Chapter 11
Respiratory Emergencies

Learning Objectives
- List structures & functions of the respiratory system
- State signs/symptoms of patient with breathing difficulty
- Describe emergency medical care of patient with breathing difficulty
- Describe emergency medical care of patient with respiratory distress

Learning Objectives
- Establish relationship between airway management & patient with breathing difficulty
- List signs of adequate air exchange
- Recognize need for medical direction to assist in emergency medical care of patient with breathing difficulty
Learning Objectives

• State generic name, medication forms, dose, administration, action, indications, contraindications for prescribed inhaler

• Defend treatment regimens for various respiratory emergencies

• Explain rationale for administering an inhaler

Learning Objectives

• Distinguish among emergency medical care of infant, child, adult patient with breathing difficulty

• Differentiate between upper airway obstruction, lower airway disease in infant, child patient

Introduction

• Respiratory emergencies
  ▶ Life-threatening situations
  ▶ Effective management
    * Maintain open airway
    * Ensure adequate ventilation
    * Oxygenation
  ▶ Asthma
    * You will learn to assist with administration of self-administered metered dose inhaler (MDI)
Anatomy & Physiology

- Provides basis for understanding assessment, treatment of illness/injury
  - Respiratory system delivers $O_2$ to blood for body tissues

Anatomy & Physiology

- Airway
  - Begins at nose/mouth as air enters/passes through nasopharynx/ oropharynx
  - Air continues through upper airways, past epiglottis
  - Down trachea, into 2 main bronchi, that direct air into right & left lungs
Anatomy & Physiology

- Alveolar-capillary exchange
  - Gas diffuses from area of high concentration (alveolar) to area of lower concentration (capillary)
  - $O_2$ from air diffuses into blood, carried by hemoglobin, delivery to body

Anatomy & Physiology

- Mechanics of breathing
  - Diaphragm
    - Principal muscle of respiration; aided by external intercostal muscles
Anatomy & Physiology

- Central nervous system controls
  - Normal breathing is voluntary
  - Affected by CO₂ & O₂ levels in blood; adjusts rate/depth of breathing
  - Tidal volume
  - Minute volume
  - Monitor chest rise/fall, and rate of breathing

Pathophysiology

- Airway can be obstructed at multiple points:
  - In unconscious patients, tongue may fall back, block oropharynx, producing snoring sound
  - Epiglottis swollen from infection

- Airway can be obstructed at multiple points:
  - Inadequate breathing
    - Too shallow or respiratory rate is too slow
      - Average adult: 12 breaths/min × 500 mL/breath = 6000 mL/min
  - Inadequate oxygenation
    - Fluid, pus, other material present at alveoli level
    - Fluid collecting in alveoli or between alveoli and capillaries impairs diffusion
    - Increase oxygenation; if inadequate ventilation, give positive-pressure ventilation
Anatomic Considerations—Infants & Children

- Airway differs from adult
  - Internal airway diameter smaller at all levels
  - Tongue large in relation to airway
  - Narrowest part of airway - cricoid ring

- Larynx/trachea cartilage softer
- Chest wall softer
- Head positioning to open airway:
  - Infants: place head in sniffing position
  - Toddlers/small children: extend neck slightly
- Small obstructions, swelling, mucus - possible airflow blockage
- Infants – obligate nose breathers

Assessing Patient with Difficulty Breathing

- Scene size-up
  - Make sure scene is safe
  - If trauma is contributing factor, consider MOI
  - Be alert for:
    - Toxic environment
    - Poisonous gases
    - Hazmat
  - Use BSI
Assessing Patient with Difficulty Breathing

- Initial (primary) assessment
  - On approach, what is your general impression
  - Is there obvious threat to life?
  - Is patient unconscious?
  - What position is patient found in?
  - Does patient speak in complete sentences, or struggling to catch their breath and speaking in short sentences?

- Patient position
  - 1st clue to seriousness of problem
  - Sitting bolt upright for unrestricted expansion of diaphragm/chest wall
  - Tripod position
  - Transport in position of comfort
Assessing Patient with Difficulty Breathing

- Initial (primary) assessment
  - Mental status
    - Assess according to Alert, verbal, painful, unresponsive (AVPU)
    - Alterations observed as result of hypoxia:
      - Restlessness
      - Agitation/anxiety
      - Lethargy/sleepiness
      - Complete unresponsiveness
  - Administer high-concentration supplemental O₂
  - Observe adequacy of breathing/ventilation

- Airway
  - Inability to speak - sign of severe airway obstruction
    - If foreign body airway obstruction (FBAO) suspected
      - Initiate basic life support (BLS) maneuvers
    - If another cause suspected - initiate rapid transport/positive pressure ventilation (PPV)
    - Use age-appropriate techniques/equipment
    - If suspected neck/head trauma – c-spine precautions
    - Rapid transport if obstruction not relieved with basic maneuvers
    - Consider advanced life support (ALS) intercept

- Breathing
  - Determine if positive-pressure ventilation needed
    - Slow, irregular breathing
    - Shallow breathing
    - Lower breath sounds
    - Seesaw breathing
    - Lower level of consciousness (LOC)
    - Severe hypoxia signs
    - Rely on assessment
Assessing Patient with Difficulty Breathing

- Initial (primary) assessment
  - Breathing
    - Rate & depth of respiration
    - Increased rate/depth of breathing during respiratory distress
    - Observe for:
      - Accessory muscle use in neck, between ribs, or below rib cage
      - Excessive movement of abdomen

- Assisted ventilation
  - Some respiratory efforts but inadequate ventilation
  - If inadequate ventilation but respiratory rate more than 12/min
  - If slow, shallow breathing
  - Administer supplemental O₂ whenever assisted ventilation is required
Assessing Patient with Difficulty Breathing

- Initial (primary) assessment
  - Circulation
    - During respiratory distress/other serious problems, HR increases/decreases as hypoxia progresses
      - Early: increased HR
    - Severe respiratory distress
      - Cool, pale, sweaty skin
      - Cyanosis
      - Consider need for rapid transport/ALS intercept

Assessing Patient with Difficulty Breathing

- Focused (secondary) assessment
  - Obtain SAMPLE history
  - Ask OPQRST questions

Assessing Patient with Difficulty Breathing

- Focused (secondary) assessment
  - Physical examination
    - If responsive patient with no trauma
    - Reassess mental status/skin condition
    - Check head, neck, and chest
    - Check for JVD
    - Check for crepitation
Assessing Patient with Difficulty Breathing

- Focused (secondary) assessment
  - Baseline vital signs
    - Record, paying particular attention to respiratory rate/pulse
    - Reevaluate need for positive-pressure ventilation

Emergency Medical Care

- Shortness of breath
  - High-concentration supplemental O₂
  - If inadequate breathing – assist with PPV
  - Priority patient for early transport
    - Seated position/position of comfort
  - Reduce unnecessary physical exertion

Emergency Medical Care

- Prescribed inhalers
  - Understand general pharmacologic principles
  - Medication name
    - Identify name of prescribed inhaler, communicate information to medical direction, or compare with standing orders
Emergency Medical Care

- Prescribed inhalers
  - Actions & side effects
    - Dilate bronchioles
    - Contain B-agonists
    - Inhaled drug administered directly to bronchioles focuses effects on respiratory tree; minimizes other side effects

- Prescribed inhalers
  - Indications
    - Signs/symptoms of respiratory distress
    - Handheld MDI prescribed by physician
    - Specifically authorized by medical direction

- Prescribed inhalers
  - Contraindications
    - Unable to use device
    - AMS
    - Inadequate ventilation
    - Unable to inhale medication
    - Taken maximum prescribed dose before arrival
Emergency Medical Care

- Prescribed inhalers
  - Medication form
  - Dosage
  - Administration

Administering a Prescribed Inhaler

- Obtain order
- Check expiration date & doses taken
- Shake inhaler vigorously
- Administer inhaler
- Replace O₂
- Repeat per medical direction

Skill 11-1
Medication Administration via Nebulizer

- Check for allergies; obtain order from medical direction
- Check medication 3 times for:
  - Correct medication
  - Correct dose
  - Correct patient
  - Expiration date
  - Loss of clarity, particulate matter
Skill 11-1
Medication Administration via Nebulizer

- Pour contents of unit dose into nebulizer chamber
- Screw top back on nebulizer

Skill 11-1
Medication Administration via Nebulizer

- Remove O₂ delivery device from patient
- In adult, attach nebulizer O₂ tubing to regulator

Skill 11-1
Medication Administration via Nebulizer

- In young child, hold mouthpiece at opening of patient’s mouth
- Monitor patient & medication
Skill 11-1
Medication Administration via Nebulizer

- When complete, reattach O₂ device
- Reevaluate patient

Emergency Medical Care

- Ongoing assessment/reassessment
  - Assess vital signs, repeat secondary (focused) assessment
  - Document time medication administered, findings from reassessment on prehospital report

Emergency Medical Care

- Infants & children
  - Asthma - common condition in children
  - In very young children - inflammation/constriction of bronchioles
  - Inhaler therapy in children similar to adults
Emergency Medical Care

- Infants & children
  - Distinguish between lower/upper respiratory disease
  - Rib cage softer, more moveable in children & retractions may be more evident
  - Cyanosis considered danger sign; condition can deteriorate rapidly

Conditions that Cause Respiratory Emergencies

- Respiratory emergencies may have new illness or complications of chronic respiratory condition:
  - Asthma
  - Emphysema
  - Chronic bronchitis
  - Heart failure
  - Croup
  - Epiglottis
  - Pneumonia
  - Pneumothorax
  - Hyperventilation syndrome
Conditions that Cause Respiratory Emergencies

- Chronic Obstructive Pulmonary Disease (COPD)
  - Includes chronic bronchitis/emphysema
  - Primary complaint - shortness of breath
  - Bronchoconstriction

- COPD
  - Chronic bronchitis
    - Chronic productive cough present more than 3 mo/yr for more than 2 yrs
Conditions that Cause Respiratory Emergencies

- COPD
  - Emphysema
  - Disease caused by destruction of alveoli
  - Less lung surface in which O₂ can diffuse into blood
  - Muscle portion of bronchioles within lung damaged
Conditions that Cause Respiratory Emergencies

- COPD
  - Respiratory failure
    - Respiratory system becomes ineffective
      - Subject to infections that aggravate patient condition

- Asthma
  - Obstructive respiratory disease
  - Caused by constriction of lower airways
  - Triggered by stress, infection, or allergy
  - Treatment

- Asthma
  - Acute asthma attack
    - Shortness of breath
    - Patient assumes upright posture
    - Uses accessory muscles to increase ventilation
    - Patient flushed and breathes forcefully
    - Wheezing & prolonged expirations audible without stethoscope
Conditions that Cause Respiratory Emergencies

● Asthma
  ➢ Severe asthma attack
    * Patient becomes exhausted & produces little airflow
    * No wheezing
    * Difficulty speaking
    * ↓ Breath sounds
  ➢ Assist ventilations during rapid transport

Conditions that Cause Respiratory Emergencies

● Pneumonia
  ➢ Inflammation of alveolar spaces caused by various infecting organisms/aspiration of gastric contents into tracheobronchial tree
  ➢ Signs/symptoms
    * Fever
    * Cough with productive sputum
    * Difficulty breathing
    * Chills
    * Headache
    * Pain that increases with breathing/coughing

Conditions that Cause Respiratory Emergencies

● Pulmonary embolism
  ➢ Blood clots released from leg veins after surgery/patients taking birth control
  ➢ Fat emboli released from long-bone fractures, as clot releases, travels up through vena cava, into right atrium, right ventricle, into pulmonary artery
Conditions that Cause Respiratory Emergencies

- Pulmonary embolism
  - Signs
    - Difficulty breathing
    - Chest pain that increases with breathing
    - Coughing up bloody sputum
    - Calf tenderness
    - Hypoxia, including cyanosis
    - AMS
    - Recent history of surgery, prolonged bed rest, recent travel, use of oral contraceptives, phlebitis

- Physical findings
  - Often normal
  - Rapid pulse
  - Shock
  - Signs of right-sided heart failure

- Treatment
  - High-concentration O₂
  - Treat for shock

Conditions that Cause Respiratory Emergencies

- Hyperventilation syndrome
  - Feel as if cannot breathe, may begin to voluntarily increase rate and depth of breathing
  - Often accompanied by anxiety
  - Increased minute ventilation decreases amount of CO₂ in blood; changes acidity of blood
  - Chief complaint – shortness of breath

- Treatment
  - Supplemental O₂
  - Calm reassurance
Conditions that Cause Respiratory Emergencies

- Spontaneous pneumothorax
  - Part of lung ruptures
    - Allows air to exit lung, enter space between pleural lining of chest cavity and outer covering of lung

- Monitor for progression of simple pneumothorax to tension pneumothorax
  - Absence of breath sounds on one side
  - Distended neck veins
  - Hypotension
  - Tracheal deviation

Conditions that Cause Respiratory Emergencies

- Croup & epiglottitis
  - Upper respiratory problem - primarily in children
    - Croup
      - Viral infection
        - Causes swelling/narrowing of upper airway
    - Epiglottitis
      - Bacterial infection
        - Causes swelling of epiglottis
Conditions that Cause Respiratory Emergencies

- Croup & epiglottitis
  - Signs
    - Fever
    - Dyspnea
    - Coughing
  - Treatment
    - Stridor/crowing
    - Increased work of breathing
    - Tripod position
    - Administer humidified O2
    - Position of comfort
    - Positive-pressure ventilation

- Pertussis ("whooping cough")
  - Highly contagious bacterial infection
  - Transmitted by direct contact with mucus
  - Symptoms
    - High-pitched, whooping cough
    - Fever
    - Signs of hypoxia
  - Treatment
    - Supplemental O2 via nonrebreather mask

Summary

- Patients with respiratory emergencies typically have difficulty breathing, inadequate breathing, or respiratory arrest

- Primary management includes:
  - Airway management
  - Positive-pressure ventilation
  - Administration of supplemental O2
  - Positioning
  - Assisting patients in administration of prescribed inhalers
Summary

- Signs and symptoms of difficulty breathing include:
  - Dyspnea
  - Restlessness
  - Increased HR
  - Increased or decreased RR
  - Shallow or irregular breathing
  - Abdominal breathing
  - Noisy breathing
  - Crowing/stridor
  - Audible wheezing
  - Gurgling
  - Snoring
  - Inability to speak
  - Pale/cyanotic skin
  - Coughing
  - Tripod position

Summary

- Signs of increased work of breathing include accessory muscle use, retractions, nasal flaring

- Patients with dyspnea often sit bolt upright, supported by their hands in tripod position

Summary

- Management of airway may include:
  - Clearing obstruction of upper airway
  - Suctioning
  - Manual maneuvers to open airway
  - Adjuncts to maintain patent airway

- Patients with respiratory distress should receive supplemental $O_2$
Summary

- Patient with signs of inadequate breathing should receive high-concentration supplemental O₂, positive-pressure ventilation when needed.

- Patients with asthma/COPD may carry MDIs. You may have to assist these patients in administering medication.

Questions?