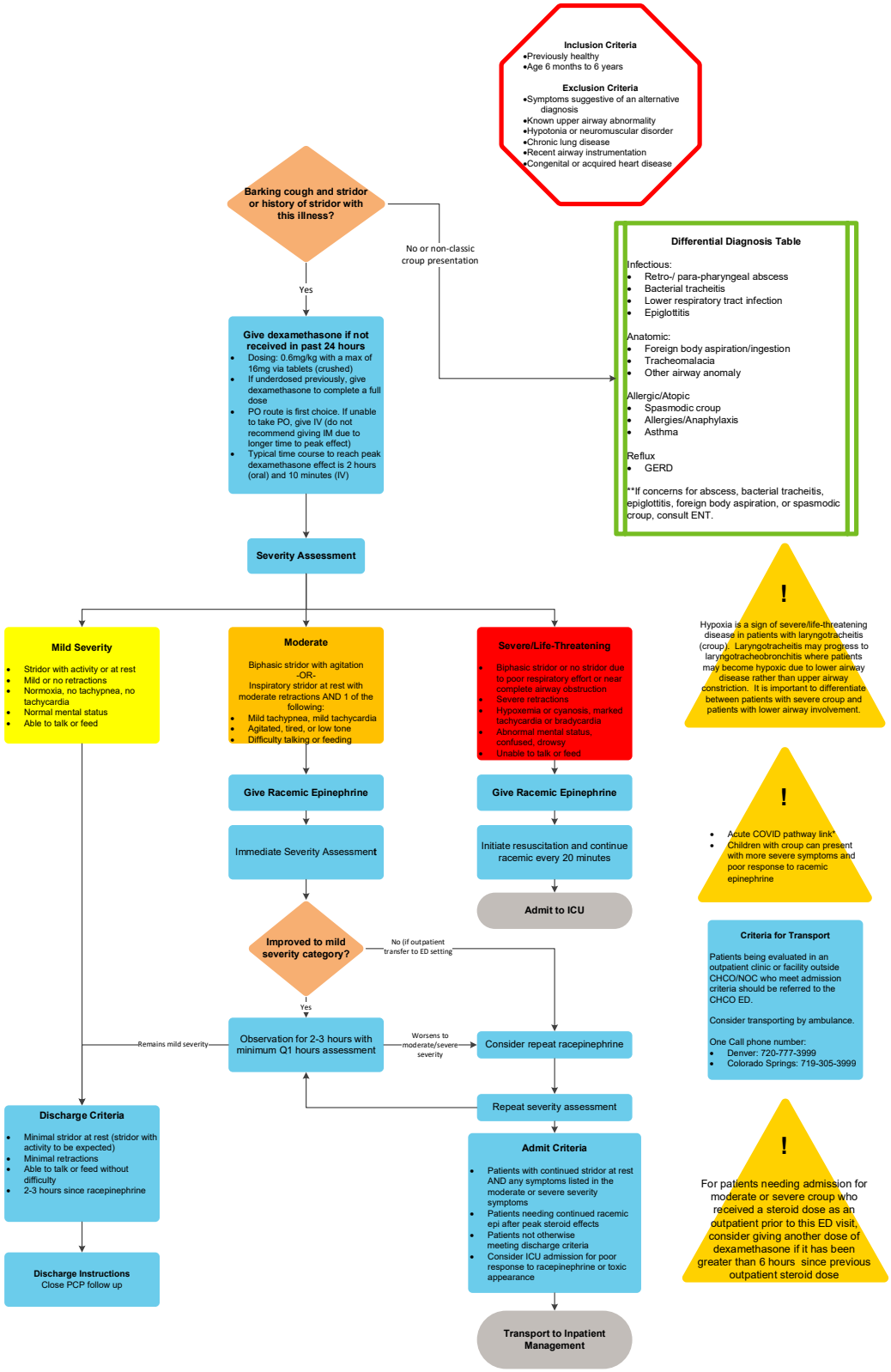
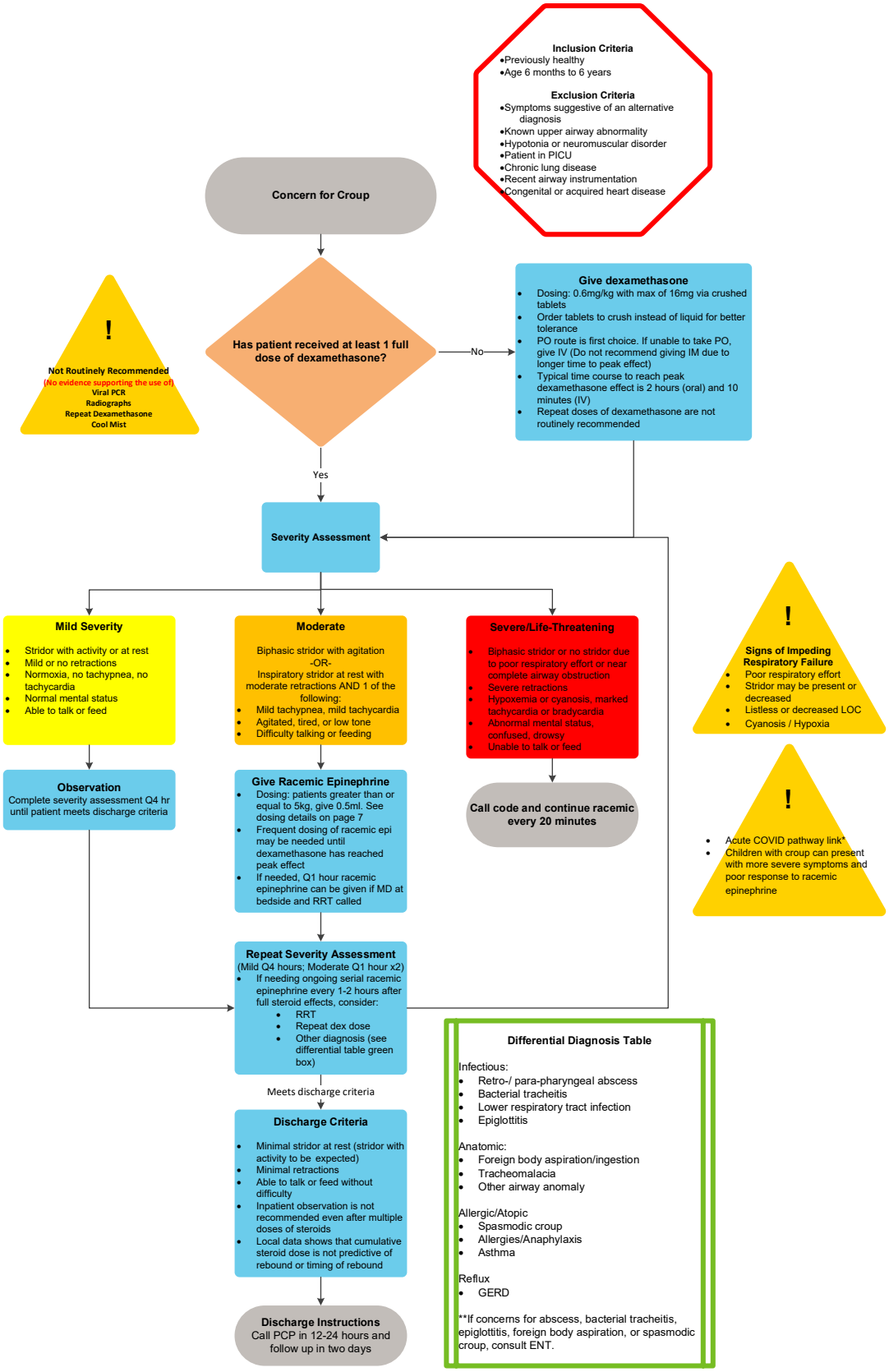
VIRAL CROUP

ALGORITHM: Outpatient/ED Management



*Acute COVID Pathway

ALGORITHM: Inpatient Management



*Acute COVID Pathway

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TARGET POPULATION

Inclusion Criteria

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

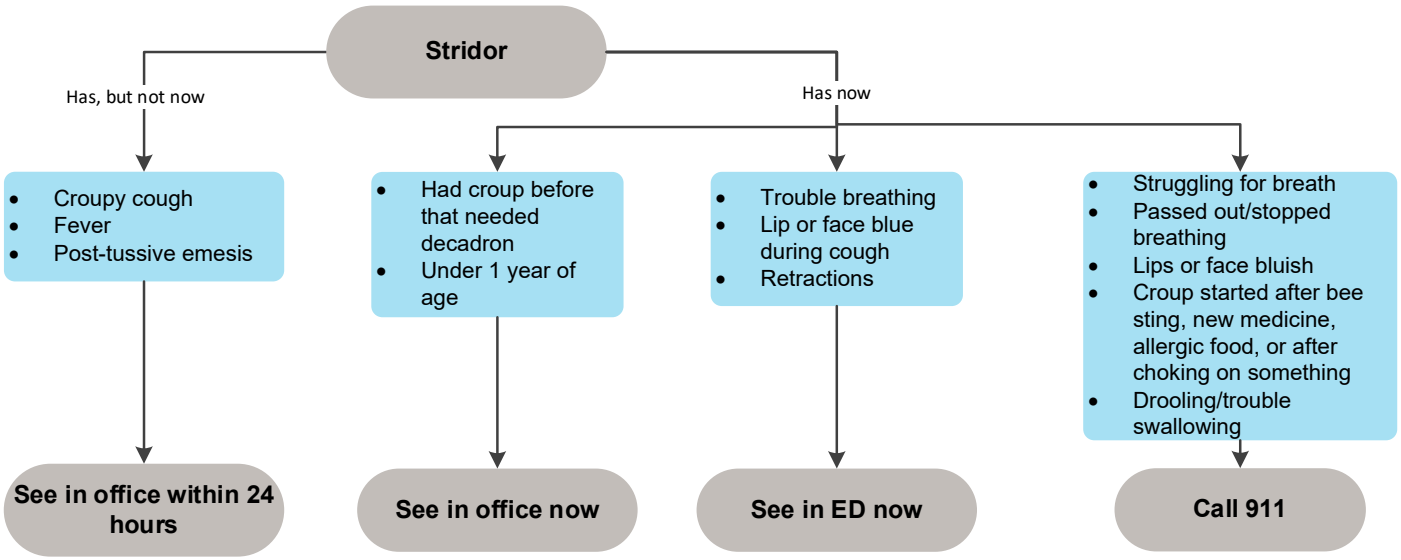
Exclusion Criteria

- 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; special respiratory precautions for confirmed COVID-19 cases
- Good hand washing
- Protect high risk patients from exposure
- Minimize 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): Breathing heard across room, 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 including heart or lung disease
- 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, diphtheria. 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), 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:

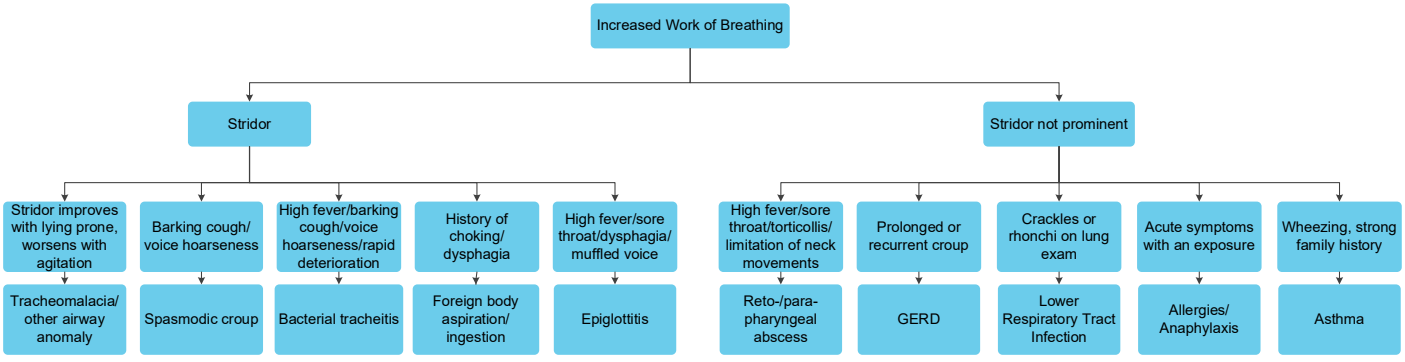
Day 1 to 3	Rhinorrhea Sore throat Low grade fever Mild cough	**Day 3 to 7**	Onset symptoms of upper airway inflammation Hoarseness Barking cough Stridor (variable) Respiratory distress (variable)

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.

	Mild	Moderate	Severe/life-threatening
Stridor	With activity or at rest	Biphasic with agitation. -OR- Inspiratory at rest with moderate retractions AND at least 1 additional sign/symptom from the moderate categories below	Biphasic or absent due to poor respiratory effort
Retractions	Mild	---	Severe (intercostal, nasal flaring)
Vital signs	Normal oxygen saturation on room air, No tachypnea, No tachycardia	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

Radiographs and viral testing are 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
  - Frequency: Once
  - Maximum Dose: 16 mg
  - Time to oral peak effect: 2 h
  - Time to peak IV effect: 10 min
  - Duration of action: 24 to 72 h

  Note: The taste of oral dexamethasone liquid is not well tolerated thus the preferred method of administration is a crushed dexamethasone tablet mixed with vehicle of choice. IM route is not recommended due to longer time to peak efficacy and erratic muscular absorption.

Nebulized Epinephrine

Racemic Epinephrine (1:1 mixture of δ & 9-isomers)

- Dose: 2.25% solution in 2.5mL NS via nebulizer over 15 minutes
    - For patients <5kg: 0.25 mL
    - For patients >/=5kg: 0.5mL
- Frequency: as needed based on severity (see algorithms)
- 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.
It is safe to send children home from the ED, outpatient clinic or urgent care after receiving racemic epinephrine if they have been observed for a minimum of 2-3 hours post therapy.

Recommended in some patients:

In patients requiring ongoing repeated doses of racemic epinephrine after reaching full steroid effect consider additional evaluation for alternative diagnoses and/or a Rapid Response Team (RRT) evaluation.

- Consider ENT consult for laryngoscopy in patients with 2 or 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

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.

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.
- Croup can progress to laryngotracheobronchitis with lower airway involvement, which can cause hypoxemia. It is important to distinguish between severe croup and lower airway infection as this changes acuity and care management.

Other Therapies

- Mist: Humidified air with or without oxygen is not indicated
- Antitussive or decongestant medications are not indicated.
- Antibiotics play 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)
- 2-3 hours since racepinephrine

Note: Patients who have received nebulized epinephrine may be discharged home from the outpatient/ED/UC setting after a minimum of 2-3 hours if no stridor at rest.
Consider additional monitoring or evaluation prior to discharge in inpatients requiring repeated doses of racemic epinephrine after peak steroid effects (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 needing continued doses of racepinephrine after peak steroid effect
- 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 12-24 hours of discharge and PCP office visit within 2 days.

Return Precautions

- Worsening increased work of breathing
- Lips or face turning blue
- Hoarse voice
- High fever, breathing fast, or fast heart beat
- Prolonged symptoms with no improvement of barking cough after 7 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, barky 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
- SARS CoV-2
- Mycoplasma pneumoniae
- Enteroviruses
- Herpes Simplex viruses
- Adenovirus
- Measles virus

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APPROVED BY

Pharmacy & Therapeutics Committee – October 7, 2021
Clinical Care Guideline and Measures Review Committee – September 27, 2021

MANUAL/DEPARTMENT	Clinical Pathways/Quality
ORIGINATION DATE	August 11, 2011
LAST DATE OF REVIEW OR REVISION	October 7, 2021
COLORADO SPRINGS REVIEWED BY	 Michael DiStefano, MD Chief Medical Officer, Colorado Springs
APPROVED BY	 Lalit Bajaj, MD, MPH Chief Quality Outcomes Officer

REVIEW REVISION SCHEDULE

Scheduled for full review on October 7, 2025

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