Chapter 9
Airway Management

Chapter Goal
- Establish &/or maintain patent airway, oxygenate & ventilate patient

Learning Objectives
- Explain primary objective of airway maintenance
- Identify commonly neglected prehospital skills related to airway
- Identify upper/lower airway anatomy & describe functions
- Explain differences between adult & pediatric airway anatomy
Learning Objectives

- Define gag reflex
- Explain relationship between pulmonary circulation & respiration
- List concentration of gases comprising atmospheric air
- Describe measurement of O₂ in blood

Learning Objectives

- Describe measurement of carbon dioxide in blood
- Describe peak expiratory flow
- List factors causing decreased O₂ concentrations in blood
- List factors increasing/decreasing carbon dioxide production

Learning Objectives

- Define atelectasis
- Define percentage of O₂ in inspired air (Fio₂)
- Describe voluntary/involuntary regulation of respiration
- Describe modified forms of respiration
Learning Objectives

- Define normal respiratory rates & tidal volumes for adult, child, & infant
- List factors affecting respiratory rate/depth
- Define pulsus paradoxus
- Explain infection risk to EMS providers associated with ventilation

Learning Objectives

- Define, differentiate between hypoxia & hypoxemia
- Describe causes of respiratory distress
- Explain safety considerations of O₂ storage/delivery
- Identify types of O₂ cylinders & pressure regulators, including high-pressure regulator & therapy regulator

Learning Objectives

- List steps for delivering O₂ from cylinder & regulator
- Describe use, advantages, disadvantages of O₂ humidifier
- Describe indications, contraindications, advantages, disadvantages, complications, liter flow range, & concentration of delivered O₂ for supplemental O₂ delivery devices
Learning Objectives

- Describe indications, contraindications, advantages, disadvantages, complications, & technique for ventilating patient using:
  - Mouth-to-mouth
  - Mouth-to-nose
  - Mouth-to-mask
  - 1-person bag-mask
  - 2-person bag-mask
  - 3-person bag-mask
  - Flow-restricted, O₂-powered ventilation device

Learning Objectives

- Explain advantage of 2-person bag-mask ventilation
- Compare ventilation techniques for adult vs. pediatric patients
- Describe indications, contraindications, advantages, disadvantages, complications, technique for automatic transport ventilator ventilation
- Describe Sellick (cricoid pressure) maneuver

Learning Objectives

- Describe manual airway maneuvers
- Describe benefits of impedance threshold device
- Describe use of oral & nasal airway
- Describe indications, contraindications, advantages, disadvantages, complications, & technique for inserting oropharyngeal & nasopharyngeal airway
Learning Objectives

- Describe ventilating patients with stoma, including mouth-to-stoma & bag-mask-to-stoma ventilation
- Describe special considerations in airway management/ventilation for pediatric patient
- Differentiate ET intubation from other methods of advanced airway management

Learning Objectives

- Describe laryngoscopy for removal of foreign body airway obstruction
- Describe indications, contraindications, advantages, disadvantages, & complications of ET intubation
- Describe visual landmarks for direct laryngoscopy

Learning Objectives

- Describe use of cricoid pressure during intubation
- Describe methods for confirming correct ET tube placement
- Describe methods for securing ET tube
- Describe indications, contraindications, advantages, disadvantages, complications, equipment, & technique for extubation
Learning Objectives

- Describe methods of pediatric ET intubation
- Describe indications, contraindications, advantages, disadvantages, complications, equipment, & technique for using dual-lumen airway
- Describe indications, contraindications, advantages, disadvantages, complications, equipment, & technique for using LMA

Learning Objectives

- Define, explain implications of partial airway obstruction with good/poor air exchange
- Define complete airway obstruction
- Describe causes of upper airway obstruction
- Describe maneuvers to treat complete airway obstruction

Learning Objectives

- Explain purpose, indications, techniques, special considerations for suctioning upper airway
- Identify types of suction equipment
- Identify types of suction catheters, including hard, rigid, soft catheters
Learning Objectives

- Describe indications, contraindications, advantages, disadvantages, complications, equipment, & technique for tracheobronchial suctioning of intubated patient

- Identify special considerations for tracheobronchial suctioning of intubated patient

- Define gastric distention

Learning Objectives

- Describe indications, contraindications, advantages, disadvantages, complications, equipment, & technique for nasogastric & orogastric tube insertion

- Identify special considerations for gastric decompression

- Define, identify, & describe tracheostomy, stoma, & tracheostomy tube

Learning Objectives

- Define, identify, & describe laryngectomy

- Describe special considerations in airway management/ventilation for facial injury patients
Introduction

- Primary objective—ensure patent airway, optimal ventilation
- Not all interventions/procedures are successful
- Providers neglect airway skills
- Understanding is critical

Respiratory System Anatomy: Upper Airway

- Nose
  - Opening: nostrils/nares
  - Bones that form walls of nasal cavity
    - Maxilla
    - Frontal
    - Nasal
    - Ethmoid
    - Sphenoid
  - Cribiform plate separate nose from cranial cavity
  - Palatine bones form floor of nasal cavity
  - Bony hard palate separates nasal cavity from oral cavity
  - Soft palate extends posteriorly from hard palate, separates nasopharynx from rest of pharynx
  - Nasal septum separates right & left cavity
  - Each cavity has turbinates (conchae): superior, middle, inferior
Respiratory System Anatomy: Upper Airway

- **Mouth**
  - Formed by cheeks, hard & soft palates, tongue
  - Adults have 32 teeth
    - Fractured or avulsed teeth can cause airway obstruction
    - Tongue attaches to mandible & hyoid bone
      - Most common cause of airway obstruction
      - Hyoid bone—only bone that does not articulate with another bone

- **Pharynx (throat)**
  - Extends from back of soft palate to upper end of esophagus
  - Passageway for
    - Air into respiratory tract (anteriorly)
    - Food & liquid into digestive system (posteriorly)
  - Divided into
    - Nasopharynx
    - Oropharynx
    - Laryngopharynx
  - Epiglottis, laryngeal inlet, arytenoid & cricoid cartilages in front of pharynx

- **Larynx**
  - Connects pharynx with trachea
  - Lies in front of esophagus
  - Made up of thyroid & cricoid cartilages, vocal cords, arytenoid folds
  - Piriform fossa—lateral borders
  - Functions
    - Protects lower airway
    - Produces voice
    - Glottic opening directly behind thyroid cartilage
    - Cricothyroid membrane connects thyroid & cricoid cartilage
Larynx (cont’d)
- False vocal cords (vestibular folds)
- True vocal cords
  - Vibrate to produce sound when air passes over
  - Glottic opening (glottis)—space between cords
    - Adult: Narrowest portion of upper airway
- Vagus nerve feeds larynx
  - Stimulation can cause
    - Bradycardia
    - Hypotension
    - ↓ Respiratory rate
Respiratory System Anatomy: Lower Airway

- **Trachea**
  - Cylindrical
  - 10-15 cm long
  - From larynx to bronchi
  - Supported by C-shaped cartilaginous rings
  - Conducts air from larynx to lungs

Respiratory System Anatomy: Lower Airway

- **Bronchial tree**
  - Carina → Right & left mainstem bronchi
  - Bronchi → Secondary bronchi (3 on right; 2 on left)
  - Secondary bronchi → Tertiary (segmental) bronchi
  - Bronchioles
  - Alveolar ducts
  - Alveoli
Respiratory System Anatomy:
Lower Airway

- Alveoli
  - Hollow, grapelike structures
  - 1-2 cell layers thick
  - Most important functional unit of respiratory system
    - Site for O₂ & CO₂ exchange
  - Lies in contact with blood capillary
  - Covered with surfactant
  - Atelectasis—alveolar collapse
Respiratory System Anatomy: Lower Airway

- CO₂ in blood diffuse into alveoli
- O₂ in alveoli diffuses into capillary blood
- Diffusion—particles move from area of ↑ concentration to area of ↓ concentration until distribution is equal

Respiratory System Anatomy: Lower Airway

- Lungs
  - Cone-shaped, light, spongy, elastic
  - Base—rests on diaphragm
  - Apex—upper portion
  - Lobes
    - Right: 3
    - Left: 2
  - Enclosed with serous membrane—pleura
  - Visceral pleura covers lungs
  - Parietal pleura lines inner surface of chest wall, diaphragm, mediastinum
  - Visceral & parietal pleura separated by pleural space
Respiratory System Anatomy: Lower Airway

- Differences in pediatric airway
  - Overall size smaller; more likely to occlude
  - <9 yrs of age—larger tongue compared to mouth
  - Proportionately smaller jaw can cause tongue to occlude airway
  - Floppy, omega-shaped epiglottis
  - Teeth may be absent or delicate
  - Weak muscles of neck allow airway obstruction
  - Tonsils & adenoids may affect airway patency
  - Narrow, undeveloped cricoid cartilage
  - Vocal cords more superior & anterior
  - <10 yrs of age—airway narrowest at cricoid cartilage
  - Depend on diaphragm for breathing
**Respiratory System Anatomy:**

**Lower Airway**

Differences in pediatric airway.

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**Respiratory System Physiology**

- **Respiration**
  - Exchange of gases
    - O₂ & CO₂
  - 3 parts of respiration:
    - External
    - Internal
    - Cellular

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**Respiratory System Physiology**

- **Ventilation**
  - Process of moving air in & out of lungs
  - Includes inspiration & expiration
  - Controlled by contractions of diaphragm & muscles between ribs
Respiratory System Physiology: Respiratory Volume

- **Adults:** 500–800 mL of air 12–20 times/min
- **Tidal volume**
  - Air inhaled & exhaled in 1 respiratory cycle
- **Dead air space**
  - ~150 mL
- **Alveolar air**
  - ~350 mL
- **Minute volume**
  - Air exchanged over 1 minute
  - ~6,000–16,000 mL
- **Total lung capacity**
  - Maximum lung capacity in average adult male
  - ~6 L

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Respiratory System Physiology: Respiratory Volume

- **Inspiratory reserve**—amount of air that can be inspired in addition to tidal volume
- **Expiratory reserve**—amount of air that can be forcefully exhaled after expiring tidal volume
- **Functional reserve capacity**—optimum amount of air that can be forced from lungs in 1 forced expiration after optimal inspiration
- **Residual volume**—volume of air remaining in lungs at end of maximal expiration
Respiratory System Physiology: Oxygenation

- **FiO₂**—percentage of O₂ in inspired air
- O₂ transported in arterial blood
  - Physically—dissolved in plasma (PO₂)
    - Carries 3%
  - Chemically—attached to hemoglobin (SaO₂)
    - Carries 97%
  - Oxygenated blood diffuses:
    - Alveoli → capillary blood
    - Bloodstream → tissues
    - Tissues → cells
    - Produces energy via Krebs cycle
O₂ & CO₂ diffuse across alveolar capillaries as a result of differences in partial pressure.
Respiratory System Physiology: Carbon Dioxide

- As O₂ diffuses into tissues, CO₂ diffuses from tissues into bloodstream
- From bloodstream, carried by
  - Being dissolved in plasma (produces PCO₂ of blood)
  - Couples with hemoglobin
  - Combines with H₂O as carbonic acid + components

\[
\text{CO}_2 + \text{H}_2\text{O} \leftrightarrow \text{H}_2\text{CO}_3 \leftrightarrow \text{H}^+ + \text{HCO}_3^-
\]

Respiratory System Physiology: Nitrogen

- No metabolic function
- Necessary for maintaining inflation of body cavities that are gas filled
Respiratory System Physiology

Stimulus to breathe

Factors that increase or decrease respiration:
- Body temperature
- Drugs, medications
- Pain
- Emotion
- Hypoxia
- Acidosis
- Sleep
- Head trauma
Respiratory System Physiology

- Modified forms of respiration:
  - Cough
  - Hiccup
  - Gag reflex
  - Sighing

Patient Assessment

- Initial impression
- Airway patency
- Neck
- Breathing efforts
- Respiratory pattern changes
Patient Assessment

- Pulsus paradoxus
  - Systolic BP drops during inspiration
  - Pulse quality
  - May be seen in:
    - COPD
    - Severe asthma
    - Cardiac tamponade
    - Pericardial effusion
    - Acute MI
    - Tension pneumothorax
  - Not typical assessment tool

Patient Assessment

- Pulse oximetry
  - Effectiveness of patient oxygenation
  - Part of vital signs record
Patient Assessment

- False readings:
  - Carbon monoxide/cyanide poisoning
  - Excessive ambient light
  - Patient movement
  - Hypotension
  - Hypothermia
  - Peripheral vascular disease
  - Vasoconstrictive drugs
  - Nail polish
  - Jaundice

Patient Assessment

- End-tidal carbon dioxide detectors
  - Effective
    - Correct ET tube placement
    - Tracheal tube displacement
  - Types
    - Disposable colorimetric device
    - Electronic monitor

Patient Assessment

- Esophageal intubation detectors
  - Verify correct ET tube placement
  - Types
    - Large syringe
    - Flexible bulb
  - Benefits
  - False readings
Patient Assessment

- Appearance of chest
  - Intercostal retraction/accessory muscle use
  - Respiratory compromise
    - Nasal flaring
    - Tracheal tugging
    - Retraction of intercostal muscles
    - Use of diaphragm & neck muscles assists with inspiration

- Epigastric sounds
  - Epigastrum auscultation
  - After ET intubation

- Breath sounds
  - Beneath right, left clavicles
  - Right, left lateral sides
  - 6 locations
  - Supine position
  - Important—clear, equal, bilateral lung sounds
Patient Assessment

- Gastric distention
  - Inadequate hyperextension of head
  - Pressure generated by ventilatory device
  - Improperly placed airway adjuncts

- Skin
  - Color, texture
  - Cyanosis

- Circulatory status
  - Tachycardia
  - Bradycardia
  - History

Hypoxia

- Pathophysiology
  - ↓ or inadequate O₂ supply
  - Brain swelling
  - Heart
  - ↑ myocardial/respiratory workloads

- Assessment
  - Dyspnea
  - Change in mental status
  - Tachycardia
  - Pulse oximetry reading
  - Cyanosis

Hypoxia

- Treatment
  - ↑ O₂ level
  - Indication
    - Chest pain
    - Cardiorespiratory arrest
    - Suspected hypoxia of any cause
Hypoxia

- O₂ source
  - Stored as compressed gas
  - Aluminum/steel tank
  - U.S. Pharmacopoeia
  - Grades of O₂ denoted by colors
  - Common sizes, volumes:
    - "D" 400 L
    - "E" 660 L
    - "M" 3450 L

- Pressure regulators
  - Full O₂ cylinder is 2000 psi
  - Safe working pressure is 30–70 psi

- Flow meters
  - Major types:
    - Bourdon gauge
    - Pressure-compensated
    - Constant flow selector valve
  - Measured in L/min
  - Estimate duration of O₂ supply
Hypoxia

- Liquid O₂
  - Space
  - Warmed
  - Upright storage
  - Precautions:
    - Carbon dioxide retention
    - Premature infants
    - COPD
    - Respiratory depression
    - Petroleum-based substances/adhesive tape

Hypoxia

- Humidification
  - Water attaches to flow meter
  - Keep clean
  - Replace water
  - Single-patient-use humidifiers

- Supplemental O₂:
  - High-flow
  - Low-flow

Hypoxia

- O₂ delivery devices:
  - Nasal cannula
  - Simple face mask
  - Partial rebreather mask
  - Nonrebreather mask
  - Venturi mask
Hypoxia

- Nasal cannula
  - Does not interfere with assessment
  - No rebreathing of expired air
  - Nasal obstruction
  - O₂ concentration delivered: 24%–44%
  - Flow rate: ≤ 6 L/min

- Simple face mask
  - Patients with moderate hypoxia
  - Inlet/outlet ports
  - O₂ concentration delivered—40%–60%
  - Flow rate—8–12 L/min

- Nonrebreather mask
  - Reservoir bag attached
  - Ambient air kept from entering mask
  - O₂ concentration delivered—60%–100%
  - Flow rate—10–15 L/min
  - For severely hypoxic patients
Hypoxia

- Reservoir bag
  - Collects 100% O₂
  - At least 10 L of O₂ needed
  - Precautions:
    - Twisting/kinking
    - Positioned outside sheets/blankets
    - Requires tight seal
    - Patients who report nausea

- Venturi mask
  - High-flow device
  - Draws in ambient air
  - COPD patients
  - O₂ concentration delivered—24%, 28%, 35%, 40%

Ventilation

- Pathophysiology
  - Hypoventilation leads to:
    - Hypercarbia
    - Hypoxia
    - Lowered pH
  - Uncorrected—respiratory &/or cardiac arrest

- Assessment—look at each patient
Ventilation

- Assisting breathing
  - Technique ensures:
    - Adequate seal
    - Forward disposition of lower jaw
    - Resistance to airflow
    - Maintain closed ventilatory system

Mouth-to-mouth/nose breathing

- Most basic
- Good ventilatory volumes
- Recommend protective barrier
- Little O₂
- Avoid over-ventilating—gastric distention

Pocket mask

- Reduces contamination risk
- More effective than bag-mask device
Ventilation

- Bag-mask device
  - Sizes:
    - Adult
    - Child
    - Infant
  - Replaced with ET tube
  - Indications—apneic patients
  - O₂ delivery
    - Without supplemental O₂—21% O₂
    - With O₂—flow rate of 15 L/min, 40%-60% O₂
    - 85%-100% equipped with reservoir

Ventilation

- Bag-mask device:
  - Advantages:
    - Immediate means of ventilatory support
    - Sense of compliance
    - Spontaneously breathing patients
    - Deliver O₂-enriched mixture
    - Eliminates contact with blood/body fluid
    - Extended periods without fatigue
  - Disadvantages:
    - Difficult to master
    - Difficult to maintain seal
    - Difficult to deliver required tidal volume
    - Difficult to ventilate with cervical immobilization

Ventilation

- Bag-mask device
  - O₂ delivery
    - Without supplemental O₂—21% O₂
    - With O₂—flow rate of 15 L/min, 40%-60% O₂
Ventilation

- Bag-mask device
  - Precautions:
    - Prehospital—difficult to use
    - Common problem—adequate ventilatory volumes

Ventilation

- 1-rescuer bag-mask ventilation

Ventilation

- 2-rescuer bag-mask ventilation
  - 1 rescuer opens airway while other sets up bag-mask device
  - 1 rescuer holds mask in place while other ventilates
Ventilation

- Flow-restricted O₂-powered ventilation devices:
  - Manually triggered
  - Attached to various devices
  - Can be used in awake patients
  - Contraindications
  - Advantages
  - Disadvantages
  - Precautions

Ventilation

- O₂-powered ventilation device procedure
  - Select appropriate size mask; attach to O₂ supply
  - Firmly hold mask to patient’s face

Ventilation

- Automatic transport ventilators:
  - Prehospital setting characteristics
  - Indicated: extended ventilation
  - Contraindications
  - Advantages
  - Disadvantages
Ventilation

- **Cricoid pressure:**
  - Prevent gastric distention/regurgitation
  - Advantages
  - Disadvantages
  - Complications

Ventilation

- **Pediatric patient:**
  - Invert mask if seal difficult
  - Broselow tape
  - Chin-lift maneuver
  - No pop-off valve
  - 2 hands
  - Gastric distention is common

Ventilation

- **Stoma patient:**
  - Bystander—pocket mask
  - Rescue personnel—bag-mask device
  - Seal mouth, nose
Upper Airway Problems

- Caused by:
  - Tongue—most common
  - Foreign bodies
  - Vomitus
  - Trauma
  - Laryngeal spasm/edema

- Basic treatment:
  - Head-tilt/chin-lift
  - Head-tilt/chin-lift & jaw-thrust without head-tilt
  - Jaw-thrust
  - Jaw-lift
Airway Adjuncts

- Oropharyngeal airway:
  - Indications
  - Advantages
  - Disadvantages
  - Contraindications

Oropharyngeal Airway Procedure

- Measure airway to determine appropriate size
- Open patient's mouth; begin to insert airway with tip pointing toward roof of mouth
- Slide airway along roof of mouth
- Rotate airway 180 degrees
Oropharyngeal Airway Procedure

- Airway flange should rest on patient’s lips
- Ventilate patient with 100% O₂ through bag-mask device

Airway Adjuncts

- Improper placement— oropharyngeal airway

Airway Adjuncts

- Nasopharyngeal airway:
  - Indications
  - Advantages
  - Disadvantages
  - Contraindications
  - Precautions
Nasopharyngeal Airway Procedure

- Measure airway to determine appropriate size
- Lubricate airway with water-soluble lubricant

Nasopharyngeal Airway Procedure

- Insert airway into nostril with bevel facing septum
- Advance airway until flange rests against patient’s nostril

Advanced Airway Management

- Endotracheal intubation—preferred technique
  - Indications
  - Advantages
  - Disadvantages
  - Precautions
  - Contraindications
  - Complications
  - Routes
Advanced Airway: Equipment

- ET components

Orotracheal Intubation

- Direct partner to provide ventilatory support
- Check distal cuff of ET tube
Orotracheal Intubation

- Insert stylet into appropriate position—½” from distal tip of ET tube
  - ET tube should be in protective wrapper until just before placement
- Check bulb of laryngoscope for brightness, tightness

Orotracheal Intubation

- Have rescuer providing ventilatory support
- Hold laryngoscope with left hand

Orotracheal Intubation

- Insert laryngoscope blade into mouth—slide tongue to left
- Move blade toward midline
  - Advance until distal end is at base of tongue
  - Lift scope upward/forward to displace jaw, airway structures
Orotracheal Intubation

- Grasp ET tube with right hand
- Hold ET tube horizontal to ground
  - Other rescuer applies cricoid pressure for easy visualization

Orotracheal Intubation

- Advance ET tube into oropharynx
- Advance ET tube through glottic opening
Orotracheal Intubation

- ET passing through glottic opening
- Inflate distal cuff

Orotracheal Intubation

- While keeping pressure on plunger, immediately remove syringe
- Auscultate epigastrium

Orotracheal Intubation

- Auscultate chest
- Secure tube
Orotracheal Intubation

- Check tube for condensation on exhalation
- Apply pulse oximeter

Orotracheal Intubation

- Use end-tidal carbon dioxide detector to assess placement
- Colorimetric end-tidal carbon dioxide detectors change colors during exhalation

Orotracheal Intubation

- Esophageal intubation detector:
  - Should reinflate
  - If not, ET tube is in esophagus
Orotracheal Intubation

- Complications:
  - Hypoxia
  - Injury to teeth, tissue
  - Tube misplacement
  - Vallecule, pyriform misplacement
  - Endobronchial misplacement
  - Esophageal intubation

- Vallecule, pyriform misplacement

- Endobronchial misplacement
Orotracheal Intubation

- Misplacement of ET tube into esophagus

Orotracheal Intubation

- Identifying difficult intubation:
  - Short, fat neck
  - Small, receding chin
  - Beard
  - Large tongue
  - Poor mouth opening, neck mobility
  - Facial injury—excess oral secretions
  - Facial, neck burns
  - Fractured mandible
  - Laryngeal injury

Orotracheal Intubation

- Field extubation
  - Need is rare
  - High risk of laryngospasm
  - Indications:
    - Able to protect, maintain airway
    - Risks for reintubation reduced
    - Not sedated
  - Contraindicated—risk of respiratory failure
Orotracheal Intubation

- Pediatric ET intubation
  - Indications
  - Equipment, supplies
  - Size of ET tube
  - Considerations

Multilumen Airways
Esophageal-Tracheal Combitube

- Advantages
- Disadvantages
- Contraindications
Multilumen Airways
Esophageal-Tracheal Combitube

- Assemble, check equipment
- Lubricate tube

Multilumen Airways
Esophageal-Tracheal Combitube

Insert tube into mouth
Insert tube until teeth are between heavy black lines
Multilumen Airways
Esophageal-Tracheal Combitube

Inflate blue pilot balloon

Inflate white pilot balloon

Ventilate through blue tube

Look for chest rise, auscultate for epigastric & chest sounds

No chest rise through blue tube — switch to clear tube

Look for chest rise, auscultate for epigastric & chest sounds

No chest rise through blue tube — switch to clear tube
**PTL Airway**

- Advantages
- Disadvantages
- Contraindication

Check proximal, distal cuffs for proper inflation

Replace white cap

Insert device into patient’s mouth along midline

Loop white strap around patient’s head; secure tube
PTL Airway

- Inflate both distal cuffs simultaneously
- Ventilate patient through green tube
  - Is longer tube in esophagus?

PTL Airway

- If longer tube is in esophagus, gastric tube may be inserted
- If longer tube is in trachea, remove stylet—proceed with ventilations

Laryngeal Mask Airway

- Advantages
- Disadvantages
- Complications
Laryngeal Mask Airway

- Insert LMA
- Provide ventilatory support once LMA is in place

Laryngeal Mask Airway

- Once LMA is properly seated, air enters trachea

Foreign Bodies

- Pathophysiology
  - Adult—source usually meat
  - Children—food, other objects
  - Partial obstruction
  - Complete obstruction
Relieving FBAO
Conscious Patient

- Approach victim from behind
- Locate belly button
- Place thumb side of your fist just above belly button

Grab your fist with either hand

Pull inward & upward in discrete sharp blows

Relieving FBAO
Unconscious Patient

- Straddle victim's thighs, give up to 5 abdominal thrusts
- Perform tongue-jaw lift
Relieving FBAO Unconscious Patient
- Perform finger sweep

Foreign Bodies
- Use Magill forceps to relieve airway obstruction

Aspiration
- Pathophysiology
  - Vomitus
  - Aspirating
  - Mortality increases
  - Assessment
  - Basic treatment
    - Cricoid pressure
    - Suctioning
    - Positioning
Suctioning

- Suction units
- Suction catheters

Measure catheter from tip of patient’s ear to corner of mouth

With suction off, insert catheter into patient’s mouth to proper depth

With suction on, withdraw catheter
Tracheobronchial Suctioning

- Prepare equipment
- Measure suction catheter to determine proper insertion depth

Tracheobronchial Suctioning

- Insert suction catheter into ET tube opening
- Pass suction catheter to proper depth

Tracheobronchial Suctioning

- Withdraw catheter while rotating it
- Flush catheter & tubing with saline
Tracheobronchial Suctioning

Gastric Distention
- Air enters stomach
- Complications
- Potential can be reduced
- Measures taken

Gastric Tubes
- Relieves gastric distention
- Indications
- Complications
- Orogastric decompression
- Nasogastric decompression
Gastric Tube Insertion

- Measure tube by placing tip at earlobe; run tube to nose, then run tube from nose to xiphoid process
- Lubricate tube

Gastric Tube Insertion

- Insert tube into nostril
- Auscultate epigastrium

Gastric Tube Insertion

- Aspirate gastric contents
- Tape tube in place
Special Patient Considerations

- Patients with stoma
  - Obstruction
  - Tracheostomy tube
  - Stenosis
- Remove inner cannula

Special Patient Considerations

- Clean inner cannula
- Reinsert cannula

Special Patient Considerations: Suctioning Stoma

- Preoxygenate patient
- Inject 3 mL normal saline through stoma & into trachea
- Instruct patient to exhale & gently introduce catheter until resistance is met
Special Patient Considerations: Suctioning Stoma

- Apply suction while withdrawing catheter

Special Patient Considerations

- Facial injuries
  - Pathophysiology
  - Assessment
  - Treatment

Special Patient Considerations

- Laryngeal edema or spasm
  - Pathophysiology
  - Adults
  - Children
  - Assessment
  - Treatment
Summary

- Airway management—critical element of prehospital care
- Airway skills must be practiced on ongoing basis
- Maintain respiratory system’s primary function—moving air in & out of body

Summary

- To accomplish goal:
  - Airway must be patent
  - Must be adequate $O_2$ in inspired air
  - Respiratory minute volumes must be sufficient
- First—secure airway
- Variety of procedures, devices useful to support patient’s breathing
- Avoid hyperventilation in cardiac arrest patients

Summary

- Inspired $O_2$ concentrations increased using variety of delivery devices
- ET intubation—preferred technique to secure airway
- Alternative methods exist when head, neck manipulation must be avoided