

## Chapter 7

### Airway Management and Ventilation

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## Introduction

- Priority is opening and maintaining the patient's airway
  - The body consists of specialized cells that make up muscle, bone, and tissues
    - Each cell needs O<sub>2</sub> and fuel to produce energy required to perform their specific functions
      - The cells consume O<sub>2</sub> and fuel and give off CO<sub>2</sub> and waste products

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## Introduction

- O<sub>2</sub> enters the body through the respiratory system
  - Airway must be open to accomplish this task
    - Body normally maintains airway automatically

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## Introduction

- When the level of consciousness decreases because of a traumatic event, the body may no longer maintain the airway
  - Must understand the structure and function of the airway and respiratory systems

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## Respiratory System

- Air normally enters the body through the nose
  - Filters the air, warms it to body temperature, and humidifies it
  - Fine hairs within the nostrils filter out larger particles of dust or other contaminants
  - Air then passes over small structures that resemble fins on a radiator (turbinates)
    - Warm and humidify the air

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## Respiratory System

- Pharynx (throat) lies behind the nose and the mouth
  - It is divided into two parts
    - Oropharynx
    - Nasopharynx

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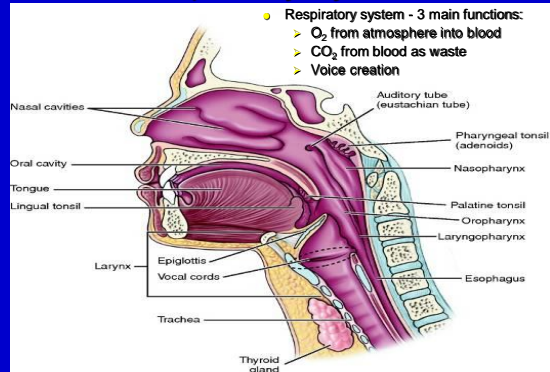
## Respiratory System

- Epiglottis is a leaf-shaped structure
  - Prevents food, liquids, and foreign matter from entering the trachea (windpipe) while swallowing

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## Respiratory System



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## Respiratory System

- Trachea is 9 inches long and is made of flexible cartilage
  - Looks like corrugated pipe
  - Connects upper airway to the lungs

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## Respiratory System

- Lungs
  - Complex system of tubes that branch off and decrease in size until air is delivered to alveoli (air sacks)

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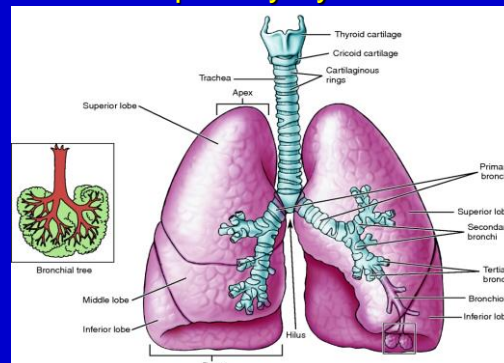
## Respiratory System

- Alveoli are encircled by capillaries (blood vessels) that transport  $O_2$  to cells of the body
  - Transfer of  $O_2$  and  $CO_2$  between air and blood takes place where alveoli and capillaries meet
    - Considered respiration

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## Respiratory System



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## Respiratory System

- Mechanics of breathing (ventilation) rely on pressure changes that occur within the chest
  - Brain receives signals from receptors in the blood that are sensitive to  $\text{CO}_2$  and  $\text{O}_2$  levels
    - An increase in  $\text{CO}_2$  level or a decrease in  $\text{O}_2$  level in blood signals the brain to increase the respiratory rate

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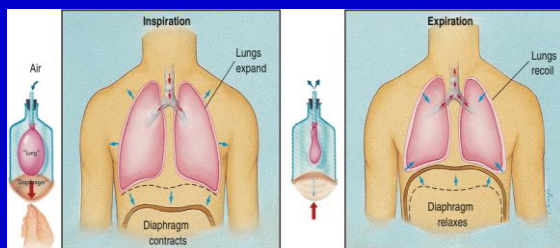
## The Respiratory System

- The mechanics of breathing (ventilation) rely on pressure changes that occur within the chest
  - Lungs are protected within the semirigid structure created by the ribs and sternum
  - Diaphragm
    - Located between chest and abdomen
    - Large muscle

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## The Respiratory System



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## A-Airway

- Opening the airway
  - When first approaching the patient, it is necessary to assess for responsiveness
    - Do this by asking patient questions
      - If a verbal response, patient has an open airway
      - If no response, gently tap patient's shoulder

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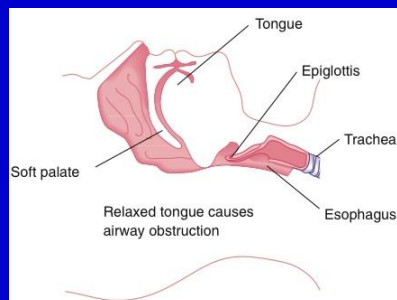
## A-Airway

- Opening the airway
  - When patient becomes unconscious, the tongue may become flaccid (limp) and fall back into the airway
    - If not corrected within a very short time, irreparable brain damage and death may occur

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## A-Airway



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## A-Airway

- Opening the airway
  - Head-tilt/chin-lift
    - Best method for opening the airway in uninjured, unresponsive patients
    - Provides most effective airway position
    - Method should not be used with trauma patients

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## A-Airway

- Opening the airway
  - Head-tilt/chin lift
    - Place one hand on the patient's forehead and apply enough pressure to tilt the head back
    - With your other hand lift up and pull the patient's jaw forward with your fingers on the body part of the chin



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## A-Airway

- Opening the airway
  - Head-tilt/chin lift
    - Avoid pressing your fingers deeply into soft tissues of the chin because this can cause airway obstruction
    - Avoid using your thumb to lift the chin
      - Use fingers
    - Keep patient's mouth open

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## A-Airway

- Opening the airway
  - Jaw thrust
    - Jaw thrust without head tilt is alternative method of opening airway
    - Safest technique for patients with suspected spinal injury



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## A-Airway

- Opening the airway
  - Jaw thrust
    - Position yourself behind the patient and place your fingers on the angles of patient's lower jaw
      - Lift with both hands to move jaw forward

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## A-Airway

- Opening the airway
  - Trauma chin-lift
    - Position yourself at patient's side and grasp lower jaw with your thumb, placing your fingers beneath patient's chin
    - Pull up on patient's chin to elevate jaw and open the mouth



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## A-Airway

- Inspecting the airway
  - After the airway is opened, you should inspect the mouth to see if anything is blocking the airway
    - Open patient's mouth with your gloved hand and look inside the mouth to see if it is clear (patent) or blocked by fluids (such as blood, mucus, or vomit), solids (such as food or other foreign objects), or teeth, including dentures

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## A-Airway

- Clearing the airway
  - All foreign objects should be cleared from the airway immediately, by whatever means possible, and as often as needed
    - Prevents aspiration into lungs

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## A-Airway

- Clearing the airway
  - The recovery position
    - Uses the force of gravity to allow fluids to drain from the mouth and helps to keep airway clear
    - Position also keeps the tongue from falling back and blocking the airway in an unconscious patient without suspected spinal injuries



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## A-Airway

- Clearing the airway
  - The recovery position
    - Elevate patient's left arm above head or place it along patient's left side with the palm facing his left hip
    - While providing support to the head and neck, grasp patient's right shoulder and roll the patient toward you
    - Continue moving the patient off the shoulder and onto the left anterior chest and abdomen area
    - Bend the patient's right leg slightly, and place the right leg in front of the left leg for stabilization and comfort

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## A-Airway

- Clearing the airway
  - The recovery position
    - Patient's left arm can be placed at his side or left extended with the elbow bent to position the forearm at the top of the patient's head
    - Place the patient's right hand under the chin and left cheek to help stabilize the head

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## A-Airway

- Clearing the airway
  - Finger sweeps
    - If on inspection of the airway you see foreign material or vomit, it should be quickly removed
      - To do this, first roll the patient onto his/her side
      - With a gloved hand, sweep out solid objects with one or two fingers

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## A-Airway

- Suctioning

- If recovery position or finger sweep is ineffective, suction may be indicated
  - Your first responder equipment and training may include some type of suction unit



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## A-Airway

- Suctioning

- To suction the mouth of an unresponsive patient, a hard or rigid tonsil-tip suction catheter is preferred
  - Insert catheter into patient's mouth no deeper than the base of the patient's tongue
  - Suction is applied only as you move the catheter out of the patient's mouth, not while inserting it into the mouth
  - Never apply for more than 15 seconds at a time
  - After suctioning, monitor patient's breathing and pulse and provide ventilation if needed

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## A-Airway



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## A-Airway

- Suctioning

- Mechanical suction units can be quickly overwhelmed by high volumes of fluid
  - Inadequate for removing solid objects such as teeth, foreign bodies, or food
    - To remove solid objects you should place the patient on his side and sweep out the mouth with a gloved hand, then resume suctioning

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## A-Airway

- Mechanical airway adjuncts

- Once patient's airway is open, it is necessary to maintain the open position
  - Accomplished by continuing to hold the patient's head in a head-tilt/chin-lift or jaw-thrust position and by using OPA or NPA

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## A-Airway

- Oropharyngeal airways (OPA)

- OPA is a disposable device that is inserted into the oral cavity and positioned to move the tongue forward and keep the airway open
- Made of hard plastic and comes in many sizes to fit infants through adults

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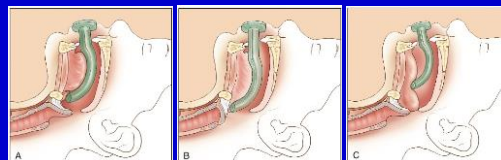
## A-Airway



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## A-Airway



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## Skill 7-1 Inserting an Oropharyngeal Airway

- Put on proper PPE
- OPA should be sized appropriately



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## Skill 7-1 Inserting an Oropharyngeal Airway

- Open patient's mouth by pulling down on the jaw
- Insert airway upside down with tip facing toward head
- Gently run tip along roof of mouth until it meets resistance



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## Skill 7-1 Inserting an Oropharyngeal Airway

- Once OPA reaches back of throat, rotate 180° until the flange is on the teeth, level with lips



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## Skill 7-1 Inserting an Oropharyngeal Airway

- OPA in its final position
- If patient begins to cough or gag, remove immediately



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## Skill 7-1 Inserting an Oropharyngeal Airway

- Alternative method for inserting an OPA uses a tongue blade and inserts the OPA in its normal anatomical position



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## A-Airway

- Nasopharyngeal airways (NPA)
  - Alternative to the OPA is the NPA
    - Soft, rubbery device serves the same purpose as the OPA, but bypasses some of the gag reflex nerves at the back of the tongue
    - Less likely to stimulate vomiting
    - Good choice for responsive patients who need help keeping their tongue from obstructing the airway

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## A-Airway



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## Skill 7-2 Inserting a Nasopharyngeal Airway

- Put on correct size PPE
- Select correct size NPA



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## Skill 7-2 Inserting a Nasopharyngeal Airway

- Inspect nostrils for size and obstruction
- Make sure diameter of NPA is less than diameter of nostril

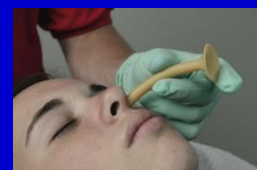


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## Skill 7-2 Inserting a Nasopharyngeal Airway

- Insert NPA into right nostril first, design makes insertion easier in this nostril
- Insert NPA posteriorly with bevel toward base of nostril/septum
- Insert toward back of head



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## Skill 7-2 Inserting a Nasopharyngeal Airway

- Once airway clears the nostril, you will feel a decrease in resistance
- Continue to insert the NPA until flange is touching nostril



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## B-Breathing

- Look, listen, and feel for whether your patient is breathing
  - Look to see if the chest is rising and falling
  - Listen for sounds of breathing
  - Feel for any breaths against your cheek



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## B-Breathing

- Breathing is normally effortless
  - Anything that draws your attention to the fact that someone is breathing is most probably a sign of distress

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## B-Breathing

- *Dyspnea*: anything that indicates the patient is working harder to breath
  - Respiratory arrest or the total lack of breathing is the most critical finding
  - If patient is able to speak and respond to your questions, you can assume he is breathing
    - It is important to note the effort of breathing

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## B-Breathing

- Mouth-to-mask ventilation
  - Pocket mask with a one-way valve provides a safe barrier between you and your patient
    - It is constructed of semirigid plastic with a soft, air-filled cuff
    - Mask should be transparent so you can watch for vomiting
    - Cuff should create a seal when you push it firmly against the patient's face
    - Mask has a one-way valve to divert the patient's exhalations

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## Skill 7-3 Mouth-to-Mask Ventilation

- Put on appropriate PPE
- Position yourself at head of patient
- Maintain open airway by using manual/mechanical techniques



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### Skill 7-3 Mouth-to-Mask Ventilation

- Take in a normal breath, place your mouth over mouthpiece, breath evenly in patient's mouth for 1 second
- Remove mouth from mouthpiece and allow patient to exhale



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### B-Breathing

- Mouth-to-barrier ventilation
  - Barrier devices place a layer of thin film with a filter or valve between you and the patient
    - Offer variable levels of protection based on their design
    - May prevent transmission of disease, but still requires very close contact with the patient
    - Does not have exhalation valve and air often leaks around the seal
    - Presents little resistance to your ventilation
    - Advantage is its compact size; some can even fit on a key ring

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### B-Breathing



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### Skill 7-4 Mouth-to-Barrier Ventilation

- Put on appropriate PPE
- Place yourself at patient's head, maintain an open airway through use of manual or mechanical techniques  
Place barrier device over patient's mouth



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### Skill 7-4 Mouth-to-Barrier Ventilation

- Place your mouth over mouthpiece, pinch nostrils, and breathe slowly into patient's mouth
- Remove your mouth from mouthpiece and release patient's nose
- Watch for vomiting or for patient to start breathing on his own



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### B-Breathing

- Mouth-to-mouth ventilation
  - Effective method to deliver an adequate volume of air to a nonbreathing patient
    - Does not provide a high concentration of O<sub>2</sub>

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## Skill 7-5 Mouth-to-Mouth Ventilation

- Put on appropriate PPE
- Position yourself at the patient's head and maintain open airway through the use of manual/mechanical techniques
- Place your mouth over patient's mouth and pinch the patient's nose with your fingers

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## Skill 7-5 Mouth to Mouth Ventilation

- Give breath over 1 second for infant, child, or adult
- Delivery of your breath should cause the patient's chest to visibly rise
  - Avoid hyperventilation
  - For a infant, place you mouth over their mouth and nose

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## Skill 7-5 Mouth-to-Mouth Ventilation

- Remove your mouth and release the patient's nose to allow the patient to exhale
- Continue rescue breathing at the rate of one breath every 5-6 seconds (10-12 breaths per minute) for an adult
  - Every 3-5 seconds (12-20 breaths a minute) for an infant/child

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## Skill 7-5 Mouth-to-Mouth Ventilation

- Continue to maintain an open airway and watch for any signs that the patient has vomited or has started breathing on his own

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## B-Breathing

- Foreign body airway obstruction
  - Rescue breathing on any patient may not be successful
    - Patient may be choking on food or other foreign material or experiencing an airway obstruction caused by bleeding into the airway or vomiting
    - This is called an FBAO

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## B-Breathing

- Foreign body airway obstruction
  - Complete airway obstruction blocks any air from entering or exiting the lungs
    - Patient cannot cough or speak

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### Skill 7-6 Complete FBAO (Conscious Adult)

- Ask patient, "Are you choking? Or "Can you speak?"
- If there is no response



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### Skill 7-6 Complete FBAO (Conscious Adult)

- Position yourself behind patient
- Wrap your arms around patient, placing thumb side of one hand above naval but below xiphoid process



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### Skill 7-6 Complete FBAO (Conscious Adult)

- Place your second hand on top of the first and apply pressure in an inward and upward thrust
- Repeat until object is expelled or patient becomes unconscious



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### Skill 7-6 Complete FBAO (Conscious Adult)

- If obese/pregnant, use chest thrusts
- Place your arms around patient's chest, under armpits
- Give quick backward thrusts until object is expelled/patient becomes unconscious



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### Skill 7-7 FBOA (Unconscious Adult)

- Open patient's airway using either head-tilt/chin-lift or trauma chin-lift; look for foreign airway obstruction
- If you see the object, turn victim's head to the side and gently remove object using finger sweep motion



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### Skill 7-7 FBOA (Unconscious Adult)

- Open airway and attempt ventilation
- If you cannot ventilate after first attempt, reposition head, open airway, and try again
- If your breaths do not go in, immediately begin chest compressions in the middle of patient's chest, using same technique you would for CPR



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## Skill 7-7 FBOA (Unconscious Adult)

- Following 30 chest compressions, open the airway and look for obstruction
- If you are able to visualize obstruction, turn patient's head to the side and remove the object using a finger sweep motion
- Attempt to ventilate by giving patient two breaths

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## Skill 7-7 FBOA (Unconscious Adult)

- Sequence is same for pregnant or obese patients



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## Special Considerations

- Infants and children
  - Airways are different from adult airways
    - Smaller and narrower
    - Tongue is larger and takes up more space
    - Trachea is less developed and more flexible
    - Chest wall is more pliable

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## Special Considerations

- Infants and children
  - Heads are larger in proportion to their bodies
    - This can cause the neck to become hyperflexed and close the airway

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## Special Considerations

- Infants and children
  - Another potential problem is hyperextension of the airway, crimping it off
    - Problems are due to the flexibility of the immature trachea

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## Special Considerations



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## Special Considerations

- Children
  - FBAO
    - For children >1 year, procedure for clearing an FBAO is the same as that for an adult but is performed with less force

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## Special Considerations

- Children
  - FBAO
    - For children >1 year, confirm that the airway is obstructed by observing for air movement and adequate breathing
      - Inability to cry can be a key indicator of complete airway obstruction
      - If obstruction is present and child is conscious, position yourself behind the child and administer abdominal thrusts
      - Continue thrusts until the obstruction is dislodged or the child becomes unconscious

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## Special Considerations

- Children
  - FBAO
    - If the child becomes unconscious, open the airway using the head-tilt/chin-lift, and look into mouth
      - If you can see a foreign body, remove it using the finger sweep
      - If this fails, reposition the head and attempt to ventilate the child

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## Special Considerations

- Children
  - FBAO
    - If the child becomes unconscious, open the airway using the head-tilt/chin-lift, and look into mouth
      - Immediately begin five cycles, or about 2 minutes of cardiopulmonary resuscitation (CPR)
      - CPR for the FBAO victim is performed in the same manner as regular CPR except open the victim's airway wide before each breath and look for the obstruction

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## Special Considerations

- Children
  - FBAO
    - If obstruction is visible, remove it using a finger sweep and then attempt to ventilate
    - Continue CPR unless child begins to breathe spontaneously
    - If child still cannot breathe after five cycles of CPR, call EMS and then continue CPR until EMS arrives

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## Special Considerations



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## Special Considerations

### ● Infants

#### ➤ FBAO

- If an airway obstruction is present, sit or kneel with the infant in your lap to provide more stability
  - Place baby face down, straddling your arm, cradle baby's face with your hand
  - Using the heel of one hand, administer five back slaps between the infant's shoulder blades
  - Immediately following the back slaps, sandwich the baby between your arms, roll the baby over, and administer five chest compressions
  - Repeat until airway obstruction is relieved or the infant becomes unconscious

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## Special Considerations

### ● Infants

#### ➤ FBAO

- If the infant becomes unresponsive, place infant on hard surface and begin CPR
  - First, open the airway and assess for breathing
  - Look in the airway, if a foreign body is visible remove it using a finger sweep
  - Once you have opened the airway, assess for breathing and attempt to ventilate if infant is not spontaneously breathing

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## Special Considerations

### ● Infants

#### ➤ FBAO

- Give two rescue breaths and watch for a rising chest
- Next begin the steps of CPR, giving 30 continuous compressions and two breaths
  - Look into the airway first for obstruction and remove it if you see it
- After 2 minutes or about five cycles of 30:2 CPR, activate EMS

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## Skill 7-8 FBOA (Unconscious Infant)

- Position infant on firm, flat surface
- Open airway using head-tilt/chin-lift or trauma tilt/chin-lift to inspect mouth for foreign object
- If one is visible, use finger sweep to clear it



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## Skill 7-8 FBOA (Unconscious Infant)

- Open airway and attempt to ventilate
- If attempt fails, reposition head and make another attempt



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## Skill 7-8 FBOA (Unconscious Infant)

- If ventilation is still unsuccessful, begin CPR by giving 30 compressions
- After each cycle of 30 compressions, perform one extra step by opening infant's airway and looking for FBOA



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## Skill 7-8 FBOA (Unconscious Infant)

- Repeat steps 2 and 3 until object is removed
- Ensure EMS has been activated
- If you are alone, activate EMS after five cycles of CPR (about 2 minutes)



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## Special Considerations

- Mouth-to-stoma ventilation
  - Some patients will have an opening to their airway through the neck
  - To breathe for these patients a seal must be maintained with the surface of neck around the stoma



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## Special Considerations

- Mouth-to-stoma ventilation
  - Place pediatric-sized mask or a barrier device over the stoma
  - Use same techniques as previously described except patient's nose is not pinched



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## Special Considerations

- Gastric inflation/vomiting
  - Rescue breathing or assisting someone's ventilations can lead to air being pushed into patient's stomach, causing it to bulge out
    - This is termed gastric inflation
      - Can cause patient to vomit

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## Special Considerations

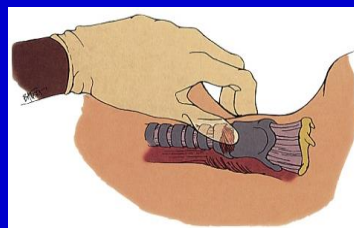
- Gastric inflation/vomiting
  - If you notice gastric inflation, you should do the following:
    - Attempt to reposition the patient's head to allow air to flow more effectively into the lungs rather than the stomach
    - Make sure breaths are not being delivered too forcefully
    - Be prepared in case patient vomits
    - Never push on an inflated stomach to release air

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## Special Considerations

- Cricoid pressure
  - No longer recommended for pre-hospital use!



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## O<sub>2</sub> Administration

- EMRs may also be called on to administer O<sub>2</sub> or assist other healthcare providers in providing O<sub>2</sub> or assisting with more advanced airway management
  - It is important to understand the principles behind these techniques to assist others more effectively
- O<sub>2</sub> is necessary for life
  - Absence of O<sub>2</sub> will cause certain death within a short time
  - Patients who have certain medical conditions or traumatic injuries may not have sufficient O<sub>2</sub> circulating in their blood to support the body
    - Healthcare providers therefore often provide supplemental O<sub>2</sub>

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## Oxygen Equipment



Full Cylinder = 2,000 psi      M Cylinder = 3,000 liters

E Cylinder = 625 liters      D Cylinder = 350 liters

- G cylinder = 5,300 liters
- H cylinder = 6,900 liters
- Larger, often used to fill smaller tanks

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## Pressure Regulators

- Provides a safe working pressure of 30-70 psi
- E tanks and smaller = secured to cylinder
- Regulator inlet filter should be free of damage and clean (dust).
- Pin index safety system



## Flowmeters

- Controls flow of oxygen in liters per minute
- Two Types: Low-Pressure and High-Pressure



Low:  
Pressure-  
Compensated  
Flowmeter



Low:  
Constant  
Flow Selector  
Valve



High:  
High-  
Pressure  
Flowmeter

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## Oxygen Safety

- Use pressure gauges, regulators, and tubing that are intended use with oxygen.
- Valve inserts and gaskets are in good condition.
- Use medical-grade oxygen.
- Store in a cool, ventilated room and properly secured.
- Don't leave a cylinder standing upright, always secure the tanks – tanks can become a missile!
- Oxygen = no smoking.
- Never use around an open flame and don't handle tanks with greasy hands.

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## Hazards of Oxygen

- Oxygen supports combustion, causing fire to burn more rapidly.
- Under pressure, oxygen and oil do not mix. Do not lubricate delivery system with petroleum products, or allow petroleum-based adhesive (tape).
- Air Sac Collapse: lungs react unfavorably
- Infant Eye Damage: With premature infants over a long period (days). May develop scar tissue on the retina.
- Respiratory Depression: End-stage COPD relies on hypoxic drive to breathe.

Administer oxygen when clinically appropriate to do so!

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## Oxygen Delivery Devices

DEVICE	FLOW RATE	OXYGEN CONCENTRATION	APPROPRIATE USE
Non-Rebreather Mask	10 to 15 L/min	80 to 90 percent	Hypoxia, Shortness of Breath, Chest Pain, Severe Injuries, Altered Mental Status.
Nasal Cannula	1 to 6 L/min	24 to 44 percent (1 = 24%, 2 = 28, 3 = 32, 4 = 36, 5 = 40, 6 = 44%)	Benefit from lower concentration settings or can't tolerate mask.
Partial Rebreather Mask	9 to 10 L/min	40 to 60 percent	Allows patient to rebreathe more exhaled air and retain more CO <sub>2</sub> . (used little in EMS)
Simple Mask	6 to 10 L/min	60 percent (highest)	Allows for more mixture of ambient air.
Venturi Mask	8 to 10 L/min	24 to 60 percent	Delivers a specific concentration depending on adapter tip and flow rate.

## Oxygen Delivery Devices



## Administering Oxygen via NRB

### From EMR Skill Station

1. Take BSI precautions
2. Gather appropriate equipment
3. Cracks valve on the oxygen tank
4. Assembles the regulator to the oxygen tank
5. Opens the oxygen tank valve
6. Checks the oxygen tank pressure
7. Checks for leaks
8. Attaches the non-rebreather mask to correct port of regulator
9. Turns on oxygen flow to pre-fill reservoir bag
10. Adjusts regulator to at least 10 L/minute
11. Attaches mask to patient's face and adjusts fit snugly

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## Nasal Cannula Administration

- Nasal cannula
- > Used for a patient who cannot tolerate a mask
- > To apply the nasal cannula, do the following:
  - Attach the tubing to the O<sub>2</sub> tank and turn on the tank
  - Adjust the flowmeter to the desired flow rate (2-6 LPM)
  - Place the prongs into the patient's nose and adjust the tubing for comfort



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## Pulse Oximetry

### Defined and Use

- Photoelectric device that monitors the oxygen saturation of hemoglobin,
- Include a monitor and sensing probe,
- Light source should have unobstructed access to a capillary bed,
- Is a useful tool as long as you remember that the device is only a tool, not a substitute for a good assessment.



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## Pulse Oximetry

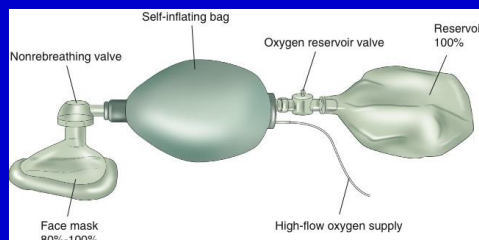
### A Useful Tool....Most of the Time

- The patient who is vasoconstricted,
- Loss of red blood cells (bleeding or anemia),
- Sickle cell disease (red blood cell disorder),
- Chemicals that displaces oxygen (carbon monoxide poisoning),
- Smokers may have 10-15% higher readings because cigarettes produce carbon monoxide,
- Known hypoperfusion is present,
- Patient's extremities are cold,
- Bright light, darkly pigmented skin, and nail polish can all cause errors in the readings.

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## Bag-Mask Ventilation

- Bag-mask devices
  - Referred to as self-inflating bags; they are commonly used in both pre-hospital and hospital situations when ventilator support (rescue breathing) is needed



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## Bag-Mask Ventilation

- Bag-mask has four major components
  - The bag itself is a collapsible, soft plastic device
  - Bag-mask valve is a one-way valve
  - The mask, like the pocket, is made up of plastic, with an air-filled cuff
  - The reservoir collects O<sub>2</sub> and allows a higher concentration of O<sub>2</sub> to be delivered to the patient

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## Bag-Mask Ventilation

- Bag-mask device
  - Provides more efficient ventilation if two rescuers work together to ventilate the patient
  - As with the pocket-mask, the ventilation rate should be 10-12 breaths per minute or 1 breath every 5-6 seconds
  - If you use the bag-mask device with O<sub>2</sub> attached, use a reservoir



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## Bag-Mask Ventilation

- Advantages to the bag-mask device:
  - Can be used with or without O<sub>2</sub>
  - Close to 100% O<sub>2</sub> concentration when connected to an O<sub>2</sub> source and reservoir
  - Minimal risk of body fluid exposure
  - Disposable and Inexpensive
- Disadvantages of the bag-mask device
  - Its large size and the need for two rescuers to adequately ventilate the patient
  - To adequately ventilate a non-breathing patient when using air without supplemental O<sub>2</sub>, 800 mL of air is needed

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