

© Department for Health and Wellbeing, Government of South Australia. All rights reserved.

Note

This guideline provides advice of a general nature. This statewide guideline has been prepared to promote and facilitate standardisation and consistency of practice, using a multidisciplinary approach.

The guideline is based on a review of published evidence and expert opinion.

Information in this statewide guideline is current at the time of publication.

SA Health does not accept responsibility for the quality or accuracy of material on websites linked from this site and does not sponsor, approve or endorse materials on such links.

Health practitioners in the South Australian public health sector are expected to review specific details of each patient and professionally assess the applicability of the relevant guideline to that clinical situation.

If for good clinical reasons, a decision is made to depart from the guideline, the responsible clinician must document in the patient's medical record, the decision made, by whom, and detailed reasons for the departure from the guideline.

This statewide guideline does not address all the elements of clinical practice and assumes that the individual clinicians are responsible for discussing care with consumers in an environment that is culturally appropriate and which enables respectful confidential discussion. This includes:

- The use of interpreter services where necessary,
- Advising consumers of their choice and ensuring informed consent is obtained,
- Providing care within scope of practice, meeting all legislative requirements and maintaining standards of professional conduct, and
- Documenting all care in accordance with mandatory and local requirements.

Explanation of the aboriginal artwork:

The aboriginal artwork used symbolises the connection to country and the circle shape shows the strong relationships amongst families and the aboriginal culture. The horse shoe shape design shown in front of the generic statement symbolises a woman and those enclosing a smaller horse shoe shape depicts a pregnant woman. The smaller horse shoe shape in this instance represents the unborn child. The artwork shown before the specific statements within the document symbolises a footprint and demonstrates the need to move forward together in unison.



Cultural safety enhances clinical safety.

To secure the best health outcomes, clinicians must provide a culturally safe health care experience for Aboriginal children, young people and their families. Aboriginal children are born into strong kinship structures where roles and responsibilities are integral and woven into the social fabric of Aboriginal societies.

Australian Aboriginal culture is the oldest living culture in the world, yet Aboriginal people currently experience the poorest health outcomes when compared to non-Aboriginal Australians.

It remains a national disgrace that Australia has one of the highest youth suicide rates in the world. The over representation of Aboriginal children and young people in out of home care and juvenile detention and justice system is intolerable.

The accumulative effects of forced removal of Aboriginal children, poverty, exposure to violence, historical and transgenerational trauma, the ongoing effects of past and present systemic racism, culturally unsafe and discriminatory health services are all major contributors to the disparities in Aboriginal health outcomes.

Clinicians can secure positive long term health and wellbeing outcomes by making well informed clinical decisions based on cultural considerations.

The term 'Aboriginal' is used to refer to people who identify as Aboriginal, Torres Strait Islanders, or both Aboriginal and Torres Strait Islander. This is done because the people indigenous to South Australia are Aboriginal and we respect that many Aboriginal people prefer the term 'Aboriginal'. We also acknowledge and respect that many Aboriginal South Australians prefer to be known by their specific language group(s).

Purpose and Scope of PCPG

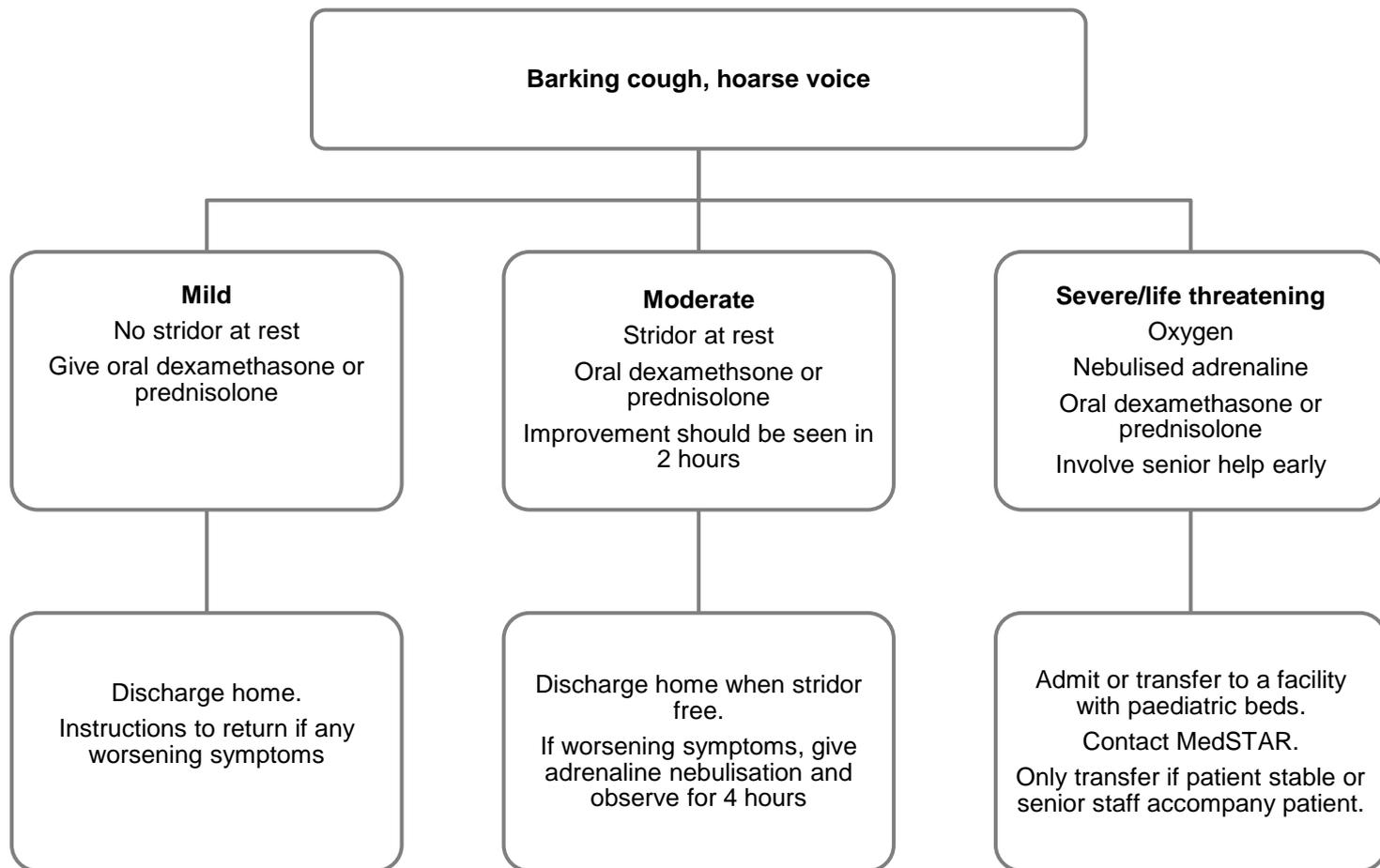
This croup guideline is primarily aimed at medical staff working in any of primary care or hospitals. It may however assist the care provided by other clinicians such as nurses. The information is current at the time of publication and provides a minimum standard for the assessment (including investigations) and management of croup; it does not replace or remove clinical judgement or the professional care and duty necessary for each specific case.

Table of Contents

Management Summary Flowchart.....	3
Important points	4
Abbreviations	4
Definitions	4
Causes	4
Assessment	5
Assessment of clinical severity	7
Management summary	8
Discharge advice	10
Inpatient care	10
References.....	11
Acknowledgements.....	12



Management Summary Flowchart



Dexamethasone: 0.15 mg/kg/dose orally (max dose 10mg). Doses up to 0.6 mg/kg (max dose 10 mg) could be considered if severe croup, **OR**

Prednisolone: 1mg/kg/dose orally (max dose 50mg) for 2 days; Prednisolone is an alternative to dexamethasone

If vomiting or oral steroid is not tolerated- Budesonide 2mg nebulised as a single dose is an option if available.

Adrenaline: 1 in 1000 – 0.5mL/kg/dose maximum of 5 mL via nebuliser. Adrenaline can be repeated every 15-20 minutes.

Consider Alternative diagnoses if:

- > Age < than 6 months or > than 6 years
- > Poor response to treatment
- > Longer duration of stridor >4 days
- > History of prolonged intubation in NICU/PICU
- > Toxic looking or excessive drooling
- > Asymmetry of chest signs.
- > History suggestive of anomalies of the upper airway

Important points

Croup is usually viral

Non-infective spasmodic croup occurs in a small subset of children.

Children typically present with onset of barking cough, inspiratory stridor and variable increase in work of breathing.

Croup mainly affects children 6 months to 3 years of age.

Children with croup should be kept comfortable and unnecessary handling avoided

Steroids are the cornerstone of management

Nebulised adrenaline should be given for acute severe croup

Senior help should be requested early in severe croup or if epiglottitis is suspected

Abbreviations

mg	milligram(s)
kg	kilograms
mL	millilitre(s)
NICU/PICU	Neonatal Intensive Care Unit / Paediatric Intensive Care Unit
ICU	Intensive Critical Care
MET	Medical Emergency Team
IM/IV	Intramuscular/Intravenous
max	maximum

Definitions

Croup	Croup is an acute illness characterized by mucosal swelling and inflammation of the larynx, subglottic area and upper trachea (laryngotracheitis).
-------	--

Causes

Croup is usually viral

- > parainfluenza types 1 and 3 (most common)
- > respiratory syncytial virus
- > Human metapneumovirus
- > influenza
- > adenovirus

Non infective spasmodic croup occurs in a small subset of children.

Assessment

Croup is a clinical diagnosis.

Key features on history are:

- > acute onset of a seal-like barking cough
- > stridor usually inspiratory
- > hoarseness
- > respiratory distress
- > fever

The child should not look toxic. While drooling is more typical of epiglottitis, some children may drool.

Examine the child on the parents' lap to minimise distress.

Do not examine the throat with a tongue depressor in children with signs of severe upper airway obstruction.

Examine for:

- > signs of toxicity
- > respiratory effort
- > chest wall retractions
- > respiratory rate
- > pulse oximetry (hypoxia from upper airway obstruction implies critical obstruction)
- > heart rate
- > inspiratory, expiratory or biphasic stridor
- > degree of alertness

Spasmodic croup is difficult to differentiate from viral croup. Episodes can recur within the same night and for two to four successive evenings. A striking feature of spasmodic croup is its recurrent nature. The clinical course is usually benign.

The main differential diagnoses are

- > acute epiglottitis
- > bacterial tracheitis
- > peritonsillar abscess
- > retropharyngeal abscess
- > foreign body aspiration
- > anaphylaxis

See the table below for a comparison of clinical signs.

Clinical Sign	Croup	Epiglottitis
Rapidity of onset	Variable	Hours (rapid onset)
URTI preceding	Sometimes	No
Cough	Barking	Minimal
Swallowing	Yes	Difficult
Posture	Unremarkable but may worsen with lying down	Sits up, leans forward
Drooling	No (occasionally can drool)	Mouth open and drools
Appearance	Unwell	Ill/ toxic
Temperature	Fever usually <38°C	>38°C
Cry	Hoarse	Soft
Voice	Hoarse	Muffled
Stridor	Loud inspiratory	Soft

Acute bacterial tracheitis presents as progressive respiratory distress with increasing stridor in a febrile toxic child in the context of prodromal viral respiratory tract infection. The usual causes are *Staphylococcus aureus*, *Streptococcus (pneumoniae, pyogenes)*, *Moraxella catarrhalis* and *Haemophilus influenzae*.

Acute epiglottitis and bacterial tracheitis are potentially fatal if missed and are airway emergencies. If in doubt, these more serious conditions should be excluded. Acute epiglottitis is rare now due to *Haemophilus influenzae* immunisation but important to note that these children look very unwell and toxic.

The primary goals in the management of acute epiglottitis and bacterial tracheitis are to secure the airway and administer appropriate antibiotics as soon as possible. Airway management and examination should be performed by an experienced multidisciplinary team ideally including someone skilled in paediatric intubation who can secure the airway by intubation if necessary (preferably via inhalation technique). In these cases, the patient should not be laid down.

Peritonsillar or retropharyngeal abscess presents with fever, drooling, a change in voice quality and neck extension and painful neck movements.

Foreign body aspiration has an abrupt onset of cough and/or stridor without fever, often in a setting of the child playing with small objects.

Anaphylaxis presents as acute onset (minutes to hours) of an allergic reaction following exposure to an allergen and presenting with multisystem signs which may include generalised urticaria, pruritus, swollen lips-tongue-uvula, respiratory compromise with dyspnoea and wheeze and/or stridor and cardiovascular compromise with hypotension, collapse and abdominal pain.

Assessment of clinical severity

Clinical Sign	Mild	Moderate	Severe	Impending Respiratory Arrest
Cough	Barking cough	Barking cough	Barking cough but may be quiet	Barking cough (may be quiet or absent due to exhaustion)
Stridor	No stridor at rest	Inspiratory stridor at rest	Marked stridor (may be biphasic)	Audible stridor at rest (may be soft)
Chest retractions	No chest retractions	Chest wall retractions	Severe chest retractions	Chest retractions (may be reduced)
Mental state	Alert	Alert	Agitated or Lethargic	Lethargy, fatigue, listless Reduced level of consciousness
Colour	Pink	Pink	Pink	Cyanosis

Investigations

Laboratory tests including nasopharyngeal aspirates (NPA) and X-rays are not required as the diagnosis of croup is clinical.

Additional investigations may be required to exclude one of the differential diagnoses.

Management

Management depends on the age of the child, severity, time of day, parent capabilities, ability to access an urgent review i.e. access to phone, transport, ambulance etc. and access to medical review.

Children with croup of any severity should be made comfortable with minimal handling and not upsetting the child.

Hypoxia may be due to lower respiratory tract disease but if due to upper airway obstruction implies critical narrowing and is a medical emergency.

Management summary

Severity	Management
Mild	<p>Many children older than 12 months may be managed at home. Easy access to further medical review must be available.</p> <p>Give oral steroid</p> <ul style="list-style-type: none"> • Oral Dexamethasone: 0.15 mg/kg (max 10 mg) as a single dose, OR • Prednisolone: 1mg/kg (max 50mg) daily for 2 days
Moderate	<p>Give oral steroid</p> <ul style="list-style-type: none"> • Dexamethasone: 0.15 mg /kg as a single dose (max 10 mg), OR • Prednisolone: 1mg/kg/dose (max 50mg) daily for 2 days. <p>If the child is vomiting or is reluctant to drink: Dexamethasone – 0.15 mg/kg/dose (max 10 mg) IM/IV OR Budesonide - 2 mg nebulised as a single dose if available.</p> <p>NB- preferable to use the route least upsetting to the child to be effective.</p> <p>Improvement should begin from 2 hours post administration. The anti-inflammatory effect of dexamethasone lasts 2-4 days.</p> <p>If improvement does not occur in 30 minutes or stridor is worsening:</p> <ul style="list-style-type: none"> • Adrenaline: (1:1000 strength) – 0.5mL/kg/dose to maximum of 5 mL via nebuliser Improvement is seen within 10-30 minutes and the clinical effect lasts for 1-2 hours. Can be repeated every 15-20 minutes. • Oxygen: if SpO₂ < 93% or significant respiratory distress <p>Note. Avoid upsetting the child if possible. Consider holding oxygen tubing a few centimetres from the child's nose and mouth (blow by oxygen). Note that the combination of hypoxia and upper airway obstruction suggests severe disease.</p> <p>Discharge if the child improves and the symptoms resolve (see discharge criteria below) However, if the child does not improve, admit to hospital or arrange transfer to a facility with paediatric beds (see admission criteria below).</p>
Severe	<p>Involve senior help early (e.g. Consultant, ICU, MET team or consider calling MedSTAR for advice)</p> <ul style="list-style-type: none"> • Oxygen: high flow oxygen by mask or blow by oxygen. • Adrenaline: (1:1000 strength) – 0.5 ml/kg/dose to a maximum of 5 mL via nebuliser (can be repeated every 15-20 minutes as required) • Give oral steroid <ul style="list-style-type: none"> ○ Dexamethasone: 0.15mg/kg/dose orally stat (maximum 10 mg). Doses up to 0.6 mg/kg/dose can be used, OR ○ Prednisolone: 1 mg/kg (max 50mg) daily for 2 days. <p>If the child is vomiting or is reluctant to drink: Dexamethasone – 0.15mg/kg/dose IM/IV can be given OR Budesonide - 2 mg nebulised - preferable to use the route least upsetting to the child (In children with severe croup, budesonide may be mixed with adrenaline and nebulised simultaneously).</p>

Severe (cont.)	<p>Admit or arrange transfer by contacting MedSTAR Kids retrieval service</p> <p>Repeated observations (1/2 - 1 hourly) of heart rate, respiratory rate, stridor, alertness and pulse oximetry are required until improvement occurs. Then manage as per instructions for moderate croup.</p> <p>If poor response to adrenaline or rapid relapse despite repeated adrenaline doses, consider intubation. Expert assistance (e.g. senior anaesthetic or ICU staff) should be alerted and discussion with MedSTAR Kids initiated.</p> <p>Repeat doses of adrenaline may be given pending intubation or retrieval.</p>
-----------------------	---

Primary and pre-hospital care

- > Assess the severity as per the above table.
- > Begin care as per the management table doing whatever is possible depending on circumstances (e.g. availability of oxygen).
- > Consider giving Prednisolone as single dose.

Note. There is no evidence that steam or humidified air speeds recovery. Steam is associated with burns and scalds and is therefore not recommended. Heliox has not been shown to be better than nebulized adrenaline in severe croup.

Indications for hospital assessment and/or admission

Absolute

Significant respiratory symptoms persisting at least 4 hours after steroid administration:

- > Audible stridor at rest
- > Significant respiratory effort
- > Oxygen requirement.

Relative

- > Young age, especially younger than 6 months
- > Poor oral intake and degree of dehydration
- > Social issues (e.g. distance from medical assistance, lack of transport)
- > Inadequate monitoring or follow up available
- > Significant parental anxiety
- > Repeated presentations within 24 hours.
- > Requiring more than one dose of adrenaline

Criteria for discharge from emergency department

- > No stridor at rest
- > Normal pulse oximetry
- > Normal colour
- > Normal level of consciousness
- > Demonstrated ability to tolerate fluids by mouth
- > At least 4 hours after the administration of adrenaline
- > Parents able to return for care if respiratory distress recurs at home
- > Parents have access to telephone, ambulance and/or early medical review.

Discharge advice

Parents should be advised that if child develops mild respiratory distress, it may be safe to drive to the nearest emergency department for treatment (See parent information sheet).

If child develops severe croup with agitation and cyanosis, the parent should call 000 for ambulance transport to an emergency department.

Ensure the GP receives a discharge letter with all relevant clinical and management details.

Inpatient care

Repeated close monitoring of respiratory rate, heart rate, oxygen saturation, stridor, alertness, air entry, cyanosis and chest retractions.

Repeat doses of steroids are not usually required.

Care as per management table.

Discharge criteria are the same as for discharge from the emergency department except the child should be stable for a longer period if there is poor access to medical care.



References

1. Johnson D, Klassen T, Kellner J. Diagnosis and management of croup: Alberta Medical Association Clinical Guidelines. Alberta Medical Association, 2005
2. Woods C. Approach to the management of croup. Up To Date 2010.
3. The Royal Children's Hospital. 2018. *Croup (Laryngotracheobronchitis)*. [ONLINE] Available from: https://www.rch.org.au/clinicalguide/guideline_index/Croup_Laryngotracheobronchitis/ [Accessed 24 July 2018].
4. Bjornson C, Johnson D. Croup. *Lancet*, 2008; 371: 329-339
5. Russell KF, Wiebe N, Saenz A et.al. Glucocorticoids for croup (review). The Cochrane Collaboration, 2009.
6. Clarke M. Diagnosis and management of croup. BC Children's Hospital Clinical Practice Guidelines. 2007
7. Health for kids in the south east; Monash Medical Centre. Evidence based practice guidelines for the management of croup in children. 2007.
8. Russell KF, Liang O'Gorman K, Johnson DW, Klassen TP. Glucocorticoids for croup, *Cochrane Database Systematic Rev* 2011;(1):CD001955
9. Woods C. Approach to the management of croup. Up To Date 2016
10. AMH Children's Dosing Companion July 2017.
11. Ortiz-Alvarez O; Canadian Pediatric Society. Acute management of croup in the emergency department. May 2017
12. Russell KF, Liang Y, O' Gorman K, Johnson DW, Klassen TP. Glucocorticoids for croup; *Cochrane Database systematic review* 2011
13. Oral dexamethasone in the treatment of croup: 0.15 mg/kg versus 0.3 mg/kg versus 0.6 mg/kg. Geelhoed GC, Macdonald WB *Pediatr Pulmonol*. 1995 Dec; 20(6):362-8.
14. A randomized comparison of dexamethasone 0.15 mg/kg versus 0.6 mg/kg for the treatment of moderate to severe croup. Chub-Uppakarn S, Sangsupawanich P *Int J Pediatr Otorhinolaryngol*. 2007 Mar; 71(3):473-7
15. Alshehri M, Almegamsi T, Hammdi A. Efficacy of a small dose of oral dexamethasone in croup. *Biomed Res (Aligarh)* 2005; 16:65–72

Information for parents

Parenting and Child Health, Women's and Children's Health Network available at: www.cyh.com/SubDefault.aspx?p=98

Acknowledgements

The South Australian Child and Adolescent Health Community of Practice gratefully acknowledge the contribution of clinicians and other stakeholders who participated throughout the guideline development process particularly:

Write Group Lead

Dr David Thomas

Write Group Members

Dr Shirley Sthavan

Dr Noha Soliman

SAPCPG Reference Group Members

Dr Gavin Wheaton

Dr Malcolm Higgins

Dr Brett Ritchie

Dr Brian Coppin

Dr Noha Soliman

Dr David Thomas

Dr Keiko Morioka

Dr Gillian Watterson

Dr Shirley Sthavan

Carol La Vanda

Carey Aylmer

Rachael Sobczak

Jayne Wilkie

Susan Cameron



Document Ownership & History

Developed by: SA Child & Adolescent Health Community of Practice
Contact: Health.PaediatricClinicalGuidelines@sa.gov.au
Endorsed by: SA Safety and Quality Strategic Governance Committee
Next review due: 07/06/2023
ISBN number: 978-1-74243-895-5
PDS reference: CG090
Policy history: Is this a new policy (V1)? **N**
 Does this policy amend or update an existing policy? **Y**
 If so, which version? **V1**
 Does this policy replace another policy with a different title? **Y**
 If so, which policy (title)? Management of Acute Croup in Children

Approval Date	Version	Who approved New/Revised Version	Reason for Change
07/06/18	V2	SA Health Safety & Quality Strategic Governance Committee	Formally reviewed and updated in line with scheduled timeline for review. Name change from Management of Acute Croup in Children to Croup.
01/07/13	V1	SA Health Safety & Quality Strategic Governance Committee	Original Version

