**Croup**

*1) In patients with croup:*

*a) Identify the need for respiratory assistance (e.g., assess ABCs, fatigue, somnolence, paradoxical breathing, in drawing)*

*b) Provide that assistance when indicated.*

Respiratory compromise evaluation

* Appearance
  + Hypoxia: restless or anxious
  + somnolent
  + Tone - decreased muscle tone, appear limp, weak.
  + Interactiveness - does not respond to a caregiver or appropriately resist examination.
  + Consolability
  + Look/gaze - unresponsive stare suggests an altered mental status.
  + Speech/cry - weak cry, a hoarse or muffled voice suggests upper airway obstruction
  + Drooling, dysphagia –oropharyngeal or laryngotracheal obstruction.
* Breathing
  + increased work of breathing
    - Decreased work of breathing may indicate progression toward respiratory failure
  + Airway sounds - stridor, snoring, grunting, wheezing
  + Positioning - "sniffing position" , tripod position
  + Accessory muscle use: supraclavicular, intercostal, and/or substernal groups
    - Head bobbing (extension of the head on inhalation and forward movement on exhalation)
    - nasal flaring
  + Vitals
* Circulation
  + Pallor or cyanosis
  + Poor capillary refill or cool skin
  + Pulsus paradoxus –an exaggeration (greater than 10 mmHg) of the normal decrease in blood pressure during inspiration
    - correlates with degree of airway obstruction

Management

* Complete upper airway obstruction: Needle cricothyrotomy
* Foreign body
  + Maneuvers should only be used for patients who are unable to phonate
  + Back blows/chest thrusts (<1 year of age)
  + Abdominal thrusts (≥1 year of age)
  + Manual removal with finger sweep
  + Laryngoscopy
* Laryngospasm: Positive pressure with a ventilation bag and tight fitting mask
* Soft tissue upper airway obstruction
  + Head tilt/chin lift
  + Jaw thrust: for patients who may have cervical spine injury
  + Nasopharyngeal airway: May be tolerated by a conscious patient
  + Oropharyngeal airway: in an unconscious patient
* Respiratory failure
  + Bag-mask ventilation
  + Endotracheal intubation
* Tension pneumothorax
  + Needle thoracentesis
  + chest tube placement following emergent decompression
* Cardiac tamponade: Pericardiocentesis

*2) Before attributing stridor to croup, consider other possible causes (e.g., anaphylaxis, foreign body (airway or esophagus), retropharyngeal abcess, epiglottitis).*

Stridor DDx

* Congenital
  + Nasal deformities: Choanal atresia or agenesis, septum deformities, turbinate hypertrophy, vestibular atresia or stenosis.
  + Pharynx
    - Craniofacial anomalies: Crouzon's, Pierre Robin, Apert's Syndrome.
    - Tongue Macroglossia and glossoptosis
  + Larynx
    - Laryngomalacia: Most common chronic stridor
    - Laryngeal webs
    - Laryngeal cysts
    - Subglottic hemangioma
    - Subglottic stenosis
  + Trachea
    - Tracheal stenosis
    - Tracheomalacia
* Bacterial tracheitis
  + 6 mo to 8 yo
  + S. aureus, Strep pyogenes, S. pneumonia, H. influenzae
  + Initially similar to croup (hoarseness, barking cough, stridor)
  + High fever, toxic, poor response to epinephrine
  + IV antibiotics
  + Intubation
* Epiglottitis
  + Hemophilus influenza (rare since vaccination)
  + 1-8 year old
  + High fever, no barky cough, dysphagia, drooling, anxious appearance, sitting forward in sniffing position
  + Secure airway
* Laryngeal diphtheria
  + Any age
  + Gradual onset (2-3 days)
  + Hoarseness, barking cough, dysphagia, fever
  + Grayish-brown membrane on tonsils
  + Inquire about vaccination
* Retropharyngeal abscess
  + < 6 yo
  + May be preceded by trauma, FB aspiration, URI
  + Sore throat, dysphagia, drooling
  + Neck pain, stiffness
* Foreign body

*3) In any patient presenting with respiratory symptoms, look specifically for the signs and symptoms that differentiate upper from lower respiratory disease (e.g., stridor vs. wheeze vs. whoop)*.

Stridor

* caused by the oscillation of a narrowed airway
* suggests significant obstruction of large airways
* Stridor from extrathoracic area is more pronounced during inspiration
* Stridor caused by obstruction at the glottis (vocal cords) may occur during inspiration only, or during both inspiration and expiration
* originates in the intrathoracic airways more pronounced on exhalation

Wheeze

* occur during inspiration or expiration
* can originate from airways of any size
* Stridor refers to a monophonic wheeze that is loudest over the central airways

*4) In a child presenting with a clear history and physical examination compatible with mild to moderate croup, make the clinical diagnosis without further testing (e.g., do not routinely X-ray*).

Definition

* Aka laryngotracheobronchitis
* Parainfluenza
* Most commonly 6 mo to 3 years
* Autumn/winter months generally
* Abrupt onset of barky cough
* Inspiratory stridor, hoarseness, respiratory distress
* Severity
  + Mild: occasional barky cough, no stridor at rest, no to mild suprasternal/intercostal indrawing
  + Moderate: frequent barky cough, stridor, suprasternal/sternal wall retraction at rest, no or little distress or agitation
  + Severe: occasional expiratory stridor, marked sternal wall retractions, significant distress and agitation
  + Impending respiratory failure: lethargy, or decr LOC, dusky appearance on RA

History

* With or without antecedent upper respiratory symptoms of cough, rhinorrhea and fever
* Symptoms occur in evening
* Seal like barky cough
* Inspiratory stridor
* Hoarseness
* No to moderate fever
* Symptoms fluctuate worse when child agitated
* Majority symptoms resolve within 48 hrs
* Resolution of croup symptoms, children may have typical URTI like symptoms

Physical

* Febrile, tachy, tachypnea
* O2 sats in severe cases
* Seal like barky cough
* Hoarse voice
* Stridor (mostly inspiratory)
* Intercostal retractions
* No drooling
* Nontoxic
* Impending respiratory failure
  + Change in mental status
  + Pallor
  + Dusky
  + Decreased retractions
  + Decreased breath sounds, decreasing stridor

5) In patients with a diagnosis of croup, use steroids (do not under treat mild-to-moderate cases of croup)

Treatment

* Comfortable
* Do not agitate
* Oxygen if respiratory distress/hypoxia (<92%)
  + Blow by : hose with end open held near nose/mouth
* Epinephrine
  + Severe respiratory distress (sternal wall indrawing and agitation)
    - Improvement occurs within minutes
    - Wears off after 1 hr
  + Racemic 0.5mL of 2.25% soln diluted into 3mL of NS or sterile H2O via nebulizer
  + L Epinephrine 1:1000 sol’n via nebulizer
  + May be repeated as necessary
* Dexamethasone
  + For all children, regardless of severity
  + Improvement after 2-3 hrs
  + Persist 24-48 hrs
  + Single dose - No evidence to support multiple doses
  + 0.6 mg/kg po/IM
  + Po is well absorbed, reaches peak serum levels as rapidly as IM
    - Both equivalent results
  + Reduces
    - Rate/duration of intubation
    - Rate/duration of hospitalization
    - Rate of return to medical care
    - Duration of symptoms in children with mild, moderate, severe symptoms
* Admission
  + Respiratory compromise after >4 hrs with corticosteroids
  + Relative
    - Patient living long distance away or inadequate transportation
    - Inadequate observation or f/u
    - Significant parental anxiety
    - Recurrent ED visits within 24 hrs
* Discharge from ED
  + Mild symptoms
  + 2 hrs after epinephrine

*6) In a patient presenting with croup, address parental concerns (e.g., not minimizing the symptoms and their impact on the parents), acknowledging fluctuating course of the disease, providing a plan anticipating recurrence of the symptoms*.

* Symptoms worse at night
* Discharge instructions
  + provide humidified air, Steamed bathroom environment
  + Avoid irritants (Smoke)
  + Return if signs of Respiratory distress
  + Symptoms lasts 3-5 days, up to 10 days