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A PAIN IN THE NECK ++

HANNAH SMITH

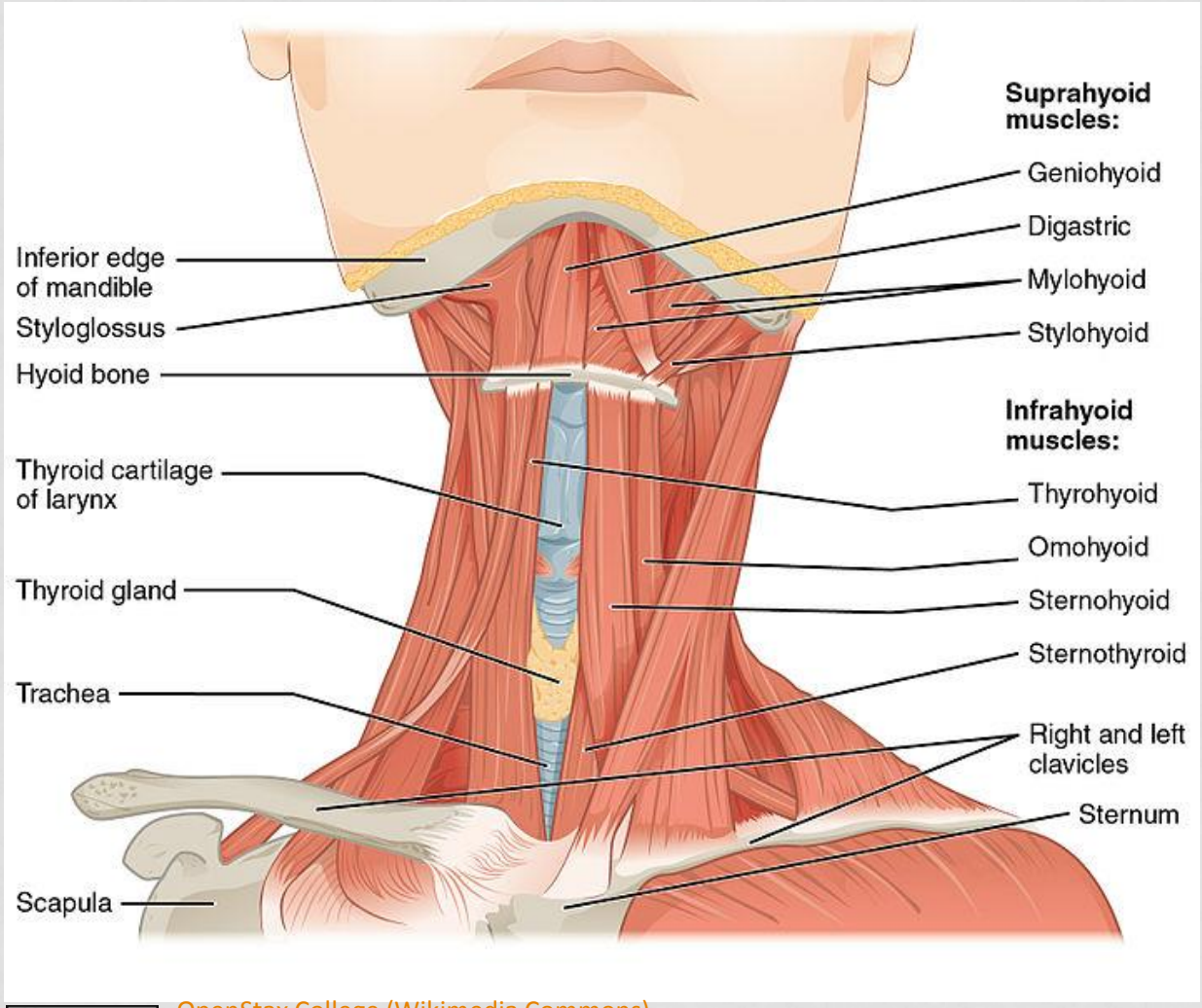
INFECTIOUS NECK PATHOLOGY

- Abscesses
- Other infectious

ABSCESSES

- Retropharyngeal
- Parapharyngeal (lateral) pharyngeal
- Peritonsillar

ANATOMY OF THE NECK

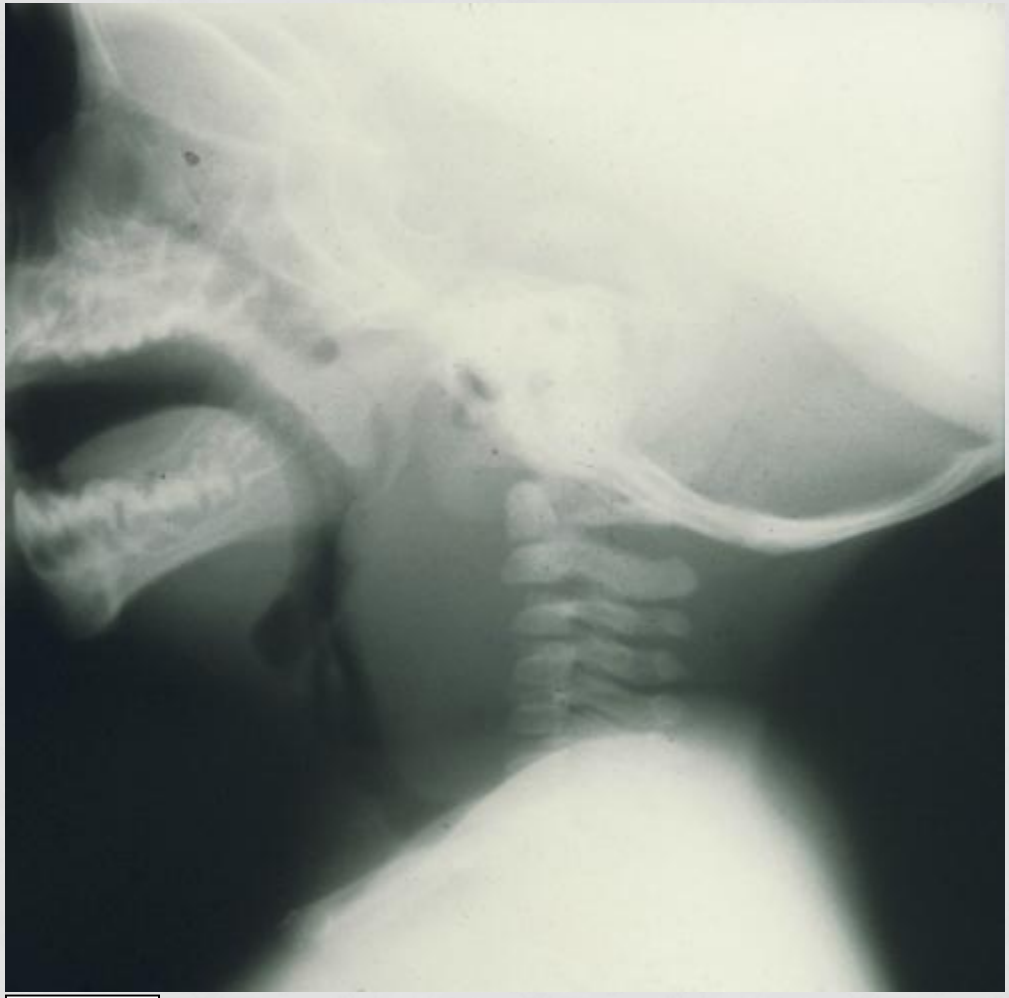


OpenStax College (Wikimedia Commons)

RETROPHARYNGEAL

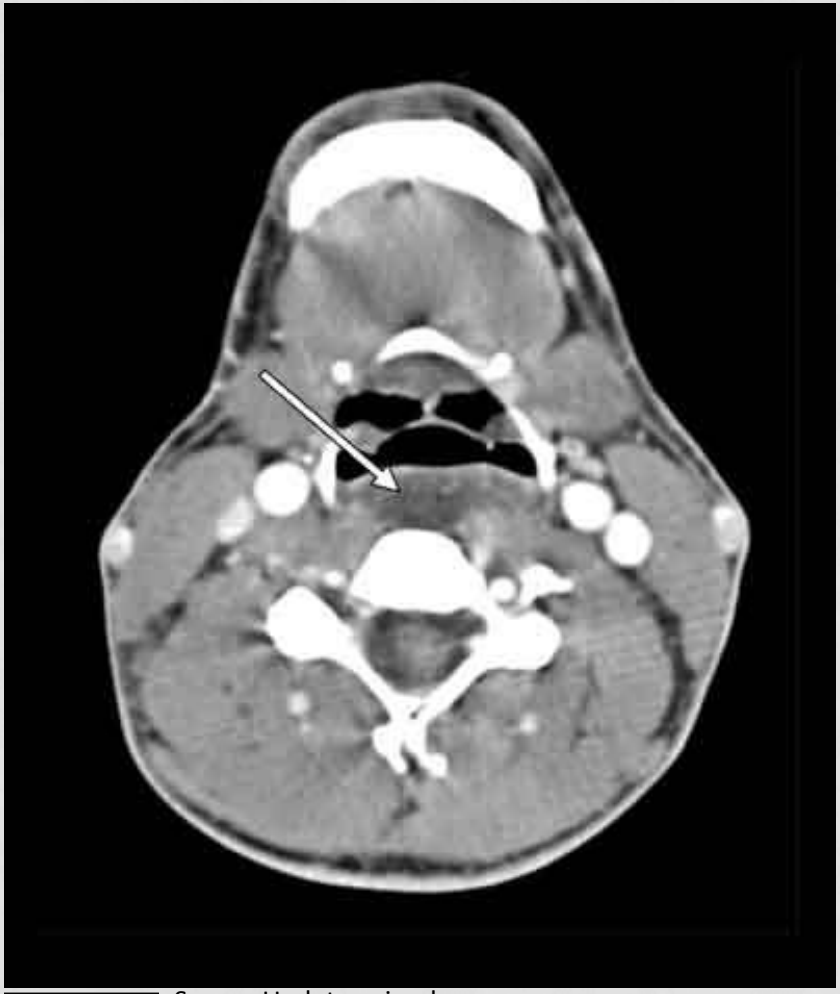
- Potential space between anterior border of cervical vertebrae and the posterior wall of esophagus
- Usual pathogens
  - Group A strep
  - Anaerobic organisms
  - S. aureus
- Typical age: < 4yrs
- Clinical clues: difficulty moving neck, fever, sore throat, ill appearing
- Imaging:
  - Lateral neck radiograph
    - Look for increase in width of soft tissues anterior to the vertebrae and on occasion an air fluid level -- normal space is <1/2 width vertebral body
  - Ultrasound
  - CT

IMAGING



PD-INEL Merck Manual

IMAGING



PARA (OR LATERAL) PHARYNGEAL

- Deep soft-tissue space of the neck, but not in the midline; bulging behind the posterior tonsillar pillar rather than superior to tonsil
- Less common than retropharyngeal
- High fever, toxic; less abrupt onset than epiglottitis
- Clinical clues: fluctuant mass obstructs larynx and esophagus, leading to stridor and drooling; may have trismus, swelling below mandible; also sore throat, neck pain, difficulty moving neck, cervical lymphadenopathy and less commonly, torticollis
- Virtually identical symptoms to retropharyngeal abscess
- Imaging:
  - Not well visualized by radiograph, need CT

TREATMENT OF RETROPHARYNGEAL AND PARAPHARYNGEAL ABSCESSES

- Drainage by ENT
- Admit
- Antibiotics
  - Unasyn (Ampicillin/Sulbactam)
  - Clindamycin

PERITONSILLAR ABSCESS

- May complicate a previously diagnosed infectious pharyngitis or may be initial source of a child's discomfort
- Typical age: older children and adolescents
- Bilateral peritonsillar abscesses are unusual
- Diagnosis evident from visual inspection
  - Produces a bulge in the posterior aspect of the soft palate, deviates the uvula to the contralateral side of the pharynx and has a fluctuant quality on palpitation
- Imaging: usually not necessary

TREATMENT OF PERITONSILLAR ABSCESSES

- Incision and drainage in ED
- Antibiotics
  - IV Unasyn (Ampicillin/Sulbactam), Clindamycin if admit
  - PO Augmentin (Amoxicillin/Clavulanate) or Clindamycin at discharge
- Dispo: home if can take PO

EPIGLOTTITIS

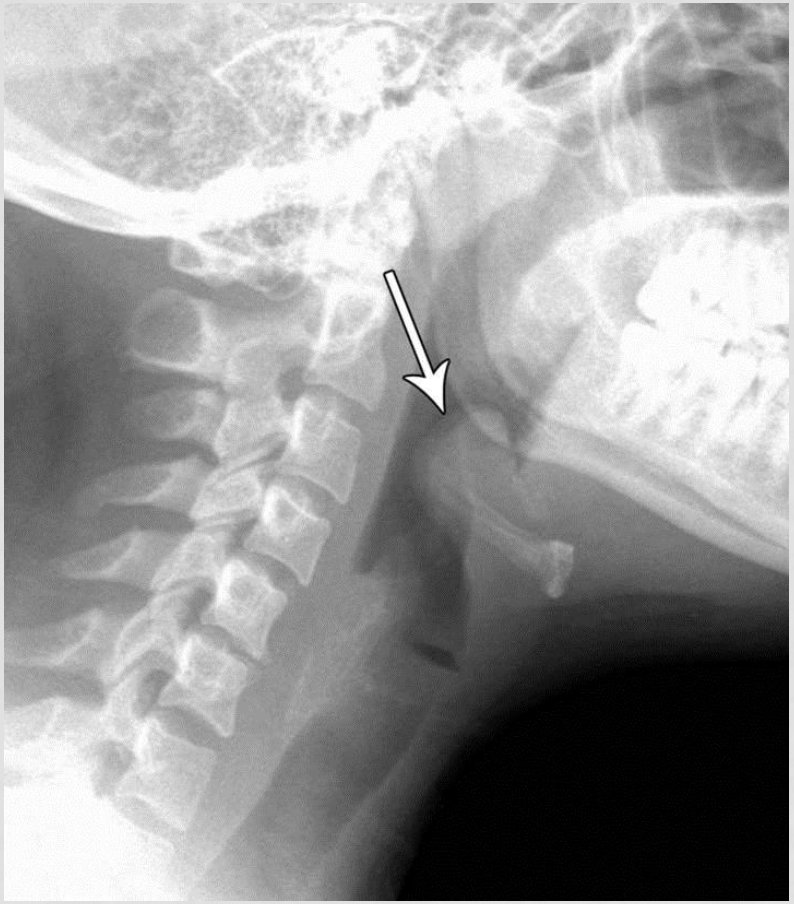
- Inflammation of the supraglottic structures, bacterial cellulitis of epiglottis and aryepiglottic folds
- Typical age: 2-8yrs, may be even older ages
- Prodrome: minimal coryza
- Onset: rapid progression within hours
- Symptoms: fever, dysphagia, odynophagia, drooling, irritability, toxic appearance (plus late findings of stridor)
- Radiogaphic findings: thickening, rounding of epiglottis (thumbprint sign), loss of vallecular air space, normal subglottis
- WBC: Elevated with >70% neutrophils
- H. flu type b (vaccine failure and unimmunized), group A beta-hemolytic streptococcus, Staph, pneumococci, Candida

EPIGLOTTITIS

- Management
  - Airway
  - Antibiotics
  - Admit

IMAGING

- Thumb print sign



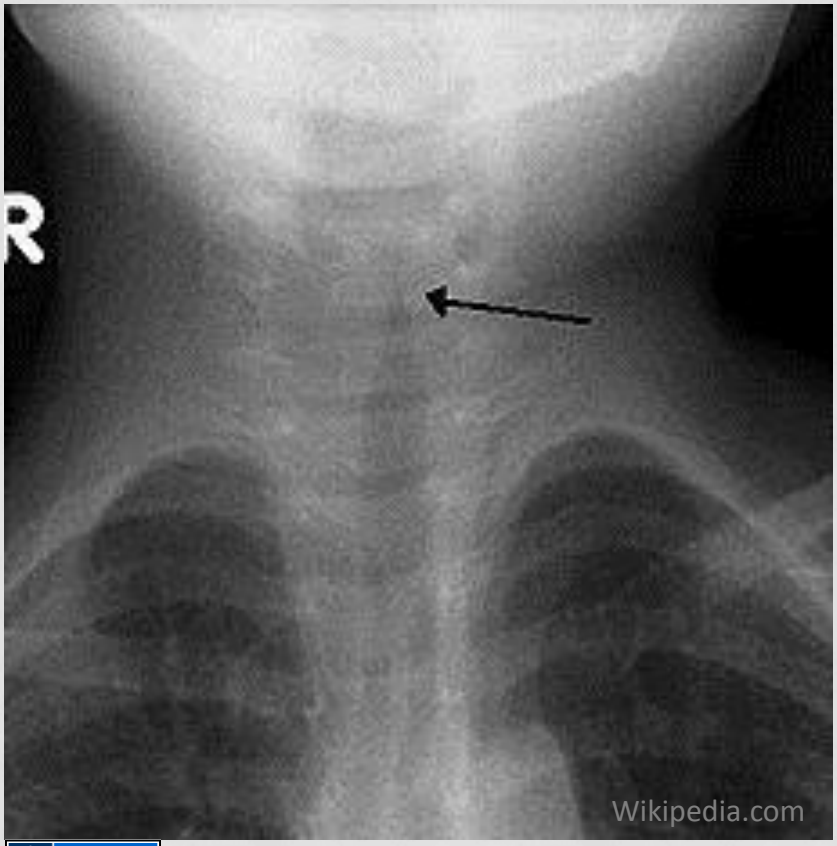
PD-INEL http://pediatricimaging.wikispaces.com/Epiglottitis

ACUTE LARYNGOTRACHEITIS

- Inflammation of larynx and trachea
- Typical age: 2 months to 3 yrs
- Prodrome: usually coryza
- Fever in first 24h and within 24 to 48h stridor or signs of obstructed airway
- Hoarseness, barking cough with minimal to severe inspiratory stridor, no dysphagia, usually nontoxic
- Radiograph: Subglottic narrowing on PA view
- WBC: mild elevation with >70% neutrophils
- Parainfluenza type I (autumn), type 3 - severe disease; RSV, adenovirus, measles, rhinoviruses, metapneumoviruses, coronoviruses

IMAGING

- Steeple sign



PD-INEL Source Undetermined

ACUTE LARYNGOTRACHEITIS

- Management
  - PO Dexamethasone (0.6mg/kg, max 10mg)
  - Stridor at rest?
    - YES: Racemic epi
      - Typical 2 hour trial period, if fails admit; if OK discharge home
    - NO: Okay to discharge home with expectant management

BACTERIAL TRACHEITIS

- Inflammation of the larynx, trachea and bronchi or lung; represents extension of laryngotracheitis, but more severe illness pattern
- Typical age: 3 months to 3 yrs [*children with trach at any age!*]
- Prodrome: usually coryza
- Onset: gradually progressive over 2-5 days, originally may present like laryngotracheitis but refractory to typical therapy
- Symptoms: hoarseness, barking cough, usually severe inspiratory stridor, typically toxic presentation
- Radiograph: subglottic narrowing on PA view, irregular soft tissue densities on lateral view, bilateral pneumonia
- WBC: elevated or abnormally low with >70% neutrophils/bandemia
- Initial infection likely caused by viruses (parainfluenza/influenza) but evolution due to bacterial superinfection particularly from Staphyloccus aureus, group A streptococci and H influenza

BACTERIAL TRACHEITIS

- Management
  - Airway
  - Antibiotics
  - Admit

OTHER INFECTIOUS ETIOLOGIES

- Diphtheria
  - Thick pharyngeal membrane and marked cervical adenopathy or “bull neck”
- Ludwig’s angina
  - Sublingual (often from dental infection), rapidly spreading cellulitis which can cause life-threatening swelling of the tongue (5% mortality rate)
- Lemierre’s syndrome
  - Fusobacterium necrophorum or mixed anaerobic flora
  - Jugular venous thrombophlebitis with septic emboli (monitor for hypotension)
  - Asymmetric enlarged anterior cervical lymph nodes
- Infectious mononucleosis
  - Epstein-Barr virus (EBV)
  - Typical age: adolescents
- Viral pharyngitis
  - Coxsackie virus (hand-foot-mouth)
  - Adenovirus (pharyngoconjunctival fever)
- Strep pharyngitis
  - Pen G
  - Amoxicillin
  - Alternatives: Clindamycin, Azithromycin

WHEEZING

- Age <5 years
  - Asthma
  - Anaphylaxis
  - Infection
    - Viral upper or lower respiratory infection
    - Bronchiolitis
    - Tuberculosis
    - Pertussis
  - Bronchopulmonary dysplasia
  - Foreign body aspiration
  - Anatomic abnormality
    - Vascular ring
    - Mediastinal mass
  - Tracheobronchomalacia
  - Aspiration due to swallow dysfunction or GERD
  - Cardiac disease with congestive heart failure (CHF)
  - Immunodeficiency, immotile cilia
  - Cystic fibrosis

WHEEZING

- >5 years
  - Asthma
  - Anaphylaxis
  - Vocal cord dysfunction
  - GERD
  - Cystic fibrosis

BRONCHIOLITIS

- Inflammatory disease of lower respiratory tract
- Leads to obstruction of small airways (from edema, necrosis, increased mucous, bronchospasm)
- Median duration: 12 days
  - Tends to worsen before improvement
- In United States, peaks from December through March
- Etiologies
  - RSV (responsible for 70%)
  - Parainfluenza
  - Adenovirus
  - Humanmetapneumovirus
  - Influenza virus
  - Mycoplasma
  - Chlamydia

BRONCHIOLITIS

- Diagnosis – made clinically
- Symptoms
  - URI with rhinorrhea, cough, and ± fever (two-thirds will have fever)
  - Higher risk: underlying cardiac or pulmonary disease , immunodeficiency, prematurity
  - Apnea (highest risk, <1 month)
  - Hypoxia/cyanosis (< 12 weeks at highest risk)
  - Anorexia
- Exam
  - Note: nasal flaring, intercostal retractions, tachypnea, prolonged expiratory phase, crackles or rales
  - Is patient a “happy wheezer?”

BRONCHIOLITIS

- Labs/Testing
  - Chest radiograph
    - If diagnosis is uncertain, not following expected time course, severe cases
  - FBC
    - Not indicated
  - Viral testing
    - For infants <3 months being admitted
    - For cohorting
  - <30 days + fever
    - Full septic work up
  - <90 days + fever with diagnosis bronchiolitis
    - Obtain UA and urine culture to rule out UTI

BRONCHIOLITIS

- Treatment
  - Nasal saline with suctioning
  - Nebulized hypertonic saline q6h
  - Supplemental oxygen (for SpO2 <90% while awake)
  - Hydration – place IV if PO fails or patient condition is severe
  - Albuterol
    - Administer single dose and assess for improvement
    - Continue if improved
  - Antibiotics
    - Not indicated unless empirically treating neonate for rule out sepsis, rare instance of secondary pneumonia (<2%)
  - Airway adjuncts
    - Heliox, racemic epinephrine, BIPAP, intubation

ASTHMA

- **Background**
  - Chronic inflammatory disease of the airways that affects 6 million children in US
  - Variable and recurring symptoms, airflow obstruction, bronchial hyperresponsiveness, and an underlying inflammation due to local infiltration and injury by neutrophils, eosinophils, lymphocytes, and mast cell activation
  - Strongest identifiable predisposing factor for developing asthma is atopy – the genetic predisposition for the development of IgE mediated response to aeroallergens
  - Viral respiratory infections are an important cause of asthma exacerbations

Adapted from Guideline for Acute Asthma Exacerbation Management in the Emergency Department Saint Louis Children's Hospital, December 2013

ASTHMA

- Physical Exam
  - ***Assess the severity of the asthma exacerbation***
  - Focus on:
    - Level of alertness
    - Presence of respiratory distress
    - Accessory muscle use
    - Respiratory rate
    - Wheezing
    - Air movement
  - Indications of more severe exacerbations:
    - Anxiety
    - Decreased level of consciousness
    - Diffuse wheezing or poor air movement
    - Increased respiratory rate
    - Accessory muscle use

Adapted from Guideline for Acute Asthma Exacerbation Management in the Emergency Department Saint Louis Children's Hospital, December 2013

ASTHMA

Risk Factors for Death from Asthma

Previous severe exacerbation (e.g., intubation or ICU admission for asthma)

Two or more hospitalizations for asthma in the past year

Three or more ED visits for asthma in the past year

Hospitalization or ED visit for asthma in the past month

Using ≥ 2 canisters of SABA per month

Difficulty perceiving asthma symptoms or severity of exacerbations

Other risk factors: lack of a written asthma action plan

Social history

Low socioeconomic status or inner-city residence

Illicit drug use

Major psychosocial problems

Comorbidities

Cardiovascular disease

Other chronic lung disease

Adapted from the National Asthma Education and Prevention Program Expert Panel Report 3 Guidelines for the Management of Asthma Exacerbations, 2009

ASTHMA

- PEF (peak expiratory flow)
  - Performed at presentation and again 30-60 minutes after initial treatment
  - Use to categorize the severity of the exacerbation and indicate the need for hospitalization
  - Obtain in children over the age of 5 years
- Pulse oximetry
  - Perform at presentation and repeat one hour after initial treatment
  - Assess lung function in infants and young children

Adapted from Guideline for Acute Asthma Exacerbation Management in the Emergency Department Saint Louis Children's Hospital, December 2013

ASTHMA

Pulmonary Score (PS)

Score	Respiratory Rate		Wheezing*	Accessory Muscle Use
	< 6yrs	≥ 6yrs		
0	< 30	<20	None	No apparent activity
1	31-45	21-35	Terminal expiration	Mild increase
2	46-60	36-50	Entire expiration	Increase apparent
3	>60	>50	Inspiration or expiration	Maximal activity

* If no wheezing due to minimal air exchange, score 3

Adapted from Guideline for Acute Asthma Exacerbation Management in the Emergency Department Saint Louis Children's Hospital, December 2013

ASTHMA

- Treatment Options
  - **Oxygen (use for saturations < 91%)**
  - **Short Acting Beta-2 Agonists (SABA)**
    - Drug of choice for treating acute asthma symptoms and exacerbations
    - Relaxes airway smooth muscle and increase airflow in 3-5 minutes
    - Albuterol is the SABA of choice
      - Albuterol treatments every 10 to 20 minutes for a total of 3 doses or a higher dose continuous treatment can be given safely as initial therapy
      - In children and adolescents with acute asthma exacerbation, no significant difference has been noted for important clinical responses such as resolution of asthma symptoms, repeat visits or hospital admissions when medications are administered via MDI with spacer versus nebulizer

Adapted from Guideline for Acute Asthma Exacerbation Management in the Emergency Department Saint Louis Children's Hospital, December 2013

ASTHMA

- **Treatment Options [continued]**
  - **Ipratropium Bromide**
    - In multiple doses along with SABAs in moderate or severe asthma exacerbations, provides additive benefit
      - IB every 20minutes (250 or 500micrograms) for 3 doses, then as needed for up to 3 hours for severe exacerbations or 4-8 puffs (18microgram/puff) every 20minutes as needed for up to 3 hours.
      - A single dose of an anticholinergic agent is not effective for the treatment of mild and moderate exacerbations and is insufficient for the treatment of severe exacerbations.
  - **Systemic corticosteroids**
    - Speed resolution of airflow obstruction, reduce the rate of relapse, and may reduce hospitalizations, especially if administered within one hour of presentation to the ED
    - Oral corticosteroids are generally recommended over intravenous or intramuscular routes of administration due to equivalent efficacy and less invasive in those patients who can tolerate oral medications.
    - Oral prednisone/prednisolone at doses of 1-2mg/kg (max 60mg) is considered the standard of care for acute asthma exacerbations at our institution. It should be noted that some evidence suggests lower doses of systemic corticosteroids (1mg/kg) are equally efficacious

Adapted from Guideline for Acute Asthma Exacerbation Management in the Emergency Department Saint Louis Children's Hospital, December 2013

ASTHMA

- Treatment adjuncts:
  - **Magnesium sulfate**
    - IV dose should be considered in children with moderate to severe exacerbations who are minimally responsive or unresponsive to initial treatment with SABA, oral corticosteroids and ipratropium
    - In acute exacerbation of patient >2 years maximized on standard therapy, IV magnesium sulfate has been shown to reduce hospitalizations and to improve lung function without significant side effects
  - **Epinephrine and Terbutaline**
    - IV epinephrine or terbutaline can be considered in patients who are minimally responsive or responding poorly to SABA, ipratropium bromide, systemic corticosteroids and magnesium sulfate, or who are unable to tolerate aerosol treatments
  - **BIPAP**

Adapted from Guideline for Acute Asthma Exacerbation Management in the Emergency Department Saint Louis Children's Hospital, December 2013

ASTHMA

- When to consider intubation (fewer than 1% of asthmatics)
  - If the patient deteriorates or fails to improve
  - No absolute criteria other than respiratory arrest and coma, the following are indications for acute airway intervention:
    - Worsening pulmonary function tests despite vigorous bronchodilator therapy
    - Decreasing PaO_2
    - Increasing $PaCO_2$
    - Progressive respiratory acidosis
    - Declining mental status
    - Increasing agitation

Adapted from Guideline for Acute Asthma Exacerbation Management in the Emergency Department Saint Louis Children's Hospital, December 2013

ASTHMA

- Do everything you can to NOT intubate the asthmatic

Because

- An asthmatic can die during intubation

ASTHMA

- How to do everything possible for success
  - RSI
  - Fluids
    - Increase preload in advance of intubation to maintain adequate CO when intubated
  - Consider ketamine for the induction agent
    - Ketamine indirectly stimulates catecholamine release
    - Dose of up to 2 mg/kg, will produce bronchodilation in the critically ill asthmatic
  - Mechanical ventilation
    - Initially airflow obstruction results in larger tidal volumes secondary to air trapping,
    - Permission hypercapnea or mechanical hypoventilation
      - Lower rate, combined with a prolonged expiratory phase, helps prevent air trapping
    - Any patient undergoing hypoventilation will require heavy sedation and at times the use of neuromuscularblocking agents, as this type of ventilatory management is usually poorly tolerated
  - Continue SABA, corticosteroids, etc.
  - Tension pneumothorax is common cause of sudden death in intubated asthmatic [prepare the chest tubes!]