it can be unpredictable, careful monitoring of any of these symptoms is needed. Food, medication, exercise, blood transfusions, contrast dye, latex, immunizations, venom, and biological agents can all cause anaphylaxis; however, some anaphylactic reactions are idiopathic in nature. Priorities for the nurse include maintaining the patient's airway, breathing and circulation, ending exposure to the suspected causative agent, calling for urgent help, and administering epinephrine. Once the patient is stable, it will also be important for the nurse to give education on allergen avoidance and the use of an EpiPen®. If the causal allergen is unknown, a referral to an allergist may be required for further testing.

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Differential Diagnosis Considerations

Consider: anxiety, asthma exacerbation, carcinoid syndrome, chronic urticaria, COPD exacerbation, dehydration, epiglottitis, hereditary angioedema, hyperventilation, mastocytosis, menopausal flushing, MI, PE, red man syndrome, sepsis, shock, syncope, thyroid tumor, vasovagal reflex

Questions to Ask the Patient/Family/Witness/Yourself

- What are you allergic to? Have you been exposed to a known allergen?
- When did your symptoms start?
- What were you doing before/when the symptoms started?
- Do you have a history of anaphylaxis? If so, did you use an EpiPen®?

If the allergen is unknown

- Have you eaten any peanuts, shellfish, milk, eggs, or tree nuts recently or before the symptoms started?
- Have you had any recent dietary changes or eaten anything out of the ordinary? vigorous exercise? insect bite/sting? immunizations? contrast dye? exposure to latex?
- Have you had any recent invasive interventions such as a blood transfusion?
- Have you taken any new prescribed or over-the-counter medications? Have there been any recent changes to your current medication?
- Does anyone in your family have a history of anaphylaxis or severe allergic reactions?

Associated Signs/Symptoms: PAIN: pain anywhere; GENERAL: fatigue; EENT: swelling of the lips/mouth/throat, hoarseness, rhinorrhea; CARDIOVASCULAR: chest pain/tightness, palpitations; RESPIRATORY: cough, dyspnea, wheezing; GASTROINTESTINAL: diarrhea, nausea, swallowing difficulties,

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vomiting; NEUROLOGICAL: dizziness, (pre)syncope; SKIN: flushing, pruritus, rash; PSYCHOLOGICAL: anxiety, confusion, feelings of impending doom

Recommended Assessments

- Vital signs
- Temperature
- Pain scale (if applicable)
  - Tolerable pain level
- General
  - Level of consciousness and orientation
  - Inspect: signs of acute distress, affect, restlessness
  - Speech changes due to breathlessness or hoarseness
- Skin
  - Inspect: cyanosis, diaphoresis, pallor, urticarial rash
  - Palpate: temperature
- Eyes
  - Inspect: lid swelling
- Mouth
  - Inspect: swelling or erythema of the lips, posterior pharynx and/or tongue
- Head/face/neck
  - Palpate: swelling, tenderness
- Cardiovascular
  - Auscultate: heart sounds, rate, rhythm
- Respiratory
  - Inspect: respiratory effort, depth, pattern, use of accessory muscles
  - Auscultate: lung sounds, stridor
- Gastrointestinal
  - Auscultate: bowel sounds
  - Palpate: (rebound) tenderness
- Extremities
  - Inspect: IV site
  - Palpate: capillary refill, pulses

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Past Medical History Considerations

- Allergies

Puts the patient at risk for differential considerations

- CAD
- Drug abuse/use
- Eczema
- HTN
- Nicotine use
- Obesity

Reoccurrence/exacerbation should be considered

- Anaphylaxis
- Asthma
- COPD
- MI
- PE

Chronic conditions that can mimic signs and symptoms of anaphylaxis

- Anxiety
- Asthma
- Chronic urticaria
- COPD
- Hereditary angioedema
- Menopausal flushing

Medication Evaluation

Most common causative/exacerbating medication

- ACE inhibitors
- Anesthetics
- Antibiotics
- Biologic/immunosuppressive agents
- Chemotherapy

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- Contrast dye
- Neuromuscular blockers
- NSAIDs
- Opioids

May effect response to epinephrine because of antagonistic effects

- Alpha-adrenergic blockers
- Beta blockers

Lab Evaluation and Trends

- Baseline tryptase level

Nursing Intervention Considerations

- **Remove/stop suspected causative agent immediately**
- Call for help or rapid response/code team immediately. Ideally, a provider should be present to give STAT orders.
- Maintain a patent airway
  - Apply high-flow oxygen and wean as appropriate
  - Encourage slow relaxed deep breathing if hyperventilating
  - Suction as needed
  - Call respiratory therapy for signs of respiratory distress
- Verify patent IV if IVF or IV medication treatment is anticipated
  - Flush according to facility protocol; watch for swelling, erythema, pain, and other signs of infiltration
  - Large bore IV is preferred
- Medications (if ordered or protocol allows)
  - Hold suspected causative medication until discussion with the provider
  - Epinephrine 1:1,000 IM (1mg/1mL) in outer thigh STAT (max single dose of 0.5mg)
  - Rapid or bolus IV fluids per rapid response orders
  - PRN bronchodilator treatment per respiratory therapy if the patient is coughing or short of breath

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- Diet
  - NPO until discussion with the provider
- Activity
  - Keep the patient in bed until discussion with the provider
- Positioning
  - Lay supine with feet elevated if the patient is hypotensive
  - HOB raised to comfort for respiratory distress
  - Side lying position if there is a decrease in LOC or the patient is vomiting
- Monitor
  - Stay with the patient until stable
  - Vital signs and trends
  - Oxygen saturation/pulse oximetry
  - Temperature trends
  - Telemetry/cardiac monitor
  - Orientation status changes
  - Agitation levels
  - Peripheral pulses
  - Skin assessment every 8–24 hours
  - Signs of decreased cardiac output, such as weak pulses, cool skin, altered mental status, hypotension, oliguria, and mottling
  - Signs of respiratory distress, such as cyanosis, tachypnea, hypoxia, use of accessory muscles, diaphoresis, and adventitious lung sounds
- Safety
  - Perform a fall risk assessment and implement the appropriate strategies
- Environment
  - Maintain a well-lit environment
  - Avoid overstimulation
  - Maintain a comfortable room temperature
  - Utilize a fan (if appropriate)

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- Supportive care
  - Maintain effective communication between yourself, patient, and family
  - Provide emotional support and reassurance to the patient and family
  - Maintain a calm manner during patient interactions
  - Discuss plan of care with the patient and decide reasonable goals together
  - Notify the patient and family of changes in the plan of care
  - Provide light clothing and bed linen
  - Promote skin care and integrity
  - **Educational topics (as applicable to the patient):**
    - General information regarding the patient's anaphylaxis and differential diagnosis considerations
    - Procedure and intervention explanation and justification
    - Explanation regarding referrals and specialist who may see them for this issue
    - New medication education including reason, side effects, and administration needs
    - Medication changes
    - Relaxation techniques and breathing exercises
    - Oxygen therapy and maintenance
    - Trigger and allergen avoidance
    - Telemetry
    - Skin care
    - Safety needs and fall risk
    - NPO diet
    - When to notify the nurse or provider
    - Signs and symptoms of cardiac emergencies
    - Signs and symptoms of respiratory emergencies
    - Signs and symptoms of anaphylaxis
    - Home anaphylaxis management
    - Pressure injury prevention

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ISBARR Recommendation Considerations

- Ask the provider to come assess the patient STAT
- Transfer to the ICU if hemodynamically unstable, advanced medication management is required, or closer monitoring is needed
- Medication
  - Discontinue/change suspected causative medication
  - Hold oral medications if the patient is unable to tolerate or NPO
  - Discuss changing medication routes with the provider (and pharmacy) if the patient is NPO
  - Add antihistamines
  - Add corticosteroids
  - Add glucagon if the patient is on a beta blocker and not responding to epinephrine
  - Add PRN and/or scheduled bronchodilator nebulizer treatments per respiratory therapy for coughing, dyspnea, or other signs of respiratory distress
- IV fluid needs if oral intake is poor, there are signs of dehydration, and the patient is NPO or hypotensive. Rapid infusion or bolus rates should be discussed.
- Labs
  - ABG
  - Plasma histamine
  - Tryptase
- Safety
  - Activity-level changes
  - Fall risk protocol
- Monitoring needs
  - Continuous O_2 monitoring
  - Telemetry/continuous cardiac monitoring
  - Vital signs including frequency and parameters to call the provider

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- Change diet to
  - NPO
  - Avoidance of suspected food allergen (if applicable)
- Referrals
  - Allergist

ISBARR Template	
I **Introduction**	**Introduce Yourself and the Patient** • "Hello, Dr. Brown, this is Andrea Chiroff. I am the nurse for your patient Aaron Schlicht in Room 402. He was admitted for pneumonia this morning."
S **Situation**	**Sign/Symptom You Are Concerned About** • "Mr. Schlicht developed respiratory distress and hypotension 10 minutes after his IV Zosyn dose was started." **Associated Signs/Symptoms** • "He was feeling short of breath and was wheezing. He also felt like his tongue and the back of his throat were swollen."
B **Background**	**Vitals** • "Respirations were 32, O_2 sat was 87% on room air, and blood pressure was 82/40." **Exam** • "When I examined him, his lips and tongue were moderately swollen, he was tachypnic and wheezing throughout all of his lung fields." **Past Medical History** • "He denies a history of angioedema, anaphylaxis, or known drug allergies," **Labs and Medications** • "and has not taken any other medications today or eaten any suspicious foods."
A **Assessment**	**Assessment** • "I was concerned about anaphylaxis."

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ISBARR Template	
R Recommendations R Read Back	**Nurse's Recommendations, Interventions, and Read Back** • "I stopped the Zosyn immediately and called the rapid response team. Eight liters of oxygen via mask was placed and his O_2 came up to 95%. We gave 0.5mg of IM epinephrine twice and an albuterol nebulizer treatment was done by respiratory therapy. Normal saline was started at 500 milliliters per hour. Systolic blood pressures remain in the 80s. His dyspnea and tachypnea has improved. I ask that you come see the patient STAT and we transfer him to the ICU for closer monitoring. Would you like a tryptase or plasma histamine drawn? Would you like anything else done at this time?" • "Thank you, Dr. Brown. I would like to read back your orders. You would like a STAT tryptase drawn, discontinue Zosyn, and would like the patient transferred to the ICU. Is that correct?"

Disclaimer: This dialogue is factitious and any resemblance to actual persons, living or dead, or actual events is purely coincidental.

In order to avoid order discrepancies, it is recommended that all orders be entered by the provider in the electronic medical record.

- Ask if the provider wants anything else done
- Read back orders; ask that they enter all orders into the electronic medical record

Select Differential Diagnosis Presentations

Anxiety

Overview: psychiatric disorder that can cause intense fear and worry

Patient may complain of: fatigue, chest pain, palpitations, dyspnea, nausea, vomiting, abdominal pain, constipation/

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diarrhea, paresthesias, tremors, headache, insomnia, dizziness, mind racing, feelings of impending doom

Objective findings: signs of acute distress, irritability, inability to focus, diaphoresis, tachycardia, hypertension, tachypnea, muscle tension

PMH considerations/risk factors: hx of anxiety, depression, PTSD, insomnia, substance abuse, physical abuse, recent physical or emotional trauma, family hx of psychiatric diseases

Diagnostics: clinical diagnosis; workup to rule out more emergent causes may be indicated

Asthma Exacerbation

Overview: acute inflammation and swelling of the airway, progressively worsening asthma symptomology

Patient may complain of: activity intolerance, chest pain/tightness, coughing, dyspnea, wheezing, sputum production, insomnia

Objective findings: signs of acute distress, irritability, diaphoresis, cyanosis, breathlessness, hypoxia, tachypnea, cough, sputum, use of accessory muscles, adventitious breath sounds

PMH considerations/risk factors: hx of asthma, allergies, obesity, eczema, recent respiratory illness, nicotine use

Diagnostics: clinical diagnosis; chest X-ray, spirometry, PEF may be considered

COPD Exacerbation

Overview: acute inflammation and swelling of the airway, progressively worsening COPD symptomology

Patient may complain of: worsening fatigue, activity intolerance and sputum production from baseline, chest pain/tightness, coughing, dyspnea, wheezing, hemoptysis, insomnia

Objective findings: signs of acute distress, lethargy, cyanosis, diaphoresis, hypoxia, breathlessness, cough, adventitious breath sounds, sputum, prolonged expirations, use of accessory muscles, barrel chest, digital clubbing

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PMH considerations/risk factors: hx of COPD, asthma, allergies, GERD, recent respiratory illness, nicotine use

Diagnostics: clinical diagnosis, chest X-ray, spirometry may be considered

Dehydration

Overview: abnormal loss of extracellular fluid volume

Patient may complain of: fatigue, thirst, dry mouth, constipation, palpitations, oliguria, muscle cramps, dizziness, headache

Objective findings: fever, altered mental status, lethargy, irritability, decreased skin turgor, generalized skin dryness, dry mucous membranes, (orthostatic) hypotension, tachycardia, oliguria

PMH considerations/risk factors: liver or renal disease hx of/failure, recent vomiting and/or diarrhea, GI bleeding, polyuria, diuretic use, burn injury, or intense physical activity

Diagnostics: BMP/CMP, CBC, urine Na, I/O

Myocardial Infarction

Overview: decreased or no blood flow through the coronary arteries causing cardiac muscle death

Patient may complain of: fatigue, chest pain not improved with rest, radiation of the pain to the left arm/neck/jaw, palpitations, dyspnea, activity intolerance, abdominal pain, nausea, dizziness, anxiety, feelings of impending doom; symptoms have longer duration than stable angina

Objective findings: signs of acute distress, lethargy, irritability, altered mental status, diaphoresis, cool clammy skin, hypertension/hypotension, tachycardia/bradycardia, arrhythmia, murmur, ST elevations, pathologic Q waves, weak pulses, sluggish capillary refill, tachypnea

PMH considerations/risk factors: hx of MI, CAD, HTN, heart failure, hyperlipidemia, diabetes, cardiac valve disorders, sedentary lifestyle, NSAID use, nicotine use, substance abuse, family hx of heart disease, older age

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Diagnostics: cardiac enzymes, ECG, stress test, coronary angiography

Pulmonary Embolism

Overview: a blood clot in the pulmonary vasculature

Patient may complain of: chills, fever, chest pain, pain with deep breaths, palpitations, activity intolerance, dyspnea, coughing, hemoptysis, abdominal pain

Objective findings: signs of acute distress, fever, pallor, cyanosis, diaphoresis, tachycardia, hypotension, S3/S4 heart sounds, tachypnea, hypoxia, cough, signs of DVT

PMH considerations/risk factors: hx of DVT, PE or CVA, bleeding/clotting disorder, cancer, pregnancy, HRT/birth control use, IV drug use, recent surgery, immobility, nicotine use

Diagnostics: D-dimer, chest CT, V/Q scan, chest X-ray

Sepsis

Overview: severe inflammatory response due to an infection causing organ dysfunction

Patient may complain of: fever, chills, fatigue, generalized weakness, palpitations, (pre)syncope, dyspnea, oliguria; symptoms of whatever infection is suspected (i.e., appendicitis, diverticulitis, cholecystitis, pneumonia, cellulitis, meningitis, UTI)

Objective findings: signs of acute distress/illness, lethargy, fever, altered mental status, cyanosis, cool clammy skin or warm to the touch, tachycardia, hypotension, tachypnea, hypoxia, oliguria; signs of whatever infection is suspected

PMH considerations/risk factors: hx of immunosuppression, diabetes, cancer, recent infection or hospitalization, older/younger age

Diagnostics: blood culture, lactate, CBC, BMP/CMP, PT/INR; workup may also relate to whatever infection is suspected

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