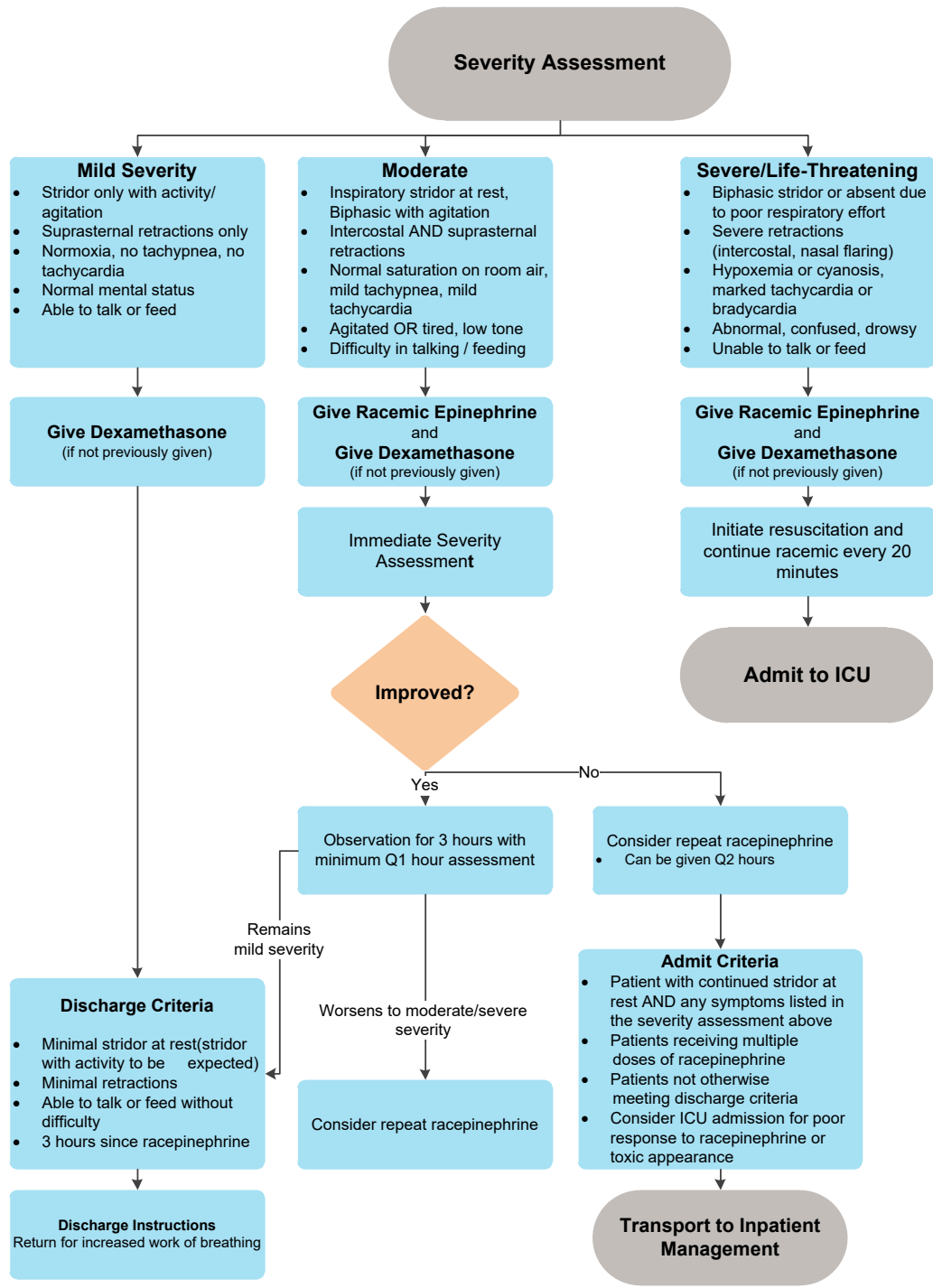


VIRAL CROUP

ALGORITHM: Outpatient/ED Management



Inclusion Criteria

- Previously healthy
- Age 6 months to 6 years

Exclusion Criteria

- Symptoms suggestive of an alternative diagnosis
- Known upper airway abnormality
- Hypotonia or neuromuscular disorder

!

Consider other diagnoses in children who appear toxic, have poor response to racemic epinephrine, have high fever, or have a rapid decompensation

!

Signs of Impeding Respiratory Failure

- Poor respiratory effort
- Stridor may be present or decreased
- Listless or decreased LOC
- Cyanosis / Hypoxia

Criteria for Transport

Patients being evaluated in an outpatient clinic or facility outside CHCO/NOC who meet admission criteria should be referred to the CHCO ED.

Consider transporting by ambulance.

ALGORITHM: Inpatient Management

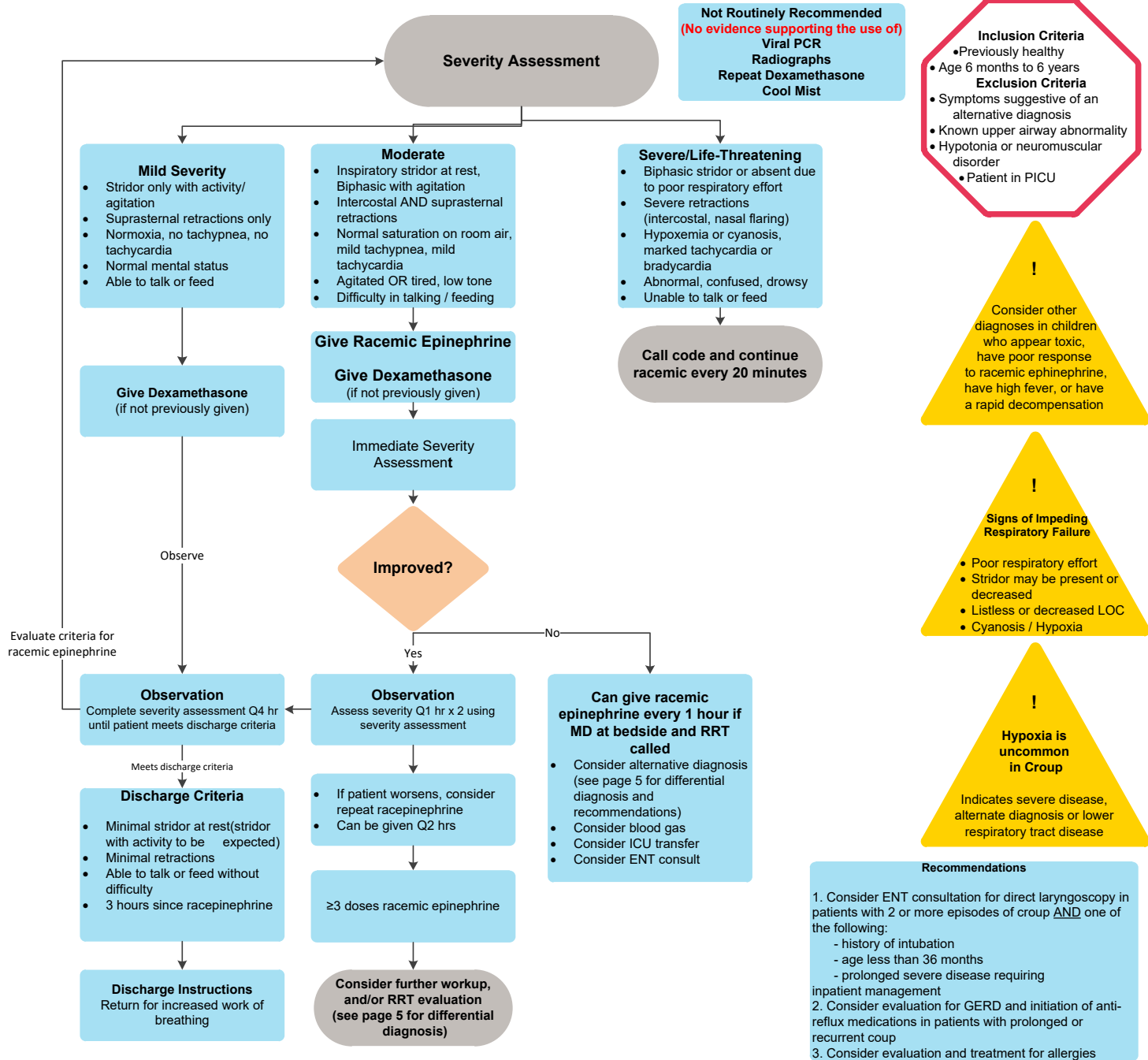


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TARGET POPULATION

Inclusion Criteria

- First or repeat episode
- Age 6 months to 6 years
- Principle diagnoses: **croup** (laryngotracheitis)

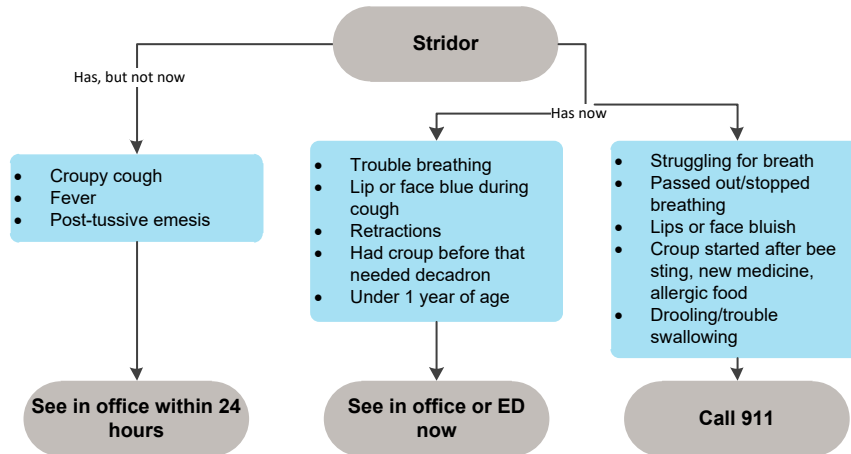
Exclusion Criteria

- Suspicion of bacterial tracheitis, epiglottitis, upper-airway abscess (peritonsillar or retropharyngeal), or other serious bacterial infection
- Severe or life-threatening disease requiring PICU admission
- Chronic lung disease (bronchopulmonary dysplasia, cystic fibrosis, pulmonary artery hypertension)
- Known upper airway abnormalities (for example: laryngomalacia, tracheomalacia, subglottic stenosis)
- Recent airway instrumentation
- Foreign body aspiration or ingestion
- Neuromuscular disorder or hypotonia
- Allergic reaction
- Angioedema
- Active varicella or tuberculosis (TB)
- Congenital or acquired heart disease

PREVENTION

- Droplet precautions for all care settings
- Good hand washing
- Protect high risk patients from exposure
- Eliminate exposure to smoke

OUTPATIENT TELEPHONE TRIAGE



- Activate EMS (911): Severe difficulty breathing (struggling for breath, grunting noises with each breath, unable to speak or cry), blue lips or reduced level of consciousness.
- ED visit (immediate): Underlying heart or lung disease, breathing heard across room, poor fluid intake, temperature greater than 105°F, excessive drooling, inability to lie flat without distress
 - Age less than 12 months, respiratory rate (RR) greater than 60, unable to sleep
 - Age greater than 12 months, RR greater than 40, difficulty breathing, not interactive
- Office visit same day: Worsening cough, some difficulty breathing, poor fluid intake, chronic or underlying illness
- Phone contact with primary care provider (PCP): barking cough, acting normally, good fluid intake

CLINICAL MANAGEMENT

Obtain History and perform physical exam
 Evaluate hydration status
 Distinguish croup from a more extensive or progressive process
 Evaluate patient using Croup severity assessment

History:

- Obtain past medical history \ birth (hospitalization, intubation/mechanical ventilation), sick contacts
- Check immunization status: Haemophilus influenza type b (HIB), pneumococcal, tetanus. Important when considering epiglottitis or diphtherial croup
- Obtain all pertinent patient history, including onset and duration of symptoms including croup prodrome (rhinorrhea, sore throat, low grade fever, cough) and timing of evidence of upper airway obstruction (hoarse voice, barking cough, audible stridor) and subglottic involvement (aphonia)

- Inquire regarding history of congenital or acquired heart disease, congenital or acquired subglottic stenosis, tracheomalacia, tracheal webs, choanal narrowing or atresia, micrognathia, macroglossia
- Check current medications and time and dose of last antipyretic and recent steroid use.

Clinical Symptoms of Croup:

- Symptoms increase at night and improve during day
 - Hoarse voice
 - Barking cough (often described as a “barking seal”)
 - Stridor (variable, usually inspiratory)
- Respiratory distress (variable):
 - Retractions (suprasternal, intercostal)
 - Tachypnea
 - Tachycardia

Clinical Progress of Croup:

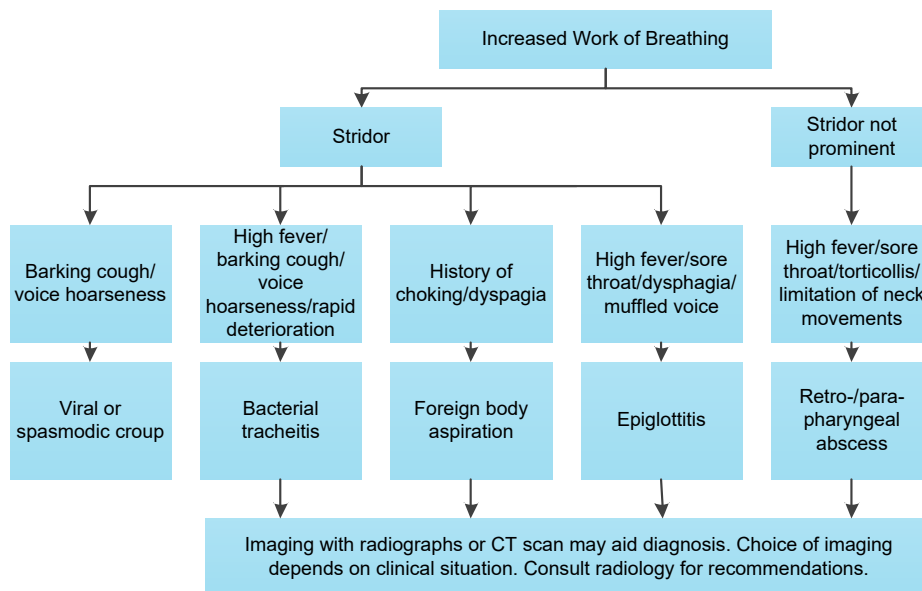
Day 1 to 3	Rhinorrhea Sore throat Low grade fever Mild cough	Day 3 to 7	Onset symptoms of upper airway inflammation Hoarseness Barking cough Stridor (variable) Respiratory distress (variable)
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Clinical symptoms that suggest Croup is not the diagnosis:

- Bacterial tracheitis should be considered if patients have a toxic appearance, poor response to racemic epinephrine, high fever, or have a rapid decomposition
- Hypoxemia is uncommon in croup and indicates severe disease, an alternate diagnosis, or lower respiratory tract disease

Differential Diagnosis:

- Distinguish croup from a more extensive or progressive process
- Conditions mimicking croup:



Monitoring:

Continuous cardiac/pulse oximetry monitoring only recommended for unstable patients and patients receiving 2 or more racemic epinephrine nebulizations within an hour due to risk of ventricular arrhythmias.

Severity Assessment:

Assess and record severity every 1-4 hours with vitals depending on patient's current severity and patient's location. (See algorithms)

Patients should be classified as mild, moderate or severe/life-threatening for each of the 5 categories including: stridor, retractions, vital signs, feeding and neurologic status. A patient's overall severity is defined by the most severe classification across all 5 categories.

	Mild	Moderate	Severe/life-threatening
Stridor	Only with activity/agitation	Inspiratory at rest, Biphasic with agitation	Biphasic or absent due to poor respiratory effort
Retractions	Suprasternal only	Intercostal AND suprasternal	Severe (intercostal, nasal flaring)
Vital signs	Normal oxygen saturation on room air, No tachypnea, No tachycardia	Normal oxygen saturation on room air, Mild tachypnea, Mild tachycardia	Hypoxemia or cyanosis, Marked tachycardia, or bradycardia
Feeding/talking	Able	Difficult	Unable
Neurologic status	Normal	Agitated OR tired, low tone	Abnormal, confused, drowsy

LABORATORY STUDIES | IMAGING

Not routinely indicated: Diagnostic tests are only indicated if they will change outcome. Croup is a clinical diagnosis and usually no testing is needed.

THERAPEUTICS

Routinely Indicated:

Corticosteroids

Dosing: Single dose

- **Dexamethasone**
 - Dose: 0.6 mg/kg orally (preferred), IV, IM
 - Frequency: Once
 - Maximum Dose: 16 mg
 - Duration of action: 24 to 72 h

Note: the taste of oral dexamethasone liquid may not be well tolerated thus the preferred method of administration may be a crushed dexamethasone tablet mixed with vehicle of choice

- **Nebulized Budesonide**
 - Dose: 2mg inhaled via nebulizer over 30 minutes
 - Equal efficacy to dexamethasone; expensive

Note: not for routine care. Consider in children with emesis or severe respiratory distress where IV access is unobtainable and the severity of symptoms makes IM dexamethasone not optimal due to its delayed onset.

Nebulized Epinephrine

Racemic Epinephrine (1:1 mixture of δ & ϑ -isomers)

- isomers epinephrine)
 - Dose: 0.05 mL/kg/dose of 2.25% solution in 2.5mL normal saline (NS) via nebulizer over 15 minutes
 - Frequency: as needed based on severity (see algorithms)
 - Maximum single dose: 0.5 mL
 - Duration of action: less than or equal to 2 hours

Note: If a patient requires 2 or more nebulizations within an hour, cardiac monitoring is recommended due to risk of ventricular arrhythmias.

The term 'rebound phenomenon' is a misnomer.
Epinephrine doesn't change the duration of croup.
Benefits lasts up to 2 hours.

It is safe to send children home from the ED after receiving racemic epinephrine if they have been observed for a minimum of 3 hours post therapy.

Recommended in some patients:

In patients requiring 3 or more doses of racemic epinephrine consider ENT evaluation, additional work-up for alternative diagnoses and/or a Rapid Response Team (RRT) evaluation.

- Consider ENT consult for laryngoscopy in patients with 2 more episodes of croup AND one of the following:
 - History of intubation
 - Age less than 36 months
 - Prolonged or severe disease requiring inpatient management
- Consider evaluation for GERD and initiation of anti-reflux medications with prolonged or recurrent croup
- Consider evaluation and treatment for allergies

Not Routinely Indicated:

Oxygen

- The presence of hypoxemia or intermittent desaturations is a sign of impending respiratory failure in croup and other central airway obstruction. Oxygen can be used to normalize SpO₂, but further diagnostic evaluation and therapies may be needed. If hypoxemia is present, a blood gas may be useful to assess for hypercarbia.

Other Therapies

- Mist: Humidified air with or without oxygen is not indicated
- Antitussive or decongestant medications are not indicated.
- Antibiotics
 - No role in viral croup

DISPOSITION

Begin discharge planning at time of initial presentation

- Assess caretaker ability to provide home care
- Assess home resources adequate to support care
- Confirm transportation and telephone
- Confirm follow-up PCP/designee in specified time frame
- Complete croup teaching
- Provide verbal and written instructions to caretakers
- Assure family awareness indications return
- Provide 24-hour contact number for PCP or designee
- Assure chart faxed to PCP or designee

Discharge Home

- Croup severity mild
- Minimal Stridor at rest (stridor with activity to be expected)
- Normal saturation on room air
- Able to talk and feed without difficulty
- Minimal or no retractions (mild suprasternal acceptable)
- 3 hours since racepinephrine

Note: Patients who have received nebulized epinephrine may be discharged home from the outpatient/ED/UC setting after a minimum of 3 hours if no stridor at rest. Consider additional monitoring or work-up prior to discharge in inpatients requiring repeated doses of racemic epinephrine (see algorithm)

Admit to Inpatient/ Observation

- Moderate severity despite treatment with corticosteroids
- Inadequate hydration
- Require supplemental oxygen and are proven not to be in acute or impending respiratory failure
- Condition deteriorates or does not improve with therapy
- Patients receiving multiple doses of racepinephrine
- Patients not otherwise meeting discharge criteria

Admit to ICU

- Severe or life-threatening severity
- Acute respiratory acidosis
- Bradypnea suggesting respiratory muscle fatigue and impending respiratory failure
- Lack of response to steroids and racemic epinephrine as characterized by persistent moderate-severe retractions, hypoxemia, severely decreased air entry, altered level of consciousness, difficulty feeding/talking, or difficulty controlling oral secretions

FOLLOW-UP | DISCHARGE INSTRUCTIONS

With PCP or designee as scheduled

If patient evaluated and discharged from the ED: PCP phone follow-up within 24 hours

If seen in PCP office: Parent/guardian to call back if patient worsens

If admitted: PCP phone follow-up within 24 hours of discharge and PCP office visit within 2 days.

Note: If patients received multiple doses of steroids while hospitalized, consider more than one outpatient follow-up visit due to long half-life of dexamethasone.

EDUCATION

Parent | Caregiver Education

- Expected clinical course less than seven days
- Educate to return for respiratory distress
- Smoking cessation counseling
- Provide parent with patient education materials

Knowledge Base

Viral croup is an acute inflammatory process in response to a viral infection that causes upper airway obstruction (primarily of the subglottic region) resulting in inspiratory stridor, barking cough and in more severe cases respiratory distress. Infection begins in the nasopharynx and spreads to the respiratory epithelium of larynx & trachea. Inflammation and edema of the vocal folds causes hoarseness.

Age: 6 months to 6 yrs (Mean = 18 mos)

Duration: 2 to 7 days

Morbidity: Highest first year of life

Epidemiology: Year round; most common fall and winter

ETIOLOGY OF CROUP

- Parainfluenza type 1 (most common) 2, 3
- Influenza A & B
- Human metapneumovirus (hMPV)
- Respiratory syncytial virus (RSV)
- Rhinovirus
- Mycoplasma pneumoniae
- Enteroviruses
- Herpes Simplex viruses
- Adenovirus
- Measles virus

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Pharmacy & Therapeutics Committee – December 1, 2016
 Clinical Care Guideline and Measures Review Committee – December 13, 2016

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REVIEW REVISION SCHEDULE

Scheduled for full review on December 13, 2020

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