GUIDELINE FOR THE MANAGEMENT OF CROUP IN CHILDREN

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<th>Croup</th>
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| Applicable to: | All children admitted to hospital with symptoms of croup |

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Area for Circulation: Children’s Hospital for Wales

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Group Consulted: Practitioners within the Children’s Hospital for Wales

Current Literature

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Disclaimer

These have been ratified at the Child Health Guideline Meeting, however clinical guidelines are guidelines only. The interpretation and application of clinical guidelines will remain the responsibility of the individual clinician. If in doubt contact a senior colleague or expert. Caution is advised when using guidelines after the review date.

Guideline for the management of Croup in children
Croup

Croup is a common cause of upper airway obstruction in young children. It is caused by various viral agents, and it characterised by varying degrees of inspiratory stridor, barking cough and hoarseness as a result of laryngeal and / or tracheal obstruction. In the majority of cases, the disease is mild and self-limiting. Acute airway inflammation is especially dangerous for infants and children because the structure of the upper airway is fundamentally different from that of an adult.

Clinical course of croup

The incubation period for croup is two to six days. Viral croup is typically preceded by twelve to forty-eight hours of low-grade fever and coryza, As the illness progresses, hoarseness and the characteristic “croupy” or barking cough will develop. Other symptoms include dyspnoea, hoarseness, stridor and wheezing. Symptoms are worse at night, peak between 24 and 48 hours and generally resolve within one week. Agitation and crying tend to aggravate symptoms and children often prefer to sit or be held upright. The clinical diagnosis of croup is made when the symptoms match the clinical course already outlined. The diagnosis of viral croup is mainly a clinical one based on the findings from the history and physical examination. Diagnostic investigations are usually not necessary.

Aetiology

Parainfluenza virus accounts for more than two thirds of cases of viral croup, with type 1 and 2 responsible for the majority of cases. Other etiological agents include influenza virus, respiratory syncytial virus, metapneumovirus, adenovirus, rhinovirus, enterovirus and rarely measles virus and herpes simplex virus. When croup is caused by an influenza virus, the clinical picture is usually more severe than that caused by a parainfluenza virus.

Epidemiology

Croup is most common between the ages of six months and three years but can occur in children as young as three months and as old as fifteen years of age; the peak incidence occurs during the second year of life. The male to female ratio is approximately three to two. The condition is more prevalent in the autumn and winter months.

Pathogenesis

Viral infection of the upper airway results in inflammation and oedema of the larynx, trachea and bronchi and production of mucus that further obstructs the airway. The subglottic trachea is the narrowest part of the child’s upper airway, the narrowing of which results in an inspiratory stridor. Because the subglottic trachea is outside the pleural cavity, the negative

Guideline for the management of Croup in children
pressure generated on inspiration tends to narrow the airway further. As the disease progresses, the tracheal lumen becomes further obstructed by fibrous exudates. Swelling of the vocal cord, on the other hand, results in hoarseness of voice. The barking cough is provoked by the inflammation in the larynx and trachea.

**Differential Diagnosis**

**Spasmodic croup** is not usually preceded by an upper respiratory tract infection and there is no associated fever. It often occurs with a sudden onset at night and usually resolves in the morning. There may be a family history of atopy.

**Epiglottitis** is characterised by an abrupt onset of high fever, toxicity, stridor, dysphasia and drooling. The child may prefer to sit leaning forward with the mouth open and the tongue somewhat protruding. There is no barking cough. Epiglottitis is rarely seen nowadays because of the widespread use of the haemophilus influenza type b vaccine.

**Bacterial tracheitis** is usually a super infection following viral croup but can manifest as a primary infection. The condition can be distinguished from viral croup by the presence of a high fever, toxicity and increasing respiratory distress unresponsive to the conventional treatment for viral croup.

**Foreign body aspiration** may cause acute stridor. A history of recent aspiration or choking on a foreign body can be obtained in ninety per cent of cases.

**Angio-oedema** may result in acute swelling of the upper airway with resultant stridor and shortness of breath. Swelling of the face, tongue and pharynx may also be present.

The following clinical features should alert the clinician to look for conditions other than croup in a child with croup like symptoms:

- Expiratory wheeze or loss of voice
- Toxic appearance or high grade fever
- Drooling, difficulty swallowing
- Prolonged or recurrent stridor
- Poor response to treatment
- Age less than 3 months

**General Management**

1. Keep calm. Try not to upset the child. Avoid monitoring equipment if this upsets the child.
2. Ensure the parents/carer stay with the child if possible.
3. Do not examine the child’s throat.
4. Nurse the child upright if practical or in the parents/carers arms if this settles them.
5. All children presenting to hospital with croup should be treated with corticosteroids.
7. CXR is not usually indicated unless there are lower respiratory signs or suspicion of a foreign body.
Assessment of the degree of airway obstruction

<table>
<thead>
<tr>
<th></th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
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<tbody>
<tr>
<td>Behaviour</td>
<td>Normal</td>
<td>Some/intermittent irritability</td>
<td>Increasing irritability/lethargy</td>
</tr>
<tr>
<td>Stridor *</td>
<td>Barking cough</td>
<td>Some stridor at rest</td>
<td>Stridor at rest</td>
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<tr>
<td>Respiratory rate</td>
<td>Normal</td>
<td>Increased rate</td>
<td>Marked increase/decrease respiratory rate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tracheal tug</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nasal flaring</td>
<td></td>
</tr>
<tr>
<td>Assessory muscle</td>
<td>Normal</td>
<td>Some assessory muscles used</td>
<td>Marked chest wall retractions</td>
</tr>
<tr>
<td>use</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxygen</td>
<td>No oxygen</td>
<td>No oxygen</td>
<td>Hypoxia is a late sign of airway obstruction</td>
</tr>
</tbody>
</table>

*loudness of stridor is not a good indicator of the severity of croup

References

Geelhoed, G (2009) 27 Years of croup: An update highlighting the effectiveness of 0.15mg/kg of dexamethasone. Emergency Medicine Australasia. 21, 3.9-314.


Additional documents to be read with this guideline

- Guideline flow chart (next page)
- Parent information leaflet (formatted to be printed both sides of A4 paper and folded to A5)
Guideline for the management of Croup in children

Care Pathway for Mild - Moderate Croup

CROUP

Life-threatening airway obstruction?
- Cyanosis
- Decreased level of consciousness
- Stridor at rest

Alternative Diagnosis
- Inhaled foreign body
- Congenital abnormality
- Epiglottitis/tracheitis
- Subglottic haemangioma

YES

Follow severe croup guideline

NO

MILD CROUP
- Barking cough
- Nil or intermittent stridor
- No recessions
- No cyanosis

MODERATE CROUP
- Dexamethasone 0.15mg/kg
- Consider pulmicort nebuliser 2mg especially if dexamethasone not tolerated.
- Admit for observation until symptoms settle
- If worsening symptoms follow severe pathway.

• Give parents explanation and fact sheet
• Single oral dexamethasone dose 0.15mg/kg
• Assess parents’ competence and transport availability
• 24 hour open access to the hospital

DISCHARGE
Care Pathway for Severe Croup

Life threatening features
Severe obstruction
Decreased conscious level,
Cyanosis

YES
Oxygen
Nebulised adrenaline
400mcg/kg (max 5mg) of 1:1000 solution
Urgent review by Paediatric registrar
Bleep 5151

 Improvement
Oral dexamethasone
0.15mg/kg

Deterioration
Repeat nebulised Adrenaline
400mcg/kg (max 5mg) of 1:1000 solution
Paediatric consultant on call to review patient

Deterioration
Further Adrenaline nebuliser 400mcg/kg (max 5mg)
Urgent review by PICU and PAEDIATRIC
ANAESTHETIST Bleep 6000
V/IM dexamethasone 0.6mg/kg once airway secured

NO
Follow mild – moderate croup guideline

Improvement
Oral dexamethasone
0.15mg/kg
Consider pulmicort 2mg nebuliser
Admit to PHDU

Admit to ward for observation

More than 1 dose of nebulised adrenaline requires patient to be monitored on PHDU

Guideline for the management of Croup in children
When to seek help
If your child has any of the following signs seek medical attention:

- Breathing difficulty
- Your child becomes pale or blue which usually happens after a coughing spell
- Your child is restless, irritable or delirious
- You notice the breastbone being sucked right back
- Your child has a high temperature and is dribbling
- You become concerned for any other reason

Croup is usually a mild illness but can get worse quickly. It is often worse at night. If there is severe breathing difficulty or your child is becoming distressed, do not hesitate to seek medical attention.

You have been given 24 hour open access to the hospital.
Contact us on the numbers the nurses have given you.

Croup in Children
Parent Information Leaflet

What is Croup?
Croup is an illness in young children, usually less than three years of age, which causes narrowing of the upper airways. The major features are a barking cough and noisy breathing. This often lasts for a few days. Before the cough develops, your child may have a sore throat, temperature, red eyes, runny nose or be off his/her food. With the cough, you might notice that the breastbone (sternum) is pulled back as your child breathes in. Noisy breathing may also be heard. This
sound is known as stridor. Your child’s voice is usually hoarse and breathing becomes more difficult as he/she becomes upset.

**Why does it happen?**
When you breathe, air passes through the voice box (larynx) and windpipe (trachea) into the lungs. In croup, the voice box and windpipe become inflamed and narrowed because of swelling of the lining and increased mucus. This blockage causes the windpipe to partly collapse – like when you suck hard on a blocked straw. Young children who have soft windpipes have the most difficulty. The size and strength of the windpipe will increase as children grow up which is why croup is less common in older children.

**What causes the blockage?**
Most episodes of croup are caused by viral infections. Some children have attacks of croup – the attacks usually occur at night and do not last long, often settling within an hour or so. This is called “spasmodic croup” and can come on suddenly. This form of croup is more common in children who either have or may develop asthma.

**Treatment**
If children have very mild symptoms of croup they do not require any treatment. However, if you think they are breathing harder than usual take the child to your Doctors or nearest A&E department. Try to keep the child as calm as possible as if the child is upset this will make the symptoms worse.

Croup is caused by viruses, so antibiotics will not help. Recent studies have shown that steam does not help but you may want to give your child calpol for comfort as their throat may be sore with coughing. Steroid medication, either by mouth or nebulised (mist from a mask) has been found to be effective and is now routinely used in hospital if children are suffering from croup.

**How long does it last?**
Generally, croup is worse in the first few days of the illness, however, it may last for up to one week. The cough usually lasts longer but tends to become looser as the child’s symptoms improve. There will be no permanent damage after an episode of croup.

*Guideline for the management of Croup in children*