

Croup - Emergency management in children

Purpose

This document provides clinical guidance for all staff involved in the care and management of a child presenting to an Emergency Department (ED) with symptoms suggestive of croup in Queensland.

This guideline has been developed by senior ED clinicians and Paediatricians across Queensland, with input from PICU and ENT staff, Queensland Children's Hospital, Brisbane. It has been endorsed for use across Queensland by the Queensland Emergency Care of Children Working Group in partnership with the Queensland Emergency Department Strategic Advisory Panel and the Healthcare Improvement Unit, Clinical Excellence Queensland.

Key points

- Croup is a common cause of airway obstruction in young children.
- Symptoms are usually mild to moderate (worse at night and peak on day two to three) and self-limiting but can be severe and rarely, life-threatening.
- Exercise care to avoid distressing a child with croup as this may exacerbate symptoms.
- Treatment includes corticosteroids and, in moderate to severe cases, nebulised Adrenaline.

Introduction

Croup (acute laryngotracheobronchitis) is a clinical syndrome characterised by barking cough, inspiratory stridor and hoarseness of voice with or without respiratory distress.^{1,2} It is a common cause of upper airway obstruction in young children.^{3,4} Illness is typically mild and self-limiting but can be severe and rarely, life-threatening.⁴

Croup results from inflammation of the upper airway, including the larynx, trachea, and bronchi. Viral invasion of the laryngeal mucosa leads to inflammation, hyperaemia, and oedema. This may subsequently result in narrowing of the subglottic region.⁵ Children then compensate for this narrowing by changing their work of breathing.

In children with severe croup, as the narrowing progresses their increased work of breathing becomes counter-productive. Airflow through the upper airway becomes turbulent (producing stridor) and their compliant chest wall begins to cave in during inspiration.⁶⁻⁸ This results in paradoxical breathing, and consequently the child becomes fatigued. If untreated, these events may lead to hypoxia and hypercapnea, which may eventually result in respiratory failure and arrest.⁶⁻⁸

Croup usually develops over a few days with a concurrent coryzal illness. Many viruses may cause croup, the most common of which are Parainfluenza and RSV.^{1,2,4,9,10} The airway obstruction symptoms of croup are classically worse at night and peak on the second or third night of the illness. Symptoms usually resolve within 48 hours but occasionally persist for up to a week.^{1,2,11,12}



Assessment



ALERT – Children with croup should be made as comfortable as possible. Take special care not to distress the child as this may exacerbate symptoms.

Several conditions can result in acute onset stridor and respiratory distress.¹³ Croup commonly affects children between 6 and 36 months.¹⁰ It is rare in children more than six years.^{5,14} Consider alternative diagnoses, especially in children outside the typical age range. In young children always consider foreign body inhalation.

Differential diagnosis of acute onset stridor and respiratory distress

Toxic appearance	Non-toxic appearance
<ul style="list-style-type: none"> Bacterial tracheitis Epiglottitis Retropharyngeal abscess Peritonsillar abscess (quinsy) 	<ul style="list-style-type: none"> Spasmodic croup Angioneurotic oedema Laryngeal foreign body Subglottic haemangioma

Adapted from NSW Department of Health Clinical Practice Guidelines¹⁵ and Royal Children's Hospital, Melbourne¹⁶

Once confident in the diagnosis of croup, an accurate assessment (mild, moderate, severe and life-threatening) of severity is important to guide treatment. Croup severity scores used in hospital-based clinical research studies are of limited value in clinical practice.¹⁷ The initial assessment of a child presenting with croup should be based on the Alberta Medical Association Guideline as outlined in the table below (developed as a clinical adaption of the research-based Westley Croup score).^{15,18} Throat examination is not recommended as distress may exacerbate symptoms.

Assessment of severity of croup

Mild	Moderate	Severe	Life -threatening
Occasional barking cough, no audible stridor at rest	Frequent barking cough, audible stridor at rest	Persistent stridor at rest (may be expiratory)	Audible stridor may be quieter
No or mild respiratory distress* at rest	Moderate respiratory distress	Severe respiratory distress	Exhausted, poor respiratory effort
Normal SpO ₂ [#] , no cyanosis	Normal SpO ₂ , no cyanosis	SpO ₂ ≤ 93% or cyanosis	SpO ₂ ≤ 93% or cyanosis
Alert	Little or no agitation	Fatigue or altered mental state	Lethargy or decreased level of consciousness

*Signs of respiratory distress include accessory muscle use, abdominal breathing, intercostal recession, subcostal recession and tracheal tug. # Oxygen saturations using pulse oximetry, commonly referred to as "sats"

Adapted from Alberta Medical Association Guideline as referenced in Cherry¹⁷



Consider seeking senior emergency/paediatric advice as per local practice for a child with moderate to severe croup.



Seek senior emergency/paediatric advice as per local practice for a child with moderate to severe croup who is not responding to treatment.



Seek urgent senior assistance onsite (such as critical care, ENT, Anaesthetics) to manage airway for child with life-threatening croup. Contact paediatric critical care (onsite or via Retrieval Services Queensland (RSQ)).



Risk factors for severe croup

- age less than six months
- underlying structural upper airway condition e.g. tracheomalacia, subglottic stenosis
- history of previous severe croup
- unplanned representation to ED within 24 hours of first croup presentation
- trisomy 21

Investigations

Investigations (including blood tests, NPA, CXR) are usually not indicated and may unnecessarily distress the child and worsen symptoms. Lateral X-ray of the neck is not routinely required as rarely alters management.¹⁷ Although subglottic narrowing, radio-opaque foreign bodies and supraglottic swelling may be apparent on radiographic imaging of the airway, the risk of the procedure generally outweighs any benefits, as the neck extension required may precipitate sudden severe obstruction.¹⁷

Management

Refer to Appendix 1 for a summary of the emergency management and medications for children presenting with symptoms of croup.

There is no definitive treatment for the viruses that cause croup. Therapy is aimed at decreasing airway oedema and providing supportive care (respiratory support and maintenance of hydration).

Recommended management includes:

- the appropriate use of corticosteroids and nebulised Adrenaline.¹⁹⁻²⁴ These interventions have been shown to reduce the need for, and duration of endotracheal intubation, length of stay, and representation rates to emergency services.^{19,20,22,25,26}
- nursing the child upright on carer's lap

Corticosteroids

Recommended for children with mild to moderate croup.

Corticosteroids take approximately 30 minutes to lessen respiratory distress,²⁷ more quickly if given via a nebuliser.^{19,22} While not fully understood, corticosteroids are thought to vasoconstrict the upper airway and exert a systemic anti-inflammatory effect.

Oral administration is recommended whenever possible. Advantages of oral over other methods include:

- less pain and distress for the child
- inexpensive and readily available
- easy to administer^{2,21,28}



Corticosteroid dosing for the treatment of croup

Dexamethasone (Oral/IM)	0.15- 0.3 mg/kg 0.15 mg/kg has shown to be an effective dose but in practice clinicians may opt for a higher dose to ensure the desired dose is ingested in a child who is vomiting/having difficulty taking oral medicine. Preferred corticosteroid as associated with lower representation rate. ^{29, 30} Not available at all hospitals and community pharmacies.
Dexamethasone (IV)	0.3 mg/kg
Prednisolone (Oral)	Day 1: 1 mg/kg/day Day 2: 1 mg/kg/day in evening ³¹

Nebulised Budesonide

Consider for a child who repeatedly vomits the oral medication.

Budesonide (NEB) dosing for the treatment of croup

Dose	2 mg nebulised with oxygen.
Side effects	Facial irritation – cover child's eyes while administering, wash face afterwards ³²

Nebulised Adrenaline

Consider as first-line treatment in any child with persisting inspiratory stridor (at rest) and marked chest wall retractions.

Adrenaline is thought to reduce bronchial and tracheal epithelial vascular permeability thereby decreasing airway oedema, increasing the airway radius and improving airflow.^{2,19} Symptoms usually improve significantly within 30 minutes.³³ The duration of effect is approximately two hours.^{1,2,33,34}

Adrenaline (NEB) dosing for the treatment of croup

Dose	5 mL of undiluted 1:1000 Adrenaline nebulised with oxygen as a single dose. Dose may be repeated if there is inadequate response. ³¹
Monitoring	Clinical observations every 15 minutes for the first hour.

Historically, children were admitted for 24 hours after an initial dose of nebulised Adrenaline. However, two retrospective cohort studies and combined data from five prospective clinical trials in croup patients treated with Adrenaline and Dexamethasone (or Budesonide) and observed for two to four hours, found that fewer than 5% of discharged children returned within 72 hours (with only 6 of 253 requiring admission).^{23,35-38} No adverse events were reported. Based on this evidence and allowing a margin of safety, discharge may be considered three hours after nebulised Adrenaline providing the child has tolerated an effective dose of corticosteroids and symptoms (stridor and/or respiratory distress) have not persisted or recurred. If a repeat dose of Adrenaline is required the three hours must be taken from the time of the second dose.³⁹ In practice, the decision to discharge will also depend on non-clinical factors including the time of day and the family's proximity to hospital.



Seek urgent paediatric critical care advice (onsite or via RSQ) for a child who fails to respond to two doses of nebulised Adrenaline.



Oxygen



ALERT – Oxygen desaturation may herald an impending complete upper airway obstruction.

Administer high flow oxygen at 15 L/min via non-rebreather mask to children with life-threatening croup.

Consider supplemental oxygen for children with severe croup and SpO₂ less than 93% providing it can be administered without distressing the child. This can be done using plastic tubing with the opening held within a few centimetres of the nose and mouth (blow-by oxygen) at minimum of 10 L/min flow rate.¹⁴

Treatments NOT recommended

- antibiotics
- steam inhalations^{38,39} - insufficient evidence to support use and associated with risk of scalds in young children⁴⁰
- heliox treatment (RCT evidence (n=91) to suggest a significant improvement in croup scores at 60 minutes but not after 120 minutes). However, individual clinicians may consider its use in refractory cases of moderate or severe croup

Escalation and advice outside of ED

Clinicians can contact the services below to escalate the care of a paediatric patient as per local practices. Transfer is recommended if the child requires a higher level of care.



Child is critically unwell or rapidly deteriorating

Includes the following children (as a guide):

- poor respiratory effort or exhausted
- SpO₂ ≤ 93% or cyanotic
- lethargic or decreased level of consciousness
- more than two doses of nebulised Adrenaline with any of:
 - ongoing stridor and moderate or severe respiratory distress
 - signs of fatigue
- physiological triggers based on age (see table below)

Less than 1 year	1-4 years	5-11 years
<ul style="list-style-type: none"> • RR >50 • HR <90 or >170 • sBP <65 • SpO₂ <93% in oxygen or <85% in air • GCS ≤12 	<ul style="list-style-type: none"> • RR >40 • HR <80 or >160 • sBP <70 • SpO₂ <93% in oxygen or <85% in air • GCS ≤12 	<ul style="list-style-type: none"> • RR >40 • HR <70 or >150 • sBP <75 • SpO₂ <93% in oxygen or <85% in air • GCS ≤12



Reason for contact	Who to contact
<p>For immediate onsite assistance including airway management (anticipate difficult airway)</p>	<p>The most senior resources available onsite at the time as per local practices. Options may include:</p> <ul style="list-style-type: none"> • paediatric critical care • critical care • anaesthetics • ENT • paediatrics • Senior Medical Officer (or similar)
<p>Paediatric critical care advice and assistance</p>	<p>Onsite or via Retrieval Services Queensland (RSQ). If no onsite paediatric critical care service contact RSQ on 1300 799 127:</p> <ul style="list-style-type: none"> • for access to paediatric critical care telephone advice • to coordinate the retrieval of a critically unwell child <p>RSQ (access via QH intranet) Notify early of child potentially requiring transfer. Consider early involvement of local paediatric/critical care service. In the event of retrieval, inform your local paediatric service.</p>



Non-critical child

May include the following children:

- moderate to severe disease
- mild to moderate disease with risk factors for severe disease including:
 - aged less than six months
 - underlying structural upper airway condition e.g. tracheomalacia, subglottic stenosis
 - history of previous severe croup
 - unplanned representation to ED within 24 hours of first croup presentation
 - trisomy 21
- other significant clinical concern not already described

Reason for contact	Who to contact
<p>Advice (including management, disposition or follow-up)</p>	<p>Follow local practice. Options:</p> <ul style="list-style-type: none"> • onsite/local paediatric service • Queensland Children's Hospital experts via Children's Advice and Transport Coordination Hub (CATCH) on 13 CATCH (13 22 82) (24-hour service) • local and regional paediatric videoconference support via Telehealth Emergency Management Support Unit TEMSU (access via QH intranet) on 1800 11 44 14 (24-hour service)
<p>Referral</p>	<p>First point of call is the onsite/local paediatric service</p>



Inter-hospital transfers

Do I need a critical transfer?	<ul style="list-style-type: none"> • discuss with onsite/local paediatric service • view Queensland Paediatric Transport Triage Tool
Request a non-critical inter-hospital transfer	<ul style="list-style-type: none"> • contact onsite/local paediatric service • contact RSQ on 1300 799 127 for aeromedical transfers • contact Children's Advice and Transport Coordination Hub (CATCH) on 13 CATCH (13 22 82) for transfers to Queensland Children's Hospital
Non-critical transfer forms	<ul style="list-style-type: none"> • QH Inter-hospital transfer request form (access via QH intranet) • aeromedical stepdown (access via QH intranet) • commercial aeromedical transfers: <ul style="list-style-type: none"> ○ Qantas ○ Virgin ○ Jetstar

When to consider discharge from ED

Most children with croup will be safely discharged from the ED.

Discharge is recommended for children who meet the following criteria:

- no respiratory distress or stridor at rest post-treatment (minimum three hours post administration of nebulised Adrenaline or one hour post oral corticosteroids)
- croup remains the primary diagnosis after consideration of differential diagnoses
- parent/caregiver has:
 - access to further doses of any required prescribed medication
 - received education and are comfortable with what to do if symptoms recur (provide [Croup factsheet](#))
 - access to transport or emergency services in the event of deterioration

Follow-up

- with General Practitioner in one to two days

When to consider admission

Facilities without a Short Stay Unit (SSU)

Admission is recommended for children with persistent or recurrent symptoms (stridor and/or respiratory distress) despite treatment at three hours.

Consider admission for the following children:

- high risk of severe illness. This includes:
 - age less than six months
 - underlying structural upper airway condition
 - history of previous severe croup
 - trisomy 21
 - unplanned representation to ED within 24 hours following diagnosis of croup at first presentation



- persistent symptoms (e.g. respiratory distress or stridor at rest) three hours after treatment
- inadequate fluid intake
- social circumstances that make discharge potentially unsafe

Facilities with a Short Stay Unit (SSU)

Consider admission to a SSU for children who are responding to treatment but require a period of observation prior to meeting the criteria for discharge.

When to consider admission to inpatient ward from SSU

Consider admission to an inpatient service for children who are failing to improve (persistent/recurring or worsening symptoms) after 12 hours of care.

Related documents

- [Croup factsheet](#)

References

1. Fitzgerald DA., Mellis C.M. Management of acute upper airways obstruction in children. *Modern Medicine of Australia*. 1995; 38: 80-88.
2. Klassen TP. Croup: A current perspective in emergency medicine. *Pediatric Clinics of North America*. 1999; 46 (6): 1167-1178.
3. Acworth J., Babl F., Borland M., et al. Patterns of presentations to the Australian and New Zealand paediatric emergency research network. *Emergency Medicine Australasia*. 2009; 21 (1): 59-66.
4. Segal AO., Crighton EJ., Moineddin R., et al. Croup hospitalizations in Ontario: A 14-year time-series analysis. *Pediatrics*. 2005; 116 (1): 51-55.
5. Cherry JD., Feigin RD. *Textbook of paediatric infectious diseases*. 3rd ed. Philadelphia (USA): WB Saunders Company; 2006.
6. Johnson D. Clinical evidence: Croup [internet]. Clinical Evidence website; 2009 [cited 2011 May 10]. Available from: <http://clinicalevidence.bmj.com/ceweb/conditions/chd/0321/0321-get.pdf>
7. Davis G. An examination of the physiological consequences of chest wall distortion in infants with croup. *Calgary (CA): University of Calgary*; 1985.
8. Davis G., Cooper D., Mitchell I. The measurement of thoraco-abdominal asynchrony in infants with severe laryngotracheobronchitis. *Chest*. 1993; 103 (6): 1842-1848.
9. Peltola V., Heikkinen T., Ruuskanen O. Clinical courses of croup caused by influenza and parainfluenza viruses. *Pediatric Infectious Diseases Journal*. 2002; 21(1): 76-78.
10. Denny FW., Murphy TF., Clyde WA., et al. Croup: an 11-year study in a pediatric practice. *Pediatrics*. 1983; 71 (6): 871-876.
11. Skolnik NS. Treatment of Croup: a critical review. *American Journal of Diseases of Children*. 1989; 143 (9): 1045-9.
12. Johnson DW., Williamson J. Croup: duration of symptoms and impact on family functioning. *Pediatric Research*. 2001; 49: 83A.
13. Majumdar S, Bateman NJ, Bull PD. Paediatric Stridor. 2006. *BMJ Best Practice*. PDF <http://dx.doi.org/10.1136/adc.2004.066902>
14. Bjornson CL., Johnson DW. Croup. *The Lancet*. 2008; 371 (9609): 329-339.
15. Children and Infants – Acute Management of Croup. NSW Health Website; 2010 {cited 2017 July 3} Available from: http://www1.health.nsw.gov.au/pds/ActivePDSDocuments/PD2010_053.
16. Royal Children's Hospital, Melbourne. Croup (Laryngotracheobronchitis) [internet]. Royal Children's Hospital, Melbourne website; 2017 [cited 2017 July 3]. Available from: http://www.rch.org.au/clinicalguide/cpg.cfm?doc_id=5141
17. Fitzgerald DA., Kilham HA. Croup: Assessment and evidence-based management. *Medical Journal of Australia*. 2003; 179 (7): 372 - 377.
18. Cherry JD. Croup. *The New England Journal of Medicine*. 2008; 358 (4): 384-91.
19. Fitzgerald DA., Mellis CM., Johnson M., et al. Nebulised budesonide as effective as nebulised adrenaline in moderately severe croup. *Pediatrics*. 1996; 97 (5): 722-725.
20. Tibbals J., Shann FA., Landau LI. Placebo-controlled trial of prednisolone in children intubated for croup. *Lancet*. 1992; 340 (8822): 745-748.
21. Geelhoed GC., Macdonald WB. Oral dexamethasone in the treatment of croup: 0.15 mg/kg versus 0.3 mg/kg versus 0.6 mg/kg. *Pediatric Pulmonology*. 1995; 20 (6): 362-368.



22. Klassen TP., Craig WR., Moher D., et al. Nebulized budesonide and oral dexamethasone for treatment of croup. *Journal of the American Medical Association*. 1998; 279 (20): 1629-1632.
23. Kelley PB., Simon JE. Racemic epinephrine use in croup and disposition. *American Journal of Emergency Medicine*. 1992; 10 (3): 181-183.
24. Prendergast M., Jones JS., Hartman D. Racemic adrenaline in the treatment of laryngotracheitis: Can we identify children for outpatient therapy. *American Journal of Emergency Medicine*. 1994; 12 (6): 613-616.
25. Jaffe D. The treatment of croup with glucocorticoids. *New England Journal of Medicine*. 1998; 339 (8): 553-555.
26. Cruz MN., Stewart G., Rosenberg N. Use of dexamethasone in the outpatient management of acute laryngotracheitis. *Pediatrics*. 1995; 96 (2 Pt 1): 220-223.
27. Dobrovoljac M, Geelhoed GC. How fast does oral dexamethasone work in mild to moderately severe croup? A randomized double-blinded clinical trial. *Emergency Medicine Australasia* 2012;24(1):79–85.
28. Ausejo M., Sanz A., Pham B., et al. The effectiveness of glucocorticoids in treating croup: meta-analysis. *British Medical Journal*. 1999; 319 (7210): 595-600.
29. Sparrow A., Geelhoed G. Prednisolone vs. dexamethasone in croup: A randomised equivalence trial. *Archives of Disease in Childhood*. 2006; 91 (7): 580-583.
30. Fifoot AA., Ting JY. Comparison between single-dose oral prednisolone and oral dexamethasone in the treatment of croup: a randomized, double-blinded clinical trial. *Emergency Medicine Australasia*. 2007; 19 (1): 51-58.
31. Therapeutic Guidelines Ltd. Croup [internet]. Therapeutic Guidelines website; 2017 [cited 2017 July 3]. Available from: <http://online.tg.org.au.cknserVICES.dotosec.com/ip/tgc/rsg/3807.htm>
32. Waiisman Y., Klein BL., Boenning DA., et al. Prospective randomised double-blind study comparing L-epinephrine aerosols in the treatment of laryngotracheitis (croup). *Pediatrics*. 1992; 89 (2): 302-306.
33. Johnson D., Jacobson S., Edney P., et al. A comparison of nebulized budesonide, intramuscular dexamethasone, and placebo for moderately severe croup. *New England Journal of Medicine*. 1998; 339 (8): 498-503.
34. 33Bjornson C, Russell K, Vandermeer B, Klassen TP, Johnson DW. Nebulized epinephrine for croup in children. *Cochrane Database of Systematic Reviews* 2013, Issue 10. Art. No.: CD006619.
35. Rizo J., DiGravio B., Sehl M., et al. The disposition of children with croup treated with racemic epinephrine and dexamethasone in the emergency department. *The Journal of Emergency Medicine*. 1998; 16 (4): 535–539.
36. Ledwith C., Shea L., Mauro R. Safety and efficacy of nebulized racemic epinephrine in conjunction with oral dexamethasone and mist in the outpatient treatment of croup. *Annals of Emergency Medicine*. 1995; 25 (3):331-7.
37. Kunkel N., Baker M. Use of racemic epinephrine, dexamethasone and mist in the outpatient management of croup. *Pediatric Emergency Care*. 1996; 12 (3): 156-159.
38. Moore M., Little P. Humidified air inhalation for treating croup. *Cochrane Database of Systematic Reviews*. 2006; Issue 3, Art. No.: CD002870.
39. Rudinsky, SL et al. Inpatient Treatment after Multi-Dose Racemic Epinephrine for Croup in the Emergency Department *The Journal Of Emergency Medicine [J Emerg Med]* 2015 Oct; Vol. 49 (4), pp. 408-14.
40. Weber JE., Chudnofsky CR., Younger JG., et al. A randomised comparison of helium-oxygen mixture (heliox) and racemic epinephrine for the treatment of moderate to severe croup. *Pediatrics*. 2001; 107(6): e96.

Guideline approval

Document ID	CHQ-GDL-60004	Version no.	2.0	Approval date	26/09/2019
Executive sponsor	Executive Director Medical Services			Effective date	26/09/2019
Author/custodian	Queensland Emergency Care Children Working Group			Review date	26/09/2022
Supersedes	1.0				
Applicable to	Queensland Health medical and nursing staff				
Document source	Internal (QHEPS) + External				
Authorisation	Executive Director Clinical Services (QCH)				
Keywords	Paediatric, laryngotracheobronchitis, upper airway obstruction, emergency, guideline, croup, children, CHQ-GDL-60004				
Accreditation references	NSQHS Standards: 1, 4, 8				



Disclaimer

This guideline is intended as a guide and provided for information purposes only. The information has been prepared using a multidisciplinary approach with reference to the best information and evidence available at the time of preparation. No assurance is given that the information is entirely complete, current, or accurate in every respect. We recommend hospitals follow their usual practice for endorsement locally including presenting it to their local Medicines Advisory Committee (or equivalent) prior to use.

The guideline is not a substitute for clinical judgement, knowledge and expertise, or medical advice. Variation from the guideline, taking into account individual circumstances may be appropriate.

This guideline does not address all elements of standard practice and accepts that individual clinicians are responsible for:

- Providing care within the context of locally available resources, expertise, and scope of practice
- Supporting consumer rights and informed decision making in partnership with healthcare practitioners including the right to decline intervention or ongoing management
- Advising consumers of their choices in an environment that is culturally appropriate and which enables comfortable and confidential discussion. This includes the use of interpreter services where necessary
- Ensuring informed consent is obtained prior to delivering care
- Meeting all legislative requirements and professional standards
- Applying standard precautions, and additional precautions as necessary, when delivering care
- Documenting all care in accordance with mandatory and local requirements

Children's Health Queensland disclaims, to the maximum extent permitted by law, all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs incurred for any reason associated with the use of this guideline, including the materials within or referred to throughout this document being in any way inaccurate, out of context, incomplete or unavailable.

© Children's Health Queensland Hospital and Health Service 2019

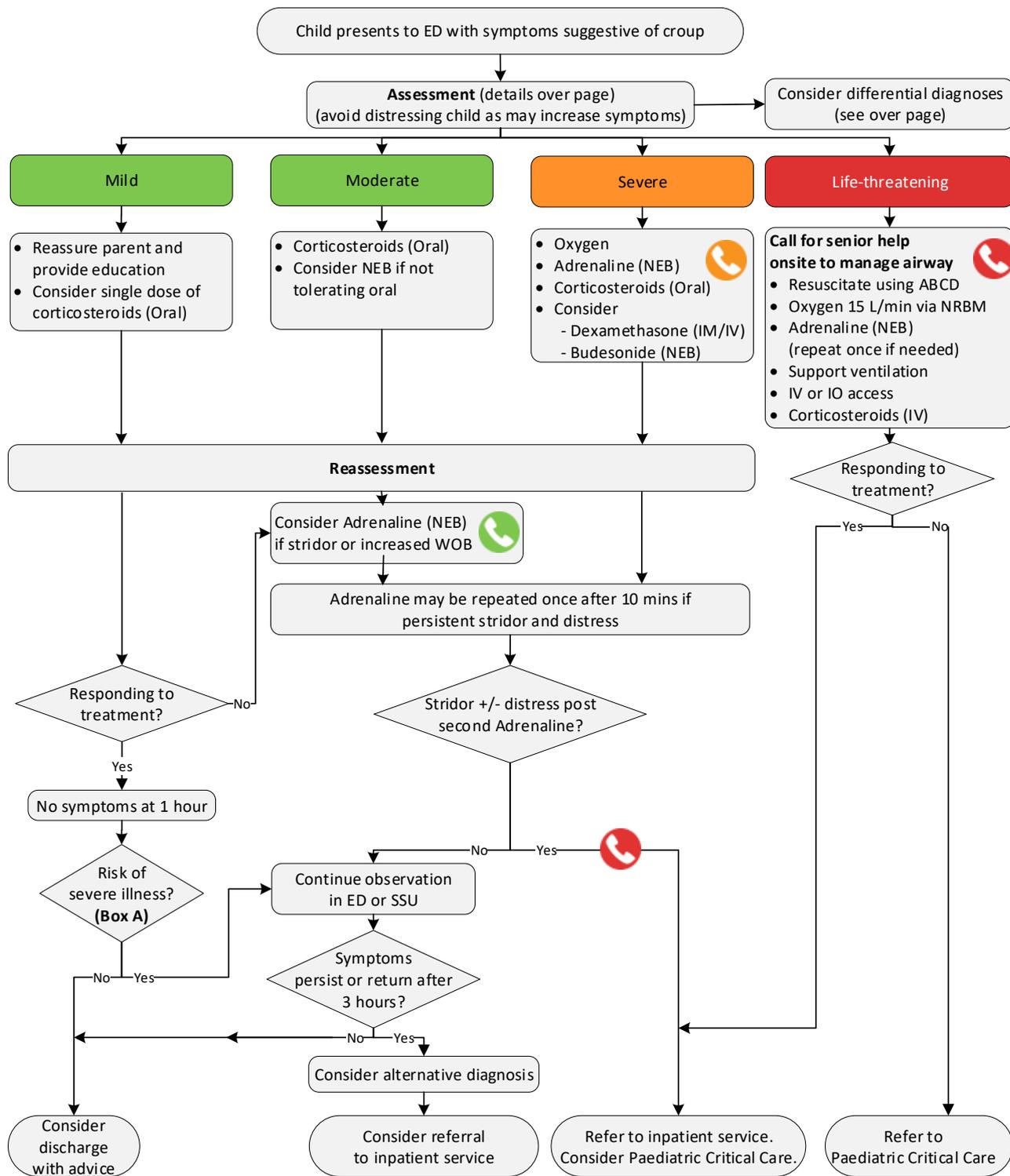


This work is licensed under a Creative Commons Attribution Non-Commercial V4.0 International licence. To view a copy of this licence, visit <https://creativecommons.org/licenses/by-nc/4.0/deed.en>

You are free to copy, communicate and adapt the work for non-commercial purposes, as long as you attribute Children's Health Queensland Hospital and Health Service and comply with the licence terms.

For copyright permissions beyond the scope of this licence contact: Queensland Emergency Care of Children working group, Children's Health Queensland Hospital and Health Service, email QPEC@health.qld.gov.au.





Box A: Risk factors for severe croup

- age less than 6 months
- underlying structural upper airway condition
- history of previous severe croup
- unplanned representation within 24 hours
- trisomy 21

Abbreviations
 WOB = Work of Breathing NRBM = Non-rebreather mask

- Consider seeking senior emergency/paediatric advice as per local practices
- Seek senior emergency/paediatric advice as per local practices
- Onsite assistance with airway may include ICU/ENT /Anaesthetics. Call Retrieval Services Queensland (RSQ) on 1300 799 127 if no paediatric critical care facility on site

CHQ-GDL-60005 – Appendix 1 V2.0



Croup – Emergency management in children – Medications

Assessment of severity of croup			
Mild	Moderate	Severe	Life -threatening
Occasional barking cough, no audible stridor at rest	Frequent barking cough, audible stridor at rest	Persistent stridor at rest (may be expiratory)	Audible stridor may be quieter
No or mild respiratory distress* at rest	Moderate respiratory distress	Severe respiratory distress	Exhausted, poor respiratory effort
Normal SpO ₂ [#] , no cyanosis	Normal SpO ₂ , no cyanosis	SpO ₂ ≤ 93% or cyanosis	SpO ₂ ≤ 93% or cyanosis
Alert	Little or no agitation	Fatigue or altered mental state	Lethargy or decreased level of consciousness

*Signs of respiratory distress include accessory muscle use, abdominal breathing, intercostal recession, subcostal recession and tracheal tug. [#] Oxygen saturations using pulse oximetry, commonly referred to as "sats"

Differential diagnosis of acute onset stridor and respiratory distress	
Toxic appearance	Non-toxic appearance
<ul style="list-style-type: none"> Bacterial tracheitis Epiglottitis Retropharyngeal abscess Peritonsillar abscess (quinsy) 	<ul style="list-style-type: none"> Spasmodic croup Angioneurotic oedema Laryngeal foreign body Subglottic haemangioma

Corticosteroid dosing for the treatment of croup	
Dexamethasone (Oral/IM)	0.15- 0.3 mg/kg 0.15 mg/kg has shown to be an effective dose but in practice clinicians may opt for a higher dose to ensure the desired dose is ingested in a child who is vomiting/having difficulty taking oral medicine. Preferred corticosteroid as associated with lower representation rate however not available at all hospitals and community pharmacies.
Dexamethasone (IV)	0.3 mg/kg
Prednisolone (Oral)	Day 1: 1 mg/kg/day Day 2: 1 mg/kg/day in evening

Budesonide (NEB) dosing for the treatment of croup	
Dose	2 mg nebulised with oxygen.
Side effects	Facial irritation – cover child's eyes while administering, wash face afterwards

Adrenaline (NEB) dosing for the treatment of croup	
Dose	5 mL of undiluted 1:1000 Adrenaline nebulised with oxygen as a single dose. Dose may be repeated if there is inadequate response.
Monitoring	Clinical observations every 15 minutes for the first hour.

For more information refer to [CHQ-GDL-60004 - Croup – Emergency management in children](#)

