

Upper Airway Obstruction in Children guideline

Subject:	Upper airway obstruction in children
Policy Number	N/A
Ratified By:	Clinical Guidelines Committee
Date Ratified:	June 2015, minor change May 2016, February 2019
Version:	3.0
Policy Executive Owner:	Clinical Director, CYP ICSU
Designation of Author:	Consultant Paediatrician
Name of Assurance Committee:	As above
Date Issued:	February 2019
Review Date:	3 years hence
Target Audience:	Paediatric doctors and A&E doctors working with children
Key Words:	Croup, Stridor, Fever, Cough, Laryngo- tracheo-bronchitis, epiglottitis

Version Control Sheet

Version	Date	Author	Status	Comment
1	05/2015	Dr Eliza Grylls, Dr Joseph Raine	Off line	Guideline now updated and adapted to cover all significant causes of upper airway obstruction in children, focusing mainly on croup. Previous guideline was on croup only. Ensured consistent with CATS guideline.
2.0	11/05/16	Dr Joseph Raine	Of line	Change made to maximum dexamethasone dosage.
3.0	Feb 2019	Dr John Moreiras Dr Trupti Patel	Live	Reviewed and amended: <ul style="list-style-type: none"> - link to CATS website and also change in dose of ceftriaxone up to 100mg/kg from 80mg/kg in epiglottitis. - Chloramphenicol as appropriate choice for tracheitis and severe penicillin/cephalosporin - Addition of option for Epiglottitis and severe penicillin / cephalosporin allergy - the same as bacterial tracheitis.

➤ Assessment

Stridor is the most pertinent clinical sign of upper airway obstruction. It is normally inspiratory but can be both expiratory and inspiratory.

Avoid upsetting the child

X DO NOT inspect throat

X DO NOT do x-rays or attempt intravenous (iv) access/blood tests

X DO NOT press an oxygen mask over face

Leave the child with a parent in a comfortable position

Take observations:

- Oxygen saturation in air (Do not rely on oxygen saturations in isolation as they drop late in upper airway obstruction and are a poor guide to severity when oxygen is given)
- Respiratory rate
- Temperature
- Pulse

Particularly worrying signs are:

- Agitation, restlessness - these signs may be due to hypoxia
- Fatigue or reduced conscious level
- Marked increase in work of breathing (ie. Tracheal tug, recession)
- Cyanosis/low oxygen saturations

If there is concern that the child may completely obstruct their airway then call for URGENT senior help including a Consultant or registrar Anaesthetist.

It is important to identify and treat serious upper airway obstruction. Once the airway is secure, time can be spent identifying and treating the specific cause.

Specific points from the history:

- Is this a first presentation?
- Any history of previous intubations or difficulty with intubation?
- Is the airway stable?

Differential diagnoses

Common	Uncommon	Rare
Viral laryngotracheobronchitis (croup)	Epiglottitis	Angioneurotic oedema
Superimposed infection on subglottic stenosis or laryngomalacia	Bacterial tracheitis	Diphtheria
	Laryngeal foreign body	Retropharyngeal abscess
	Inhalational injury (burns)	
	Anaphylaxis	
	Severe bilateral tonsillar enlargement	

2

Stridor is a sign of all the causes of upper airway obstruction.

- **Croup** - Harsh barking cough in a febrile, miserable but otherwise well child. Inspiratory stridor, dry barking cough, hoarse voice. Usually preceded by coryzal symptoms and low grade fever (<38.5°C). Usually age 6months-3years.
- **Superimposed infection on subglottic stenosis or laryngomalacia** – Acute deterioration on a background of upper respiratory tract symptoms, associated with signs of an acute infection. History of laryngomalacia/subglottic stenosis.
- **Inhaled/Ingested foreign body** – Inhaled - Sudden onset in an otherwise well child with coughing, choking. Ingested - History of witnessed/reported ingestion, gastrointestinal symptoms related to location of foreign body. Ingested object can also compress the airway.
- **Anaphylaxis** - Swelling of tongue/face, wheeze, urticarial rash. History of allergy/atopy.
- **Inhalational injury** – History of smoke inhalation, soot in sputum, singed nasal hair, soot around mouth and face, and facial burns involving mouth and nose.
- **Bacterial tracheitis** - Often hard to distinguish from croup in early stages. 'Toxic' appearing child, very tender trachea, high fever, systemically unwell, cough (not barking), deteriorating course without antibiotics. Drooling uncommon but may be present, preference to lie flat. Stridor may be soft or even absent in severe airway obstruction.
- **Epiglottitis** - Dysphagia, drooling and distress. Acute onset (within hours), toxic looking, temperature > 39°C, absent cough with low pitched expiratory

stridor (often snoring). Often in a sitting position and leaning forward, neck hyperextended. Usually 2-7 years old. Rare since the introduction of the Hib vaccine.

- **Severe bilateral tonsillar enlargement**
- **Retropharyngeal/peritonsillar abscess** - High fever, hyperextension of neck, drooling, pooling of secretions in throat.
- **Acquired subglottic stenosis** - Hoarseness, brassy cough, recurrent pneumonitis, cyanosis, dyspnoea.
- **Angioneurotic oedema** – Recurrent episodes of angioedema – abdominal pain and laryngeal oedema which may compromise breathing.
- **Diphtheria** - Gradual onset; sore throat, malaise, cervical lymphadenopathy, low-grade fever, hoarseness, cough. Ask about immunisation history.

Note: there is a large degree of overlap in clinical presentations between epiglottitis, tracheitis and upper airway abscess.

See below for management of all (except see separate Anaphylaxis in children and Foreign body inhalation/ingestion in children guidelines):

	<p>Please see Whittington Health Guideline: 'Anaphylaxis in children' 'Foreign body inhalation/ingestion in children'</p>
---	---

➤ Management

Identify and treat serious upper airway obstruction and then identify the cause.

- Allow the child to settle quietly on the carers lap in a position that he/she feels most comfortable.
- **Any** child with evidence of significant upper airways obstruction resulting in **severe stridor and respiratory distress** in the absence of a history of anaphylaxis, must be managed as follows:
 - Call the paediatric and anaesthetic registrars urgently

- Closely observe but do not examine or interfere with the child
 - as upsetting the child may lead to complete airway obstruction. Try to apply some facial oxygen by wafting it in front of the child (DO NOT force oxygen mask on to face)
- Treat the specific cause

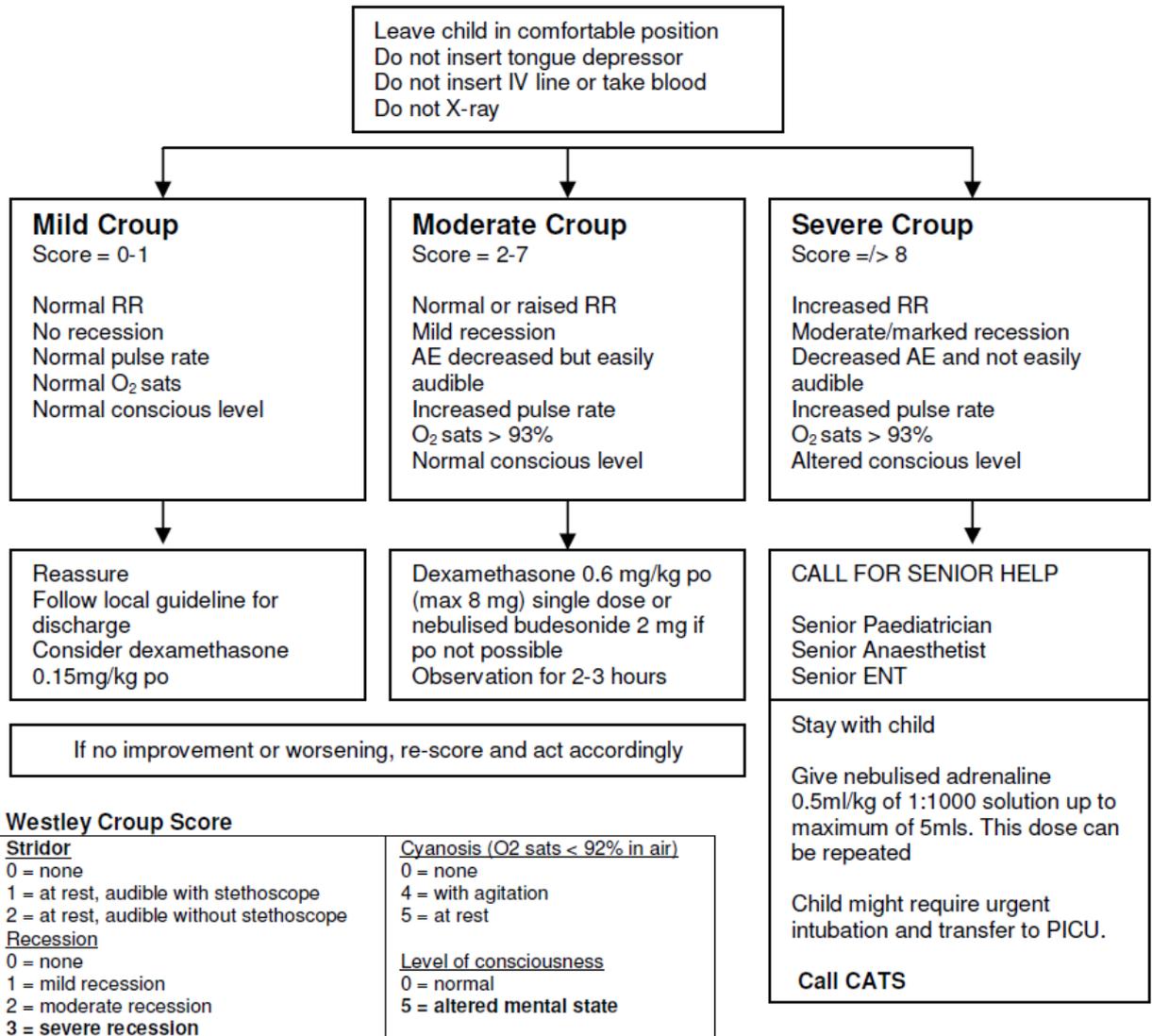
Indications for intubation²:

- Suspected epiglottitis
- Inhalational injury
- Fall in conscious level
- Increasing respiratory failure – rising pCO₂, exhaustion, hypoxia (SpO₂ < 92% despite high-flow oxygen via mask >5L/min)

➤ **Specific management (in addition to above measures)**

Croup:

Acute laryngo-tracheo-bronchitis or Croup is a common childhood illness which can present with the features described above. The most common causative organism is Parainfluenza virus but other viruses such as RSV and metapneumovirus can also be responsible. Incidence of croup varies between seasons – it is most common in Autumn.



*Croup score 0-1: Mild croup
 Croup score 2-7: Moderate croup
 Croup score >=8: Severe croup*

Mild croup:

1. Keep child and parents calm. Be as non-invasive as possible
2. Dexamethasone 600 micrograms/kg as a single dose (maximum single dose 10mg) OR 150micrograms/kg bd, by the least invasive route possible (oral, very rarely intramuscular (im)/iv-suggest discuss with the paediatric consultant). Can use intravenous preparation orally. If the lower dose regimen of dexamethasone has been used then it may be repeated after 12 hours if necessary.

Nebulised budesonide single dose (2mg in 2mls) is an alternative for children who are vomiting or in severe respiratory distress.

If tolerating fluids and only above management required can be sent home after specific follow up arranged (can be over the phone). Advise caregiver of when to seek medical attention if child deteriorates/fails to improve.

Moderate/severe croup:

1. Keep child and parents calm. Be as non-invasive as possible
2. Dexamethasone 600 micrograms/kg as a single dose (maximum single dose 10mg), by the least invasive route (oral, very rarely im/iv-suggest discuss with the paediatric consultant). Can use intravenous preparation orally.

Nebulised budesonide single dose (2mg in 2mls) is an alternative for children who are vomiting or in severe respiratory distress.

3. Oxygen to maintain oxygen saturation $\geq 92\%$ if in moderate/severe respiratory distress.
4. If at least moderate stridor at rest and moderate recessions - nebulised adrenaline 0.5ml/kg of 1:1000 solution up to a maximum of 5mls. This can be repeated every 15-20 minutes if necessary.
5. Iv fluids if needed (only if iv access can be obtained without leading to clinical deterioration).
6. Consider using heliox

Ongoing management:

- Monitoring - including pulse oximetry, respiratory status.
- Good response following:
 - Dexamethasone – observe for at least 2-3 hours.
 - Dexamethasone and adrenaline nebuliser – in almost all cases require admission. In rare cases can be discharged home after several hours of observation, which must be discussed with a consultant.

After period of observation as above, can be discharged home if:

- No stridor at rest
- Normal pulse oximetry
- Good air exchange
- Normal colour
- Normal level of consciousness
- Tolerating oral fluids

Admit to hospital: If worsens or fails to improve with above treatment.

Before discharge:

- Ensure caregiver understands indications to return and able to do so
- Advise follow-up with GP within 24 hours

If deteriorating:

- Obtain senior advice (Paediatrics + Anaesthetics +/- ENT). An ENT surgeon may be present in clinic during the working week
- Continuous oxygen saturation monitoring
- Can repeat nebulised adrenaline every 15-20 minutes if needed, (this treatment “buys time” during which experienced personnel can be assembled). If requiring frequent doses (>2 in 2-3 hours) need to be on cardiac monitoring and admitted to HDU or ITU.
- Intubation if deteriorating, increasing respiratory failure - rising pCO₂, exhaustion, hypoxia (SpO₂ < 92% despite high-flow oxygen via mask >5L/min), fall in consciousness or apnoeic.

Moderate or severe symptoms that persist for more than a few days should prompt investigations for other causes of airway obstruction.

Follow up:

- If admitted, received nebulised adrenaline or prolonged A&E/CAU stay – need GP follow up within 24 hours.
- Follow up to continue until symptoms begin to resolve.
- If does not improve as expected over 7 days may have an underlying airway abnormality or be developing a complication, therefore need further evaluation. This will almost always include an ENT review.

Complications:

- Hypoxaemia
- Pulmonary oedema
- Pneumothorax
- Pneumomediastinum
- Secondary bacterial infection

Recurrent (spasmodic) croup

- Defined as >3 episodes of croup-like illness
- Not always associated with coryzal symptoms
- Increased incidence of associated asthma and gastro-oesophageal reflux.

Foreign Body:

	<p>Please see Whittington Health Guideline: 'Foreign body inhalation/ingestion in children'</p>
---	--

Anaphylaxis:

	<p>Please see Whittington Health Guideline: 'Anaphylaxis in children'</p>
---	--

Inhalational injury:

Call anaesthetist and intubate electively– airway must be secured as soon as possible, as delay can lead to progressive airway obstruction due to oedema and lead to a situation where it is not possible to intubate.

Bacterial Tracheitis:

- **Call anaesthetist** - Often requires endoscopy or intubation, then endotracheal swab. Be aware that after intubation the ET tube may become blocked with secretions.

- Iv fluids as indicated clinically (only if iv access can be obtained without leading to clinical deterioration).

- Antibiotics – 3rd generation cephalosporin (eg. Ceftriaxone 100mg/kg/day - max 2g daily). If patient has a severe penicillin or cephalosporin allergy give iv Chloramphenicol OR Meropenem.

Epiglottitis:

- **Call for senior help early – anaesthetic, paediatric and ENT SpR/consultant** – most require intubation, when intubated swab epiglottis

- Blood cultures

- IV ceftriaxone 100mg/kg/day - max 2g daily. (If MRSA is not an aetiological concern). If MRSA is an aetiological concern, discuss with microbiology SpR/Consultant. If patient has a severe penicillin or cephalosporin allergy give iv Chloramphenicol OR Meropenem.

- Constant supervision by someone skilled in intubation

Retropharyngeal/peritonsillar abscess:

- Surgical review – may need drainage

- Refer to paediatrics

- Antibiotics:

- Peritonsillar abscess - Co-Amoxiclav (up to 3 months old – 30mg/kg BD, > 3 months old – 30mg/Kg TDS (max. 1.2g TDS)). If penicillin allergic (rash only) for ceftriaxone 100mg/kg once daily (max 2g daily). If more severe allergic reaction discuss with microbiology

- Retropharyngeal abscess – treatment depends on likely source of infection, discuss with microbiology.

Diphtheria:

- If upper airway obstruction – ABC and management as described in general management of upper airway obstruction

- When safe to do so – throat and nose swabs, inform lab of suspected diagnosis and transport to lab promptly (also swab cutaneous lesions).

- Diphtheria anti-toxin for severe cases

- Antibiotics – Discuss with microbiology SpR/Consultant
- Contact prophylaxis
- Follow-up cultures should be performed at 24 to 48 hours and two weeks following infection to document clearance.

➤ **Contacts (inside and outside the Trust including out-of-hours contacts)**

Paediatric Registrar on-call: bleep 3111

Anaesthetic Registrar on-call: bleep 3005

ENT:

- Phone clinic 4B during working hours as an ENT doctor may be able to come if there is an ENT clinic taking place. If not contact as below.
- Outside working hours phone UCH switchboard and ask to speak to the ENT SHO on call or phone them directly on 07415624966. They can contact the ENT registrar or consultant as necessary.
- If above fails call UCH switchboard and ask to be put through to the mobile number of any of the following; the UCH ENT registrar, the ENT registrar who covers RFH/Whittington and the UCH ENT consultant on call.

➤ **References (evidence upon which the guideline is based)**

1. Up to date. <http://www.uptodate.com/home>. Accessed March 2015.
2. Children's acute transport service. Clinical guideline: Upper airway obstruction. http://site.cats.nhs.uk/wp-content/uploads/2013/12/cats_uao_2013.pdf. June 2013.
3. NICE Clinical Knowledge Summary: Croup. <http://cks.nice.org.uk/croup#!scenario>. September 2012.

➤ **Compliance with this guideline (how and when the guideline will be monitored e.g. audit and which committee the results will be reported to) Please use the tool provided at the end of this template**

If there are patients with upper airway obstruction who are mismanaged then we will review the situation and arrange for an audit. We will arrange for an audit any way to be done by one of the junior doctors.

To be completed and attached to any procedural document when submitted to the appropriate committee for consideration and approval

		Yes/No	Comments
1.	Does the procedural document affect one group less or more favourably than another on the basis of:		
	• Race	No	
	• Ethnic origins (including gypsies and travellers)	No	
	• Nationality	No	
	• Gender	No	
	• Culture	No	
	• Religion or belief	No	
	• Sexual orientation including lesbian, gay and bisexual people	No	
	• Age	No	
	• Disability - learning disabilities, physical disability, sensory impairment and mental health problems	No	
2.	Is there any evidence that some groups are affected differently?	No	
3.	If you have identified potential discrimination, are any exceptions valid, legal and/or justifiable?	No	
4.	Is the impact of the procedural document likely to be negative?	No	
5.	If so can the impact be avoided?	N/A	
6.	What alternatives are there to achieving the procedural document without the impact?	N/A	
7.	Can we reduce the impact by taking different action?	N/A	

If you have identified a potential discriminatory impact of this procedural document, please refer it to the Director of Human Resources, together with any suggestions as to the action required to avoid/reduce this impact.

For advice in respect of answering the above questions, please contact the Director of Human Resources.

Checklist for the Review and Approval of Procedural Document

To be completed and attached to any procedural document when submitted to the relevant committee for consideration and approval.

	Title of document being reviewed:	Yes/No	Comments
1.	Title		
	Is the title clear and unambiguous?	Yes	
	Is it clear whether the document is a guideline, policy, protocol or standard?	Yes	
2.	Rationale		
	Are reasons for development of the document stated?	Yes	
3.	Development Process		
	Is it clear that the relevant people/groups have been involved in the development of the document?	Yes	
	Are people involved in the development?	Yes	
	Is there evidence of consultation with stakeholders and users?	Yes	
4.	Content		
	Is the objective of the document clear?	Yes	
	Is the target population clear and unambiguous?	Yes	
	Are the intended outcomes described?	Yes	
5.	Evidence Base		
	Are key references cited in full?	Yes	
	Are supporting documents referenced?	Yes	
6.	Approval		
	Does the document identify which committee/group will approve it?	Yes	
7.	Dissemination and Implementation		
	Is there an outline/plan to identify how this will be done?	Yes	
8.	Document Control		
	Does the document identify where it will be held?	Yes	
9.	Process to Monitor Compliance and Effectiveness		

	Title of document being reviewed:	Yes/No	Comments
	Are there measurable standards or KPIs to support the monitoring of compliance with and effectiveness of the document?	Yes	
	Is there a plan to review or audit compliance with the document?	Yes	
10.	Review Date		
	Is the review date identified?	Yes	
	Is the frequency of review identified? If so is it acceptable?	Yes	
11.	Overall Responsibility for the Document		
	Is it clear who will be responsible for co-ordinating the dissemination, implementation and review of the document?	Yes	

Executive Sponsor Approval			
If you approve the document, please sign and date it and forward to the author. Procedural documents will not be forwarded for ratification without Executive Sponsor Approval			
Name		Date	
Signature			
Relevant Committee Approval			
The Director of Nursing and Patient Experience's signature below confirms that this procedural document was ratified by the appropriate Governance Committee.			
Name		Date	
Signature			
Responsible Committee Approval – only applies to reviewed procedural documents with minor changes			
The Committee Chair's signature below confirms that this procedural document was ratified by the responsible Committee			
Name		Date	
Name of Committee		Name & role of Committee Chair	
Signature			

Tool to Develop Monitoring Arrangements for Policies and guidelines

What key element(s) need(s) monitoring as per local approved policy or guidance?	Who will lead on this aspect of monitoring? Name the lead and what is the role of the multidisciplinary team or others if any.	What tool will be used to monitor/check/observe/Assess/inspect/ authenticate that everything is working according to this key element from the approved policy?	How often is the need to monitor each element? How often is the need complete a report ? How often is the need to share the report?	What committee will the completed report go to?
Element to be monitored	Lead	Tool	Frequency	Reporting arrangements

