**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