Coughs and colds in children

By Lynn Greig

Learning objectives
After reading this article you should be able to:
• Discuss the aetiology and transmission of the common cold.
• Identify symptoms suggestive of a common cold.
• Provide advice on the use of cough and cold medicines in children.
• Discuss the use of complementary medicines for the common cold in children.
• Recommend strategies which may help to relieve the symptoms of a cold.

Competency standards (2010) addressed:
6.1.1, 6.1.2, 6.2.1, 6.2.2, 6.2.3, 6.3.3

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CAP110505a

Case study
Mrs Tait, a regular customer, comes into the pharmacy requesting a cough and cold medicine for her four-year-old son, Jimmy. She states that he has had a ‘cold’ for the past two or three days and describes his symptoms as a runny nose, sneezing, a non-productive cough and a mild fever. She says this is the third cold he has had in the past four months.

Why is my son getting so many colds?
Children get more coughs and colds than adults. Adults average two to four colds a year, whereas children of pre-school age have an average of 12 colds a year. Several colds may occur one after the other. The frequency decreases with increasing age as the immune system develops. Children aged five to nine have an average of four to seven colds per year. Living with smokers increases a child’s risk of developing coughs and colds.1-3

What is causing my son’s cold?
The common cold can be caused by more than 200 different viruses. Up to 60% of colds are caused by one of more than 100 types of rhinoviruses. Other causative agents include coronaviruses, respiratory syncytial viruses, para-influenza viruses, adenoviruses, enteroviruses, metapneumoviruses, and some Coxsackie and echoviruses. Influenza is an acute upper respiratory infection (URI) caused by influenza viruses of the family Orthomyxoviridae.3-6
**Table 1. Influenza or the common cold?**

<table>
<thead>
<tr>
<th>Spectrum of illness</th>
<th>Influenza</th>
<th>Common cold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed of onset</td>
<td>Sudden</td>
<td>Gradual</td>
</tr>
<tr>
<td>Fever</td>
<td>Usually high</td>
<td>Usually mild</td>
</tr>
<tr>
<td>Main symptoms</td>
<td>Chills, fever, muscle aches, malaise, cough, headache, photophobia, sore throat</td>
<td>Sneezing, rhinorrhoea, nasal congestion, cough</td>
</tr>
<tr>
<td>Severity</td>
<td>Severe – confined to bed</td>
<td>Usually mild</td>
</tr>
<tr>
<td>Course of illness</td>
<td>May be prolonged (up to several weeks)</td>
<td>Usually brief (but cough may last for 2–3 weeks)</td>
</tr>
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</table>

**How did he catch the cold?**

Transmission of the common cold is mainly through direct hand contact with secretions from an infected person, object or surface, followed by self-inoculation through touching a mucous membrane (e.g. nose, eye). Rhinovirus can survive for as long as four hours on the hands. Inhalation of infected droplets is a less common method of transmission. Influenza, on the other hand, is transmitted mainly by inhalation of infected respiratory droplets. 3,5

At least 75% of viral upper respiratory infections (URI) are transmitted by children. This occurs mainly in places where children are in close proximity to each other, e.g. day care centres or classrooms. The children can then transmit the infecting virus to the other members of their family when they return home.3

**How do I know it’s only a cold and not influenza?**

A common cold usually begins with a ‘scratchy’ or sore throat, followed by sneezing and rhinorrhea (runny nose). The nasal secretions are initially clear but later become purulent, and nasal congestion may alternate with rhinorrhea. Children may also develop fever. A non-productive cough develops on day three or four and may later become loose and productive. Most symptoms due to uncomplicated colds resolve within four to 10 days, although some symptoms (particularly cough) may occasionally last for two to four weeks.3,6

Influenza usually begins with sudden onset of fever, chills, severe malaise, myalgia (especially in the back and legs), dry cough, nasal congestion and a dry, sore throat. Other symptoms may include headache and photophobia. As the infection progresses, the cough may become more severe, persistent, raspy and productive. Children may also have nausea and vomiting. Nasal symptoms generally resolve after two or three days. However, fever sometimes lasts up to five days; and cough, malaise, weakness, sweating and fatigue may persist for several weeks.3,5,7 (See also Table 1.)

**What treatment options are available?**

There are more than 70 cough and cold medicines available in Australia for children, each containing up to four drugs (including cough suppressants, antihistamines, expectorants, decongestants and analgesics/antipyretics). Dosage of almost all cough and cold medicines for children is based on a formula proposed by the FDA in 1976, i.e. children 6–12 years: ½ the adult dose; children 2–5 years: ¼ the adult dose; and ‘ask your doctor’ for children aged <2 years. If strictly followed, this system will produce a greater than 3-fold variation in mg/kg dosage between a small two-year-old girl and a big boy who is almost six, and up to a 4-fold variation when the same dose is given to a small 6-year-old girl and a big boy who is almost 12.4 See Table 2 for a list of some adverse effects of cough and cold medicines.

**Safety and efficacy of cough and cold medicines in children**

**Opioid cough suppressants (antitussives)**

No antitussive has been shown to be effective for the treatment of acute cough in children. It is possible that the lack of efficacy may be due to under-dosing and further research is required to determine appropriate doses in children and whether they are effective and safe at higher doses.4

**Dextromethorphan – A 2008 Cochrane review** found no evidence for efficacy of dextromethorphan in acute cough in children. A dosing analysis performed on the sub-group of children who received the active drug in a well-designed clinical trial of dextromethorphan showed a clear trend that the middle and higher doses provided better symptom relief. The study also showed a higher rate of central nervous system (CNS) excitation with higher doses.

**Table 2. Adverse effects of cough and cold medicines**

<table>
<thead>
<tr>
<th>Class of medicine</th>
<th>Common adverse effects</th>
</tr>
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<tbody>
<tr>
<td>Cough suppressants</td>
<td>Drowsiness, constipation, nausea, vomiting, dizziness, restlessness</td>
</tr>
<tr>
<td>Expectorants</td>
<td>Nausea, vomiting, diarrhoea, dizziness, headache, allergic reactions (e.g. rash, urticaria, angioedema)</td>
</tr>
<tr>
<td>Sedating antihistamines</td>
<td>Drowsiness, dizziness, disturbed coordination, blurred vision, tinnitus, confusion, restlessness, anxiety, nausea, vomiting, diarrhoea, constipation, urinary retention or frequency, dry mouth, wheezing, palpitations, hypotension</td>
</tr>
<tr>
<td>Decongestants</td>
<td>Oral: CNS stimulation (e.g. restlessness, insomnia, anxiety, tremor, dizziness, hallucinations), arrhythmias, hypertension, skin rash</td>
</tr>
<tr>
<td></td>
<td>Intranasal: transient burning or stinging, rebound congestion (with prolonged use), sneezing, nausea, headache, insomnia</td>
</tr>
</tbody>
</table>

Note: Adverse effects may be more common in young children and elderly people.
The authors concluded that further studies are needed on higher doses of dextromethorphan in mg/kg, to assess true efficacy and safety.\textsuperscript{4,10}

Dextromethorphan appears to be relatively safe in overdose. The main adverse reaction is CNS excitation. Seizures may occur at doses of 20–30 mg/kg. A report of 304 cases of accidental ingestion of dextromethorphan by young children (mean ingested dose 2.64 mg/kg) reported no deaths and only minor effects.\textsuperscript{11} Combinations of dextromethorphan and antihistamines or decongestants are likely to be more toxic. Combinations of dextromethorphan and pseudoephedrine have caused a number of adverse effects, including irritability, ataxia and psychosis, in young children.\textsuperscript{4,12}

**Codeine** – There are a few studies on codeine syrup in children. One small study comparing placebo, dextromethorphan and codeine in children concluded that codeine syrup was no more effective than placebo.\textsuperscript{13} Codeine also causes more adverse effects than other opioid-based antitussives. The American Association of Poison Control Centers (AAPCC) has reported that codeine is the most commonly ingested opioid, in toxic doses, by young children. Doses greater than 5 mg/kg can produce respiratory and CNS depression.\textsuperscript{14} The fact that the metabolism of codeine in children and infants is not well understood adds to the uncertainty and unpredictability of adverse effects.\textsuperscript{4}

**Pholcodine** – No studies have been done on the effectiveness or safety of pholcodine in children. Two studies in adults have shown that exposure to pholcodine cough syrup causes a large increase in levels of IgE antibodies towards pholcodine, morphine and suxamethonium. The authors of these studies have recommended restriction of pholcodine because of the risk of future allergic reactions to neuromuscular blocking agents.\textsuperscript{5,15,16}

**Dihydrocodeine** – There is no efficacy or safety data for dihydrocodeine in children.\textsuperscript{4}

**Expectorants**

There is very limited evidence for the efficacy of any of the expectorants in acute cough and no studies have been done in children. Adult studies on bromhexine found no benefit; and four adult studies on guaifenesin were inconclusive. There have been reports of ammonium chloride toxicity (including metabolic acid-base abnormalities) following abuse of cough mixtures. Bromhexine and guaifenesin appear to have minimal toxicity.\textsuperscript{4}

**Antihistamines**

One study in children on chlorpheniramine monotherapy for the common cold demonstrated no benefit.\textsuperscript{17} A study on dextromethorphan and diphenhydramine for acute cough in children found no benefit of diphenhydramine over placebo.\textsuperscript{18} There are no studies of dextchlorpheniramine, pheniramine, promethazine, doxylamine or tripolidine in children. There are numerous reports of fatal diphenhydramine toxicity in children. Diphenhydramine is the most cardiotoxic of the antihistamines, as it may cause sodium channel effects and QT prolongation. There have been no reports of toxicity or death in children from monotherapy with the other sedating antihistamines.\textsuperscript{4}

**Decongestants**

A Cochrane review on oral and nasal decongestants for the common cold found no trials in children and concluded the there is insufficient data to recommend their use in children younger than 12 years of age.\textsuperscript{19} (This review was withdrawn in 2009 because the reviewers were unable to update it.) One study of intranasal xylometazoline in children showed that it increases nasal flow, but the study had no control group.\textsuperscript{20} Pseudoephedrine has been implicated as the possible cause or a contributory factor in a number of infant fatalities. There is limited data on the safety of phenylephrine. A case series of xylometazoline poisonings in children concluded that the majority of cases caused minimal effects. Severe effects occurred with ingestions >0.4 mg/kg.\textsuperscript{21} There is also a report of four cases of oxymetazoline toxicity in children. Clinical signs included somnolence, sweating, pallor, hypothermia, bradycardia, restlessness, tachycardia, vomiting, irregular breathing and apnoea.\textsuperscript{22}

**Antihistamine-decongestant combinations**

There have been two studies of antihistamine-decongestant combinations in children. One study compared a combination of phenylephrine, phenylpropanolamine and brompheniramine to placebo and no treatment, and found no benefit and no difference in side-effects between active and placebo groups.\textsuperscript{23} The other study compared brompheniramine and phenylpropanolamine to placebo and found no difference except that children in the active group were more likely to fall asleep within two hours of treatment.\textsuperscript{24} These studies both included phenylpropanolamine which has been restricted or withdrawn from the market worldwide and is not available in Australia. There have been numerous reports of adverse effects and toxicity, including dystonic reactions and death, with antihistamine-decongestant combinations in children.\textsuperscript{3}

**Recommendations**

The Therapeutic Goods Administration (TGA) has concluded that there is currently a lack of evidence of efficacy for cough and cold medicines in children under 12 years of age, and that the risks of using these medicines in children under six years of age outweigh the likely benefits. They have determined that cough and cold medicines should not be used in children under two years of age. They have also recommended that these medicines should not be used in children under six years of age, and should only be given to children aged 6–12 years on the advice of a doctor or pharmacist.\textsuperscript{25}

At its June 2010 meeting, the National Drugs and Poisons Schedule Committee (NDPSC) recommended rescheduling 19 substances used in OTC cough and cold medicines to:\textsuperscript{26}

- Schedule 4 (prescription only) for use in children under 2 years of age;
- Schedule 3 (pharmacist only) for use in children aged from 2 to 6 years;
- Schedule 2 (pharmacy only) for use in children aged 6–12 years of age and adults.

The Advisory Committee on Medicines Scheduling (ACMS), which has replaced the NDPSC, will consider this proposal at their June 2011 ACMS meeting.
Are there any 'natural' medicines that are effective?

Complementary medicines which have been used for the common cold include echinacea, vitamin C and zinc. Each of these has been the subject of a Cochrane review.

A Cochrane review on echinacea found no clear evidence of benefit in children for either the prevention or the treatment of the common cold. There were few adverse effects, although rashes were reported in one trial in children.27

A Cochrane review of vitamin C found no trials investigating vitamin C for the treatment of the common cold in children. However, results of trials on regular prophylactic supplementation found a reduction in symptom duration of 13% in children (and 8% in adults). The authors estimated that long-term prophylaxis might produce an average reduction in four symptom days (from 28 to 24 days) per year per child. In addition, one of the prophylactic studies found that, in children, 2 g/day produced about twice the benefit of 1 g/day. None of the trials found evidence that vitamin C might be harmful in the doses that were tested. The review authors recommend further trials be carried out to test the benefits of therapeutic supplementation in children, using doses of at least 2 g per day.28

A recently updated Cochrane review found that zinc, when administered within 24 hours of onset of symptoms, reduced the duration and severity of the common cold. When children were given zinc supplements for at least five months, they had reduced cold incidence, school absenteeism and prescriptions for antibiotics. However, zinc lozenges (but not syrup or tablets) produced adverse effects, including bad taste and nausea. The reviewers concluded that, in view of the differences in study populations, dosages, formulations and duration of treatment, more research is needed before a definitive recommendation can be made.29

Should I take my child to the doctor?

If children develop any of the following symptoms they should be taken to the doctor: a temperature >38.5°C; chills; a stiff neck; severe headache; photophobia; chest pain; a skin rash; a persistent cough; fast or noisy breathing or difficulty breathing; vomiting; pale or mottled skin; unusual drowsiness; or earache. Additional triggers for referral in a baby include bulging of the fontanelle; a strange, high-pitched cry; irritability or lethargy; and refusal to feed.30,31

Case study

Mrs Tait can be reassured that a child of Jimmy's age can get as many as 12 colds a year, but that the colds should decrease in frequency as he gets older. Jimmy's symptoms are consistent with a common cold but, if he develops any of the 'alarm' symptoms listed above, or if his symptoms show no improvement within the next two or three days, she should take him to the doctor. Because the common cold is caused by a virus, antibiotics will be of no benefit. In addition, because there is insufficient evidence that cough and cold medicines or herbal medicines are effective in children, but may cause adverse effects, it is preferable not to use them. Mrs Tait can give Jimmy some paracetamol syrup (at an appropriate dose for his age and weight) to relieve fever and sore throat. Saline nose drops may also be used to help clear his nasal congestion.

Key learning points

The common cold can be caused by more than 200 different viruses. Colds are most commonly acquired through direct hand contact, with inhalation of infected droplets being a less common mode of transmission. Cold symptoms include a sore throat, sneezing, rhinorrhea, nasal congestion and a non-productive cough which may later become loose and productive. Most symptoms resolve within four to 10 days, although cough may persist for up to three weeks. There is currently little evidence that cough and cold medicines are effective in children. The TGA has determined that these medicines should not be used in children under two years of age. They have also recommended that these medicines should not be used in children under six years of age, and should only be given to children aged 6–12 years on the advice of a doctor or pharmacist. Paracetamol and saline nasal drops or spray may help to relieve some cold symptoms in a child.

References


Questions

1. Which of the following statements regarding the common cold is CORRECT?
   a) The most frequent causative agents of the common cold are respiratory syncytial viruses.
   b) The common cold is usually acquired through inhalation of infected droplets.
   c) Passive smoking increases a child’s risk of catching colds.
   d) The viruses which most frequently cause the common cold can survive for up to eight hours on a person’s hands.

2. Regarding the symptoms of the common cold, which of the following statements is CORRECT?
   a) Most symptoms of the common cold generally resolve within four to 10 days.
   b) Adults, but not children, often develop a high fever with a common cold.
   c) A common cold usually begins with sudden onset of fever, chills and muscle aches.
   d) One of the early symptoms of a common cold is a productive cough which later becomes dry and non-productive.

3. Which of the following statements regarding the use of cough and cold medicines in children is CORRECT?
   b) There is some evidence that long-term vitamin C supplementation has not been found to be effective in reducing the duration of cold symptoms in children.
   c) Saline nasal drops may relieve nasal congestion, but there is a risk of rebound congestion with prolonged use.
   d) Encourage the child to have frequent small drinks, to avoid dehydration.

4. Which of the following statements regarding the use of herbal medicines for colds in children is CORRECT?
   a) Echinacea has been found to be effective for preventing, but not treating, colds in children.
   b) There is some evidence that long-term zinc supplementation may reduce the incidence of colds in children.
   c) Long-term vitamin C supplementation has not been found to be effective in reducing the duration of cold symptoms in children.
   d) Lozenges are the preferred dosage form for zinc supplementation in children.

5. Which of the following is an APPROPRIATE recommendation for relieving the symptoms of colds in children?
   a) Allow the child to inhale steam from a bowl of hot water.
   b) Aspirin can be given in appropriate doses for a sore throat or fever.
   c) Saline nasal drops may relieve nasal congestion, but there is a risk of rebound congestion with prolonged use.
   d) Encourage the child to have frequent small drinks, to avoid dehydration.