

Respiratory Assessment and Disorders

the respiratory system: adults and children are different

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Cook Children's Teddy Bear Transport

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pediatric airway differences

- More Cartilaginous
- Size
- Number of Alveoli
- Poorly Developed Intercostal Muscles
- Diaphragm is the chief muscle of inspiration
- Cough Reflex is less effective
- The shape of the chest wall is different

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other airway differences

- Opening of trachea and esophagus are closer together- leads to increased aspiration and increased air into esophagus with BVM ventilation.
- Tongue relatively larger in proportion with the mouth causing an increased chance for obstruction.
- Obligate Nose Breathers

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other significant differences

- O₂ requirements are higher in infants/children due to their ↑ metabolic rate. Therefore they are quicker to deteriorate when in respiratory distress.
- Respiratory distress can quickly lead to cardiac depression.

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lung physiology

Four steps necessary for adequate oxygenation.

- 4 phases to the Respiratory System:
 - Ventilation
 - Distribution
 - Diffusion
 - Transportation

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ventilation

- Ventilation is the process of gas movement in and out of the lungs.
- Alveolar ventilation, is the portion of ventilation that actually reaches the alveoli.
- Problems causing ventilation/mismatch
 - FBAO
 - Croup
 - Epiglottitis

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distribution

- Air actually reaching the alveolar/capillary exchange units.

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diffusion

- Air crossing over to the circulation. Affected by blood flow to the alveoli
 - dead space unit- No flow, but adequate ventilation
 - Shunt unit- No ventilation but adequate flow
 - Silent unit- no ventilation/no perfusion



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transportation

- O₂/gases transported through the body.
- Oxygen is carried in the blood two ways
 - The majority (97.5%) is carried inside the red blood cells in the form of oxyhemoglobin
 - A small portion (2.5%) is carried in the dissolved form in plasma

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history

- Pre-existing conditions
- Family Health History
- Immunizations status
- Allergies
- Current Therapies tried
- Last Medications

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assessment

80% is Visualization

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inspection

• Color	• Symmetry of Chest
• Level of Consciousness	• Quality of Respirations
• Respiratory Rate- age appropriate	• Respiratory Patterns
• Work of breathing	• Chest Wall Deformities

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color

- “Looks Good” vs “Looks Bad”
- Color should be consistent over the trunk and extremities. Mucus membranes, nail beds, palms of hands and soles of feet should be pink. (** Cardiac Patients)
- Central cyanosis is a late sign of hypoxemia.

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level of consciousness

- Decreases in LOC can be a late sign of hypoxemia
- Evaluate the child's responsiveness in light of their psychosocial development.
 - Infants should make eye contact with and be comforted by their parents
 - Toddlers should protest when separated from caretakers (NO)
 - Preschoolers should be able to point to painful areas, and be able to tell you their name
 - School-aged children should have a good concept of time and body parts. They should be able to carry on a conversation.
 - Adolescents- They should be able to discuss their condition and plan of care.

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rate

- Age appropriate rates
 - Newborns 30-60
 - Toddlers 25-40
 - Preschoolers 22-34
 - School Age 18-28
 - Adolescents 12-16
- Resting rate is important . Also remember that fever will increase R.R.

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respiratory patterns

- Bradypnea-abnormally slow respirations
- Tachypnea-abnormally fast respirations
- Apnea-the cessation of breathing resulting from lack of respiratory effort
- Kussmaul Breathing-increased rate, deep respiration usually associated with metabolic acidosis
- Cheyne Stokes-Respiratory rate and volume progressively increase until they reach a climax, then they cease entirely for 10-50 sec.
- Obstructive-Mild to Severe

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chest wall deformities

- Pectus excavatum (funnel chest, abnormally depressed)
- Pectus carinatum (pigeon chest, abnormal prominence of the sternum)
- Thoracic kyphoscoliosis- (hump back)
- Barrel Chest (CF, COPD)

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lower airway causes of respiratory distress

- Bronchiolitis
- Pneumonia
- Foreign Body Aspiration
- Asthma
- Trauma

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bronchiolitis

- Inflammation of the bronchioles
- Lower respiratory tract illness
- Over 80% of cases appear in the first year of life
- Highly seasonal- (mid winter to spring)

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bronchiolitis: etiology

- Respiratory Syncytial Virus-(RSV) 86%
- Influenza virus A- 1%
- Rhinovirus-4%
- Adenovirus- 3%
- Parainfluenza types I, II III-6%

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rsv- epidemiology

- Responsible for 4,500 deaths annually
- Major cause of Asthma exacerbations
- 23% of all pneumonias are secondary to RSV
- Day care center attack rate-70-100%
- 10-20% reinfections per epidemic
- 44% of families with school-age children infected annually
- 14% of infants hospitalized with RSV require ICU care

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prevention

- Contact Isolation
- Best preventative measure is **HANDWASHING**
- Nasal secretions will survive up to 6 hours outside of the body .

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clinical presentation

- Nondescript rhinorrhea
- coughing
- Low grade fever for 1-2 days
- Irritability
- Poor feeding
- Tachypnea
- Retractions

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severe sign and symptoms

- Wheezing
- Cyanosis
- Apnea
- Nasal Flaring
- Vomiting
- Retraction
- Tachypnea

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management of bronchiolitis

- Fluids
- Supplemental Oxygen
- Bronchodilators
- Nasal Suctioning
- Corticosteroids
- Contact Isolation
- Carefully monitor

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pneumonia

- Pneumonia is an infection or inflammation of the lungs.
- Estimated incidence 40cases/1000 children each year

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**pneumonia
causative agent**

- Viral
- Bacterial
- Parasitic
- Fungal
- Aspiration

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pneumonia

- Cough
- Fever
- Headache
- Tachypnea
- Decreased Breath Sounds- (especially over area of consolidation)
- Abdominal Pain
- Grunting
- Retractions
- Vomiting
- Nasal Flaring
- Malaise

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pneumonia management

- Fluids
- Antibiotics- especially if bacterial etiology is suspected. If the child is immunosuppressed broad spectrum therapy is used.
- Supplemental Oxygen
- Chest physiotherapy may aid in mobilization of secretions
- Antipyretics
- Monitor closely

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foreign body aspiration

Aspiration of a foreign body is a serious and potentially life threatening problem. The severity of the aspiration is determined by the type and location of the object.

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fb - clinical presentation

- FBA should be considered in any child who has an acute onset of respiratory distress.
- Dyspnea, coughing, stridor, decreased air entry, wheezing, and cyanosis

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fb - management

- The most effective intervention—"Removal of the foreign body"(duh)
- Keep child calm
- Oxygen as needed
- Monitor
- Emergency equipment available
- Rigid Bronchoscopy

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Asthma is the most common chronic illness in childhood.

Asthma is a disease characterized by:

- hyper-reactive airways
- airway inflammation
- obstructed airways from thick mucus

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upper airway causes of respiratory distress

- Croup
- Epiglottitis
- Foreign Body Aspiration
- Infection

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croup "laryngotracheobronchitis"

Laryngeal inflammation and edema causing varying degrees of upper airway narrowing. LTB is usually viral in origin, parainfluenza type I & II being the most causative agent. (60%)

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croup

- Gradual Onset
- Age affected- 6mo-4years
- Peak occurrence at age 2 years
- Seasonal- Fall to late Winter

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croup
signs & symptoms

- Malaise
- Barky Cough
- Inspiratory Stridor
- Low Grade Fever (80% of pts.)
- Rhinitis
- Hoarseness
- Retractions
- Air Hunger
- Cyanosis
- Pencil Sign/Steeple Sign (on X-Ray)
- <10,000 WBC

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croup
management

- Largely Supportive (Calm & Quiet)
- Nebulized Racemic Epi (↓ airway Edema)
- Fluids
- Fever control
- O2 Therapy
- Steroids

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epiglottitis

- Life Threatening "True Pediatric Emergency"
- Severe airway obstruction caused by inflammation/swelling of the glottis.
- Age of Occurrence- 2-6 years

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**epiglottitis
causative agents**

- Acute Bacterial Infections
- Hemophilus Influenza Type B (**)
- Group A Beta Strep
- Pneumococcus
- Staphylococcus Aureus
- Nontypable H. influenza

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**epiglottitis
signs & symptoms**

- Sudden Onset
- High Fever -usually > 102°
- Inspiratory Stridor
- Drooling
- WBC > 10,000
- Anxious
- Muffled Voice
- Tripod Position
- Sore Throat
- Retractions
- Dyspnea
- "Thumb Sign" on lateral neck x-ray

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**epiglottitis
management**

- AVOID AGITATING CHILD!!
- Keep Child Quiet and Undisturbed
- EPI Alert
- Intubation in the OR
- O2
- Intubation/Ventilation (usually 48-96 hours)
- Fluids
- Antibiotics
- Sedation

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questions ?

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