

Management of Stridor

Clinical Guideline

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Purpose of Guidance

This guideline has been created with the aim of standardising care throughout the South Yorkshire Integrated Care System footprint, with agreed management of Acute Stridor which is a common presentation in paediatric units and to ensure equity for all our children and young people.

Scope of Guidance

This guideline is intended for primary use by staff working in the four acute hospital trusts in the South Yorkshire Integrated Care Board providing children's services:

- Barnsley Hospitals NHS Foundation Trust
- Doncaster & Bassetlaw Hospitals NHS Foundation Trust
- Rotherham NHS Foundation Trust
- Sheffield Children's NHS Foundation Trust

This includes but is not limited to Doctors, Nurses, and Allied Health Professionals.

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Version Control

This is a controlled document. Whilst this document may be printed, the electronic version posted on the **Healthier Together Staff Hub** is the controlled copy. Any printed copies of this document are not controlled.

Date	Version	Comments	Changes Made
TBC	1 [Original]	None	None

Introduction

The presence of acute stridor implies an obstruction of the extra-thoracic airways, i.e., the larynx and upper trachea. There are several differentials with the most common cause being croup. The main principles of management of stridor include the initial assessment of the degree of airway obstruction, protection of the airway where necessary and assessment of the likely cause leading to specific treatments.

Intended Audience

For use by healthcare professionals providing children's services in the four acute hospital trusts within the South Yorkshire Integrated Care Board.

Background

Acute stridor is a common condition seen in children that can potentially be very serious. Stridor is a sign of upper airway obstruction and can be due by a number of different diagnoses. Croup (Laryngotracheobronchitis) is the most common cause of acute stridor in children.¹

Careful assessment of the child with stridor is essential not only to avoid unnecessary upset which will increase respiratory distress but also to help distinguish the cause of the stridor and as such guide specific treatment. Assessment using the Westley clinical scoring system is used to help grade the clinical severity of children presenting with stridor and to also measure their response to treatment. Initial Westley score has a strong correlation with length of hospital stay.²

The mainstay of treatment for acute stridor is steroids and nebulised adrenaline, depending on severity. Careful monitoring of the child is vital to ensure the correct diagnosis is made and the potential need for more definitive airway management is considered.

Assessment of Airway Obstruction

A careful assessment of the child presenting with acute stridor is vital. All children should be scored using the Westley clinical scoring system (below). However, this does not replace good clinical assessment and judgement.

The following parameters should be noted:

- i) Severity of stridor - increase generally implies more severe obstruction.
- ii) Respiratory rate - in general will increase with increasing obstruction.
- iii) Intercostal / subcostal recession - will increase with increasing respiratory effort.
- iv) Heart rate - in general will increase with increasing obstruction.

BUT BEWARE of the child with a decrease in stridor, decreasing chest expansion, and the tiring child with slowing respirations, bradycardia and reduced conscious level all of which may be due to increasingly severe obstruction.

- v) Efficacy of respiration - chest expansion, will decrease with increasing obstruction.
- vi) Cyanosis/pulse oximetry - saturations of >95% in air is acceptable, but if <90% in air or clinically cyanosed this is indicative of severe airways obstruction and needs urgent attention.
- vii) Mental state - irritability/restlessness may be due to hypoxia, reduced level of consciousness/drowsiness indicates severe hypoxaemia.
- viii) Ability to swallow - this should not be tested but drooling of saliva in combination with stridor is often indicative of dysphagia e.g., in epiglottitis.

Pre – Terminal Signs:-

- **Silent Chest**
- **Gasping respiration**
- **Bradycardia**

Westley Clinical Scoring System

Clinical Feature	Degree	Score
Stridor	None	0
	When agitated/active	1
	At rest	2
Intercostal recession	None	0
	Mild	1
	Moderate	2
	Severe	3
Air entry	Normal	0
	Mildly reduced	1
	Severely reduced	2
Cyanosis	None	0
	When agitated/active	4
	At rest	5
Level of Consciousness	Normal	0
	Altered	5
<p>Total Score:</p> <p>Mild = 0 - 3</p> <p>Moderate = 4 - 6</p> <p>Severe = 7 - 17</p>		

Differentials of acute stridor

The below table lists the differential diagnosis of acute stridor along with treatment strategies.

	Diagnosis	Features	Treatment
Common	Viral Croup Laryngotracheobronchitis	Most common between 6 months–3 yrs of age caused by viral aetiology. Infection results in inflammation of the upper airway, larynx, trachea and bronchi. Abrupt onset usually at night. Most cases managed in primary care. 30% require hospitalisation of these 2% need intubation. Symptoms generally last 3-5 days.	Corticosteroids: Oral Dexamethasone OR Nebulised Budesonide. Nebulised Adrenaline occasionally .
Uncommon	Epiglottitis	Peak incidence 1-3 yrs of age with very sudden onset. Child looks toxic with high fever >38.5. Soft inspiratory stridor, muffled cough, drooling and unable to swallow. Poor response to nebulised Adrenaline. HiB – check immunisation history.	Require experienced senior team to manage airway – early intubation usually required. Cultures and IV antibiotics as per guidelines.
	Bacterial tracheitis	Average age 4-6 yrs but can occur at any age. Gradual onset with preceding URTI. Child septic looking with high fever >38.5, barking cough and stridor. Staph aureus and Streptococcus common organisms. Poor response to nebulised Adrenaline.	Require experienced senior team to manage airway – 80% require intubation. IV cultures and antibiotics as per guidelines.
	Inhaled foreign body	Sudden onset choking with coughing stridor or wheeze. Can affect any age child but more	Encourage cough Direct visualisation and removal by Bronchoscopy under GA.

		common in <3 yrs. Child afebrile without preceding illness. No response to nebulised Adrenaline.	
Rare	Retropharyngeal abscess	Neck pain and swelling with dysphagia, trismus and stridor. Signs of systemic sepsis.	Cultures and IV antibiotics, may require surgical drainage.
	Anaphylaxis	Acute onset of symptoms in response to trigger. Urticaria, itching, facial swelling present with possible cardiovascular compromise.	As per Anaphylaxis guideline. IM Adrenaline.
	Hereditary angioedema	Acute onset with localised non-pruritic non-erythematous angioedema usually affecting lips, eyelids and tongue. Stridor, dysphagia and voice changes due to oedema at level of larynx. Adrenaline, Antihistamines and steroids not effective.	Secure airway as necessary. Treatment requires infusion of C1 esterase inhibitor.
	Inhalation burns	History of smoke exposure. Facial burns, carbonaceous deposits around mouth. Progressive airway oedema and compromise.	Early intubation by experienced team. Fluid replacement as per Burns guideline.
	Diphtheria	Rare. Present at any age, history of inadequate immunisation or recent foreign travel. Low grade fever, dysphagia and stridor with neck pain and swelling.	IV cultures and antibiotics Diphtheria anti-toxin and treat contacts with Erythromycin.

Management of acute stridor

For emergency management see ED guideline [3.30 Acute Stridor and Croup](#).

General principles

Protect the airway and minimise agitation. Place the child in the most comfortable position, usually upright on their parent's lap. Keep examination to a minimum. Do not attempt to insert intravenous cannula, take blood or X-ray the neck unless advised by senior doctor (almost never indicated in first instance).

Do not attempt to visualise throat unless you are to perform emergency intubation or tracheostomy.

Corticosteroids

Corticosteroids are the mainstay of treatment for children presenting with stridor. In croup they reduce the frequency and duration of hospitalisation, the need for intubation and nebulised Adrenaline and reduce repeat visits to medical care.

Children should receive a single dose of 0.15mg/kg oral **Dexamethasone** (maximum dose of 10mg). The effect of Dexamethasone is seen within two hours and further beneficial effects can be seen up to 10 hours following administration. A repeat dose can be considered 12 hours after the first dose if the patient returns with residual symptoms of stridor still present.

If oral Dexamethasone cannot be tolerated nebulised **Budesonide** (2mg) can be considered as an alternative.

Where Dexamethasone is not available 2mg/kg of oral **Prednisolone** (maximum dose of 40mg) can be used as an alternative. However children treated with prednisolone are more likely to require additional doses, reflecting its shorter half-life.⁴

If the child is intubated: Prednisolone, 1mg/kg 12 hrly until 24 hours after extubation, or Dexamethasone I.V. or orally 0.15mg/kg 12 hourly until 24 hours after extubation.

Nebulised Adrenaline

In severe cases of croup and stridor and selected moderate cases of croup nebulised Adrenaline can be administered. Dose 0.4mg/kg (max 5mg) of 1 in 1000 solution (1mg/1ml), given with oxygen through a facemask.

Nebulised Adrenaline has been shown to reduce respiratory distress within ten minutes of administration with the clinical effects lasting on average one hour. It may later be associated with a rebound increase in obstruction. Therefore, it should be given where facilities, and expertise, for intubation are available. A single dose of nebulised adrenaline does not necessitate transfer to PICU.

Further doses of nebulised Adrenaline may be given but this is unusual and PICU should be informed and senior staff involved.

Nebulised Adrenaline does not replace the need for intubation if deemed necessary but may be used to "buy time" until the airway is secured.

Oxygen

Give as necessary to maintain saturations above 92%. It is important to minimise distress and wafting oxygen given by the parent holding the mask may be the best way to administer.

Discharge criteria and advice

The child presenting with stridor can be discharged when they meet the below criteria for discharge:

- Absent/mild intermittent stridor with saturations above 95% in air.
- Diagnosis of croup clear with all other diagnosis considered and excluded.
- Parents confident they can manage the child.

For children with a diagnosis of croup it is important to explain on discharge the natural history of the illness, that symptoms generally peak for 24 hours and this should be the worst the child gets.

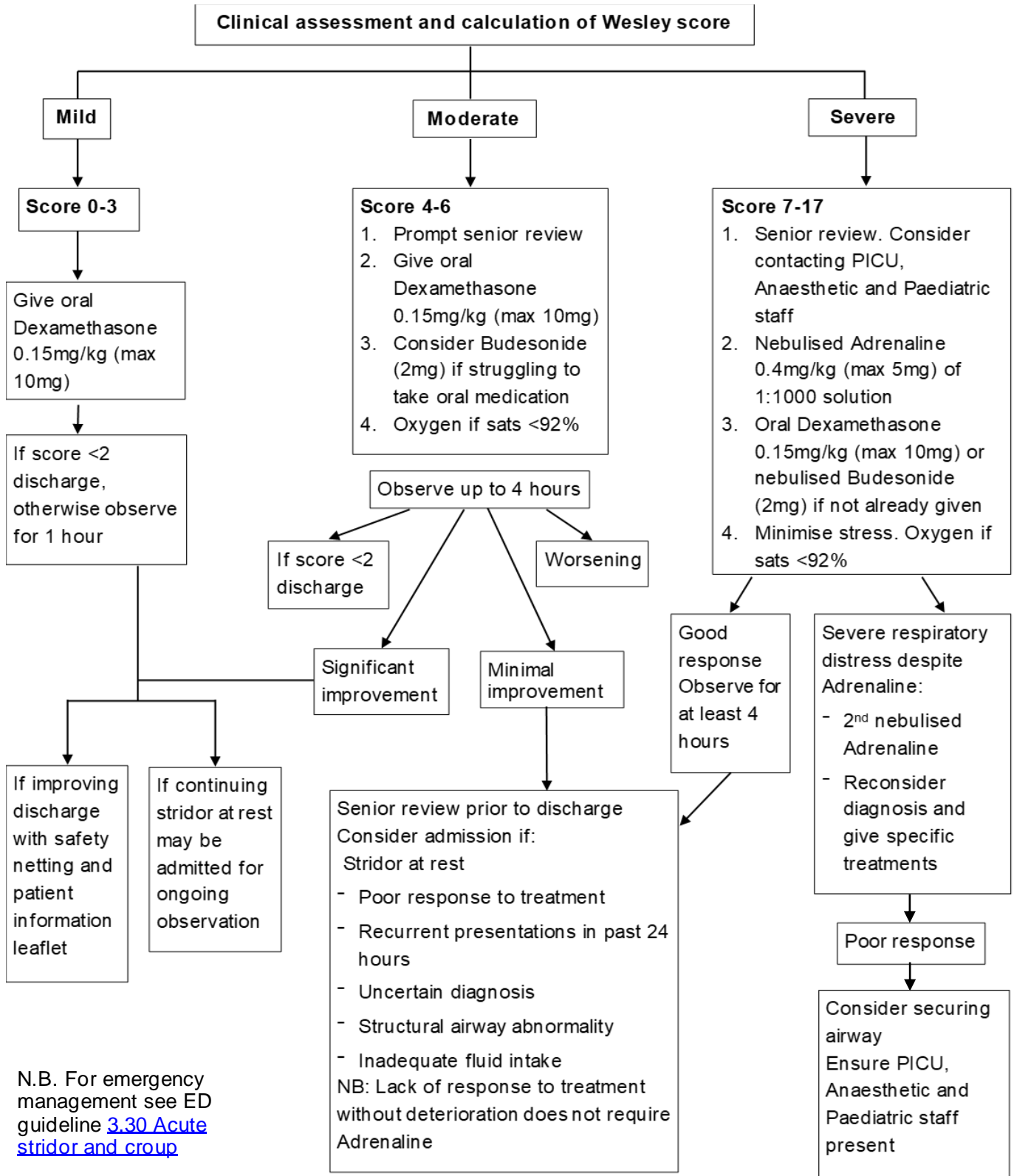
Highlight the below red flag features and give the patient information leaflet (**Info leaflet – No.47 Croup – See QR code below**). Also consider the time of day, parental concerns, access to GP review/other emergency services and availability of transport.

Red flag features:

- Stridor at rest
- Difficulty breathing – recessions
- Sever coughing spells
- Pallor or cyanosis
- Drooling or difficulty swallowing
- Prolonged symptoms longer than 7 days



Flowchart – Initial Assessment and Management of acute stridor/croup



N.B. For emergency management see ED guideline [3.30 Acute stridor and croup](#)

Review Timeline

This policy will be reviewed in its entirety on a three-yearly basis, as is standard practice, by the members of the Guideline Development Group within the Care of the Acutely Ill Child Network. If significant issues are found as a result of the audit process, a review will be conducted in advance of this to ensure patient safety. As part of the audit process, there is scope to make minor amendments to the policy built into the document, and these will be reflected in the version control table visible at the front of this document.

References

1. D Johnson. Croup. BMJ clin Evidence. 2014; 09:321.
2. Yang WC, Lee J, Chen CY, et al. Westley score and clinical factors in predicting the outcome of croup in the paediatric emergency department. *Pediatr Pulmonol*. 2017 Oct;52(10):1329-34.
3. Gates A, Gates M, Vandermeer B, Johnson C, Hartling L, Johnson DW, Klassen TP. Glucocorticoids for croup in children. *Cochrane Database of Systematic Reviews* 2018, Issue 8. Art.No.: CD001955. DOI:10.1002/14651858.CD001955.pub4.
4. Parker C.M. Cooper M.N. Prednisolone versus Dexamethasone for Croup: A randomised controlled trial. *Paediatrics* 2019:144.