

Croup: Severity Assessment and Treatment

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Reference: Nelson Essentials of Pediatrics, UpToDate





Definition

What is Croup?

Croup is an **acute viral upper airway obstruction** caused by inflammation of the **subglottic region**.

Who Does It Affect?

It typically affects children between the ages of:

**6 months
– 3 years**

of age

Etiology



★ Most Common

Parainfluenza virus



RSV

Respiratory Syncytial Virus



Influenza

Seasonal flu virus



Adenovirus

Common respiratory pathogen



Human Metapneumovirus

Emerging respiratory cause



Classic Clinical Presentation

Prodromal Symptoms

- Rhinorrhea
- Low-grade fever
- Mild cough

Typical Croup – Classic Triad

★ Barking (seal-like) cough

★ Inspiratory stridor

★ Hoarseness

Severity Assessment

MILD CROUP

✓ Mild Croup – Criteria

- Barking cough
- Hoarseness
- No stridor at rest
- No or minimal retractions

Mild croup is the most common presentation and can typically be managed at home with a single dose of dexamethasone and supportive care.

MODERATE CROUP

Moderate Croup

Stridor at Rest

Audible stridor even without agitation or crying

Chest Retractions

Mild to moderate intercostal or subcostal retractions

Tachypnea

Increased respiratory rate above normal for age

Mild Agitation

Child appears restless or anxious

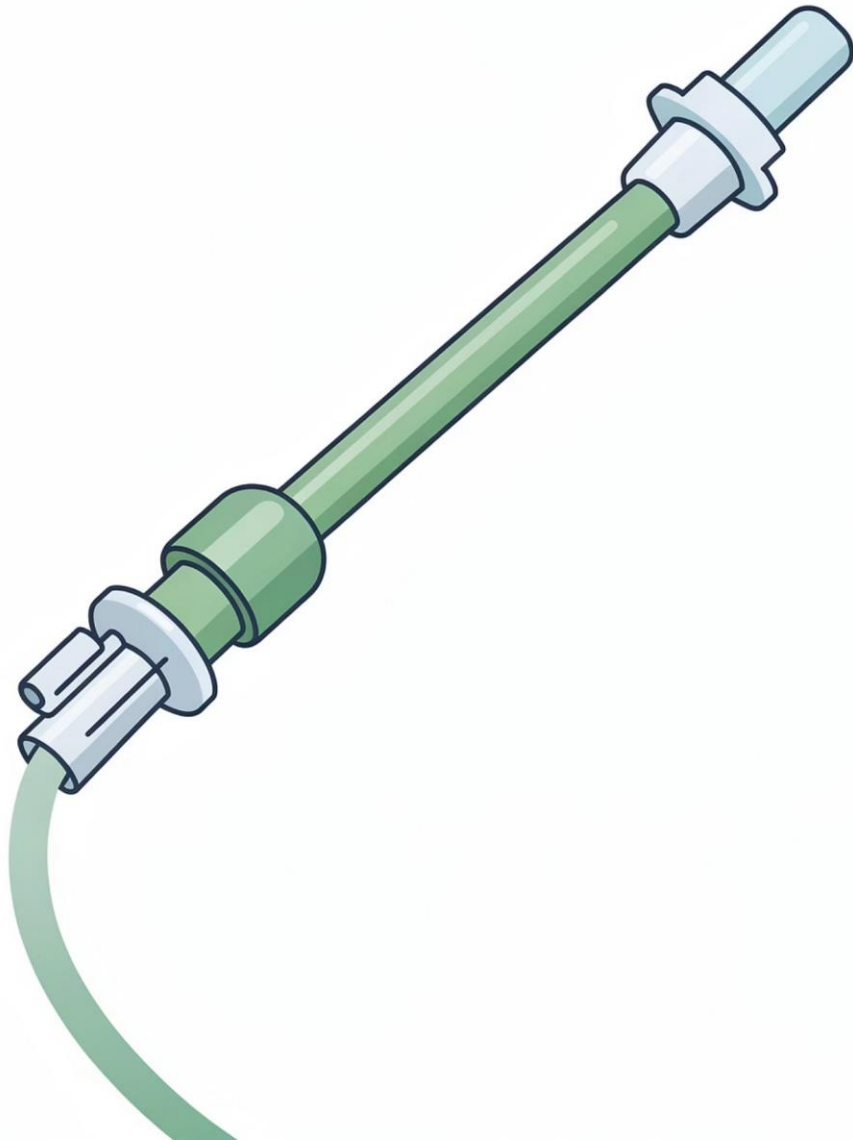
SEVERE CROUP

Severe Croup



- **Prominent stridor at rest** — loud and continuous
- **Marked retractions** — suprasternal, intercostal, subcostal
- **Significant respiratory distress** — labored breathing
- **Agitation or lethargy** — altered mental status

Severe croup requires immediate medical intervention including nebulized epinephrine and hospital admission. Close monitoring is essential.



EMERGENCY

Impending Respiratory Failure

⊗ This is a Medical Emergency

- Decreased level of consciousness
- Exhaustion
- Weak respiratory effort
- Cyanosis
- Poor air entry

Any child presenting with these signs requires **immediate PICU admission and advanced airway management**. Do not delay intervention.

Investigations

★ Clinical Diagnosis

Croup is primarily a **clinical diagnosis**.

Routine investigations are **NOT required** in typical presentations.

When to Investigate?

Investigations should only be considered when:

- Presentation is atypical
- An alternative diagnosis is suspected
- Clinical deterioration occurs unexpectedly

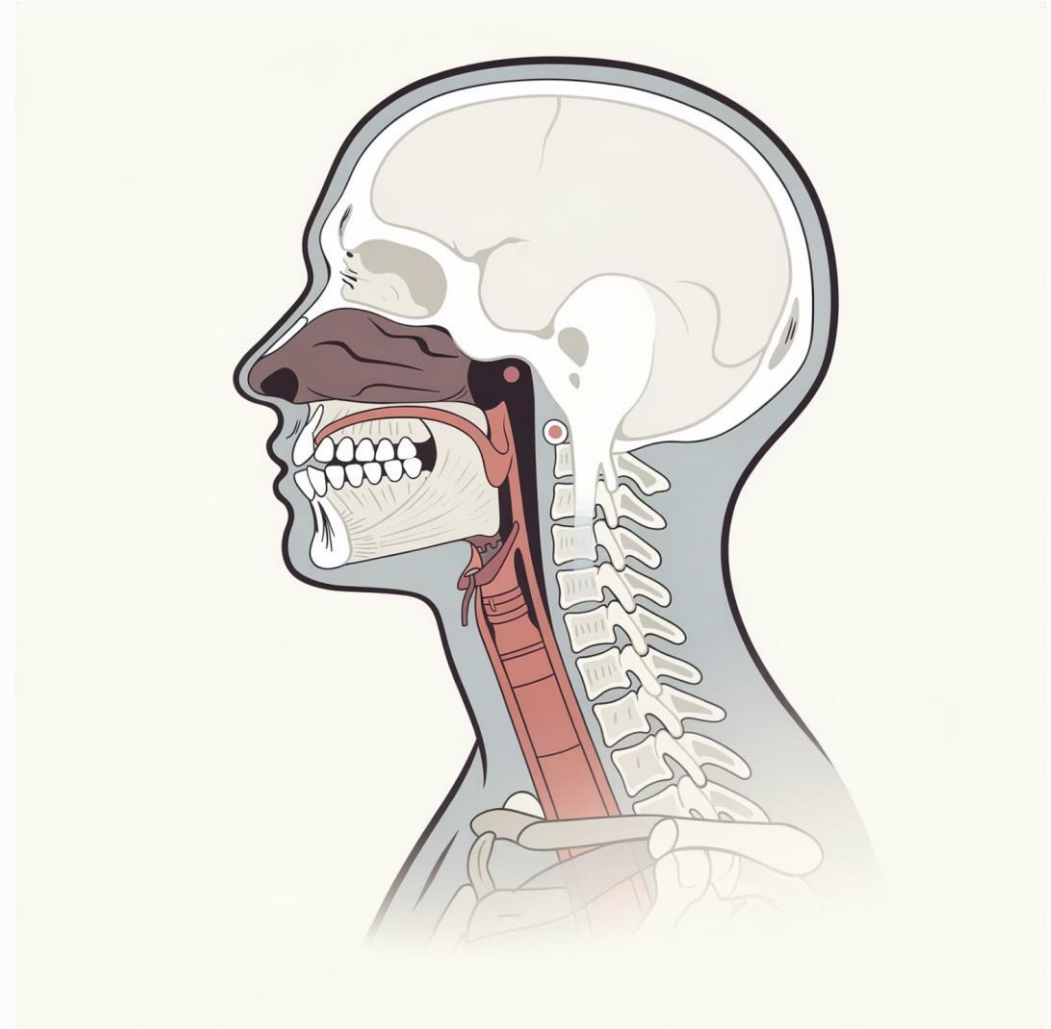
Neck X-ray — Steeple Sign

When to Consider

- Atypical presentation
- Alternative diagnosis suspected

Classic Finding

Steeple Sign — subglottic narrowing visible on AP neck X-ray, representing the tapered narrowing of the subglottic airway due to mucosal edema.



Laboratory Tests

✗ Not Routinely Indicated

Blood tests, cultures, and other laboratory investigations are not part of the standard workup for croup.

✗ Viral Testing

Viral testing rarely changes management and is therefore not recommended in routine clinical practice.

□ Clinical assessment remains the cornerstone of diagnosis. Laboratory tests add little value and may unnecessarily distress the child.



Management – General Measures



Keep the Child Calm

Agitation worsens airway obstruction. Minimize distressing procedures and allow the child to remain with caregivers.



Avoid Unnecessary Examinations

Limit invasive or distressing assessments that may increase anxiety and worsen symptoms.



Provide Oxygen if Hypoxic

Supplemental oxygen should be administered if the child shows signs of hypoxia or oxygen saturation is low.



Maintain Hydration

Ensure adequate fluid intake. IV fluids may be required if the child cannot tolerate oral intake.

Corticosteroids – ALL Patients

✓ ★ Dexamethasone is recommended for **all severities of croup**

Dose

0.15–0.6

mg/kg – Single dose

Route of Administration

Oral

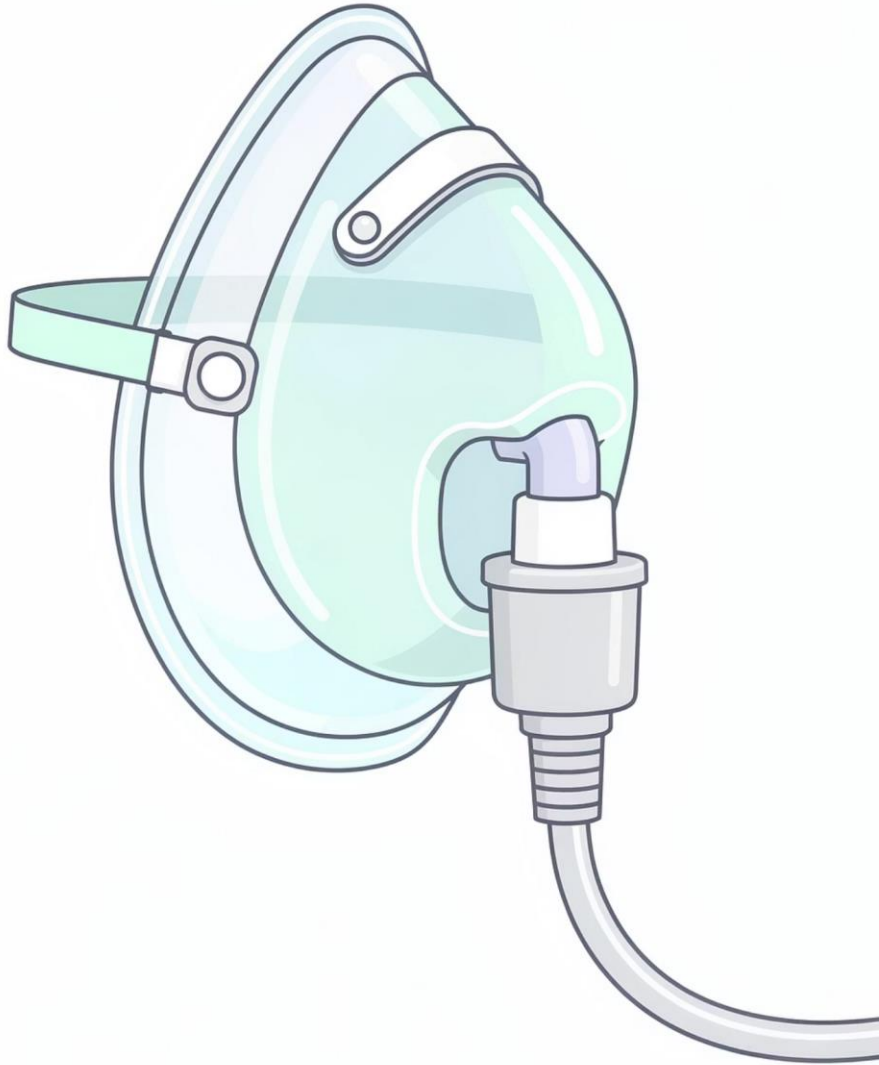
Preferred route – well tolerated

IM

Intramuscular – if oral not feasible

IV

Intravenous – for severe cases



Nebulized Epinephrine – Indications

Indicated for Moderate to Severe Croup



Stridor at Rest

Audible stridor without agitation



Significant Retractions

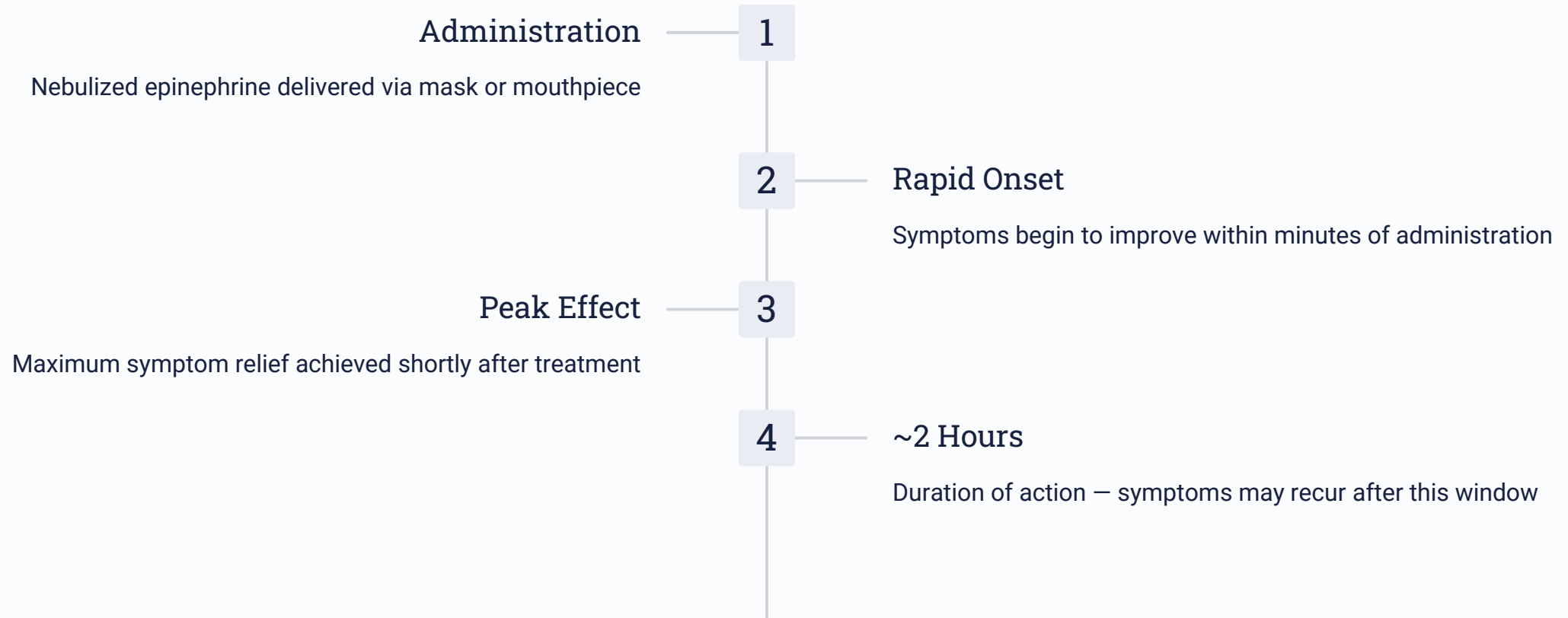
Visible intercostal or subcostal retractions



Respiratory Distress

Labored breathing and increased work of breathing

Nebulized Epinephrine — Effect



Because the duration of action is approximately 2 hours, children must be observed for at least 2–4 hours after administration to monitor for symptom recurrence.

Observation After Nebulized Epinephrine

2–4 Hours

Minimum observation period required

Why Observe?

Children receiving nebulized epinephrine must be observed for at least **2–4 hours** because symptoms may **recur** after the drug's effect wears off.



Rebound symptoms can occur and may require repeat dosing or escalation of care.

Hospital Admission Criteria

Consider admission if any of the following are present:

1

Persistent Stridor at Rest

Stridor that does not resolve with treatment

2

Repeated Epinephrine Required

Need for more than one dose of nebulized epinephrine

3

Hypoxia

Low oxygen saturation requiring supplemental oxygen

4

Dehydration / Poor Oral Intake

Inability to maintain adequate hydration orally

5

Clinical Deterioration

Worsening despite initial treatment

Airway Intervention

⊗ ● Required for Impending Respiratory Failure

Warning Signs

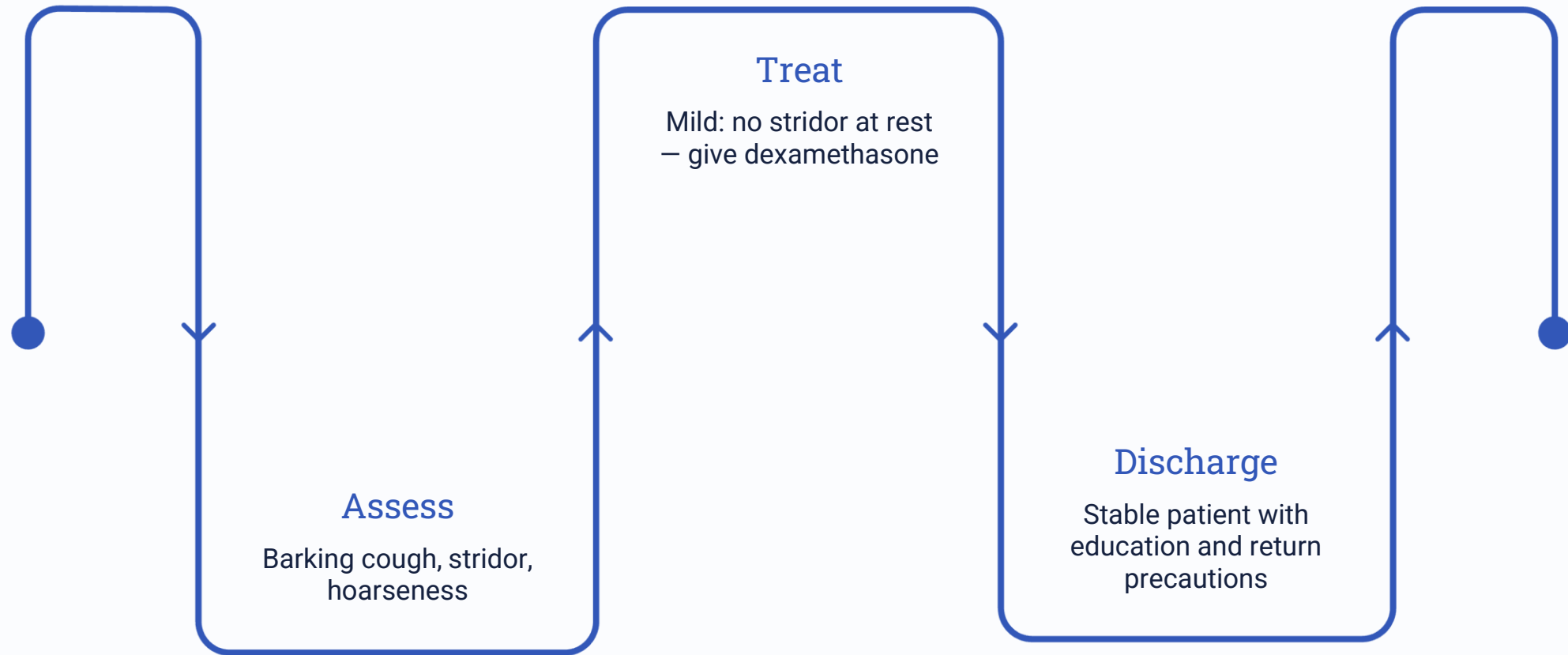
- Cyanosis
- Exhaustion
- Decreased consciousness
- Poor respiratory effort

Required Interventions

- **PICU admission** – immediate transfer to intensive care
- **Advanced airway management** – intubation or surgical airway if needed

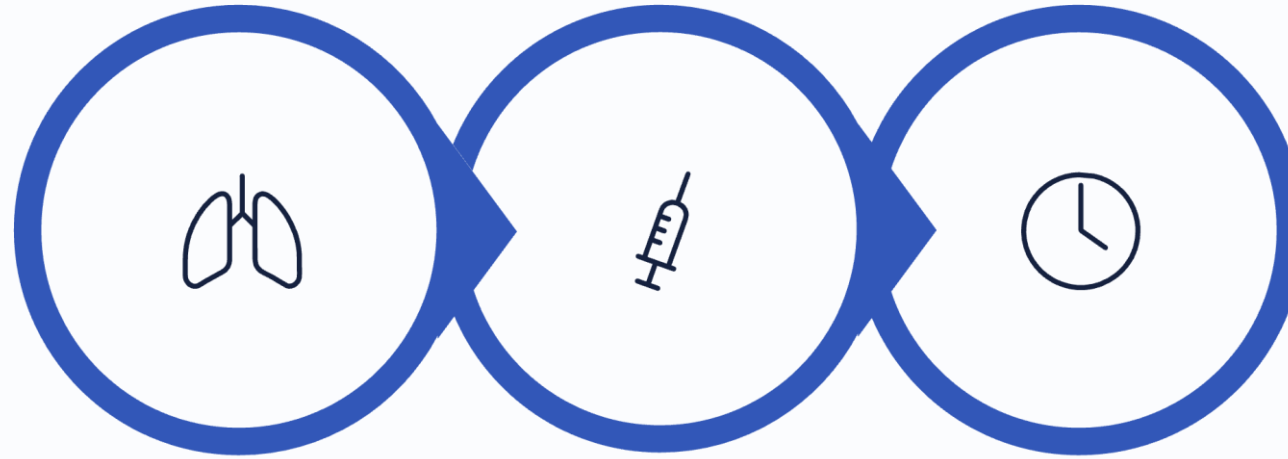
These patients represent the most critical end of the croup spectrum and require the highest level of care without delay.

Diagnostic & Treatment Algorithm – Mild



- ✓ Mild croup can be safely managed in the outpatient setting with a single dose of dexamethasone and parental education about warning signs.

Diagnostic & Treatment Algorithm – Moderate



Identify
Stridor

Give Meds

Observe 2–4h

i Moderate croup requires both dexamethasone and nebulized epinephrine. The child must be observed for at least 2–4 hours after epinephrine administration.

Diagnostic & Treatment Algorithm – Severe

Immediate Treatment

Give dexamethasone,
nebulized epinephrine, oxygen.

Admit Patient

Place patient in hospital for
severe croup management.

Marked Distress

Recognize severe respiratory
distress and stridor.

Continuous Monitoring

Ongoing observation and
support in inpatient setting.



Severe croup mandates hospital admission. All three interventions — dexamethasone, nebulized epinephrine, and supplemental oxygen — should be initiated promptly.

Diagnostic & Treatment Algorithm – Respiratory Failure



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graph LR; A[Respiratory Failure] --> B[PICU Admission]; B --> C[Advanced Airway]
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Respiratory Failure

PICU Admission

Advanced Airway

⊗ This is a life-threatening emergency. Immediate escalation to PICU and advanced airway management is mandatory. Do not delay.

Differential Diagnosis — Do Not Miss

Several conditions can mimic croup and must be distinguished to avoid mismanagement:

Condition	Distinguishing Feature
Epiglottitis	High fever, drooling, toxic appearance — child prefers tripod position
Foreign Body Aspiration	Sudden onset, choking history — no prodromal illness
Bacterial Tracheitis	Toxic appearance, poor response to epinephrine — high fever
Retropharyngeal Abscess	Neck stiffness, drooling — may have limited neck extension

Key Home Messages

Clinical Diagnosis

Croup is primarily a **clinical diagnosis** — no routine investigations needed.

Classic Triad

Barking cough + inspiratory stridor + hoarseness are the hallmark features.

Dexamethasone for ALL

Dexamethasone should be given to ALL children with croup, regardless of severity.

Epinephrine for Moderate–Severe

Nebulized epinephrine is indicated for **moderate and severe croup** only.

Stridor at Rest = Severity Marker

Stridor at rest is an important marker indicating at least moderate disease.

Danger Signs

Cyanosis, exhaustion, and decreased consciousness indicate **impending respiratory failure**.

High-Yield Facts for Examinations



Most Common Cause

Parainfluenza virus — responsible for the majority of croup cases



Site of Obstruction

Subglottic region — inflammation causes the characteristic narrowing



First-Line Treatment

Dexamethasone — for all patients regardless of severity



Moderate–Severe Disease

Add nebulized epinephrine to dexamethasone



Stridor at Rest

Indicates **moderate or severe croup** — requires escalated management

 These five high-yield points cover the most commonly tested aspects of croup in pediatric examinations. Master these and you will be well prepared.