Cold season: managing without antibiotics

For the majority of people with upper respiratory tract infections symptomatic treatment will offer better outcomes than antibiotics, which will not be indicated in most cases. Providing patients or caregivers with clear information about when antibiotics are appropriate, supportive treatments and the expected duration of symptoms can help reduce unnecessary antibiotic use this winter.

KEY PRACTICE POINTS:

- Supportive treatment options such as paracetamol, decongestants, adequate fluid intake and rest will provide the best symptomatic relief for most people with common winter illnesses
- Provide patients with information about the likely duration of their symptoms, e.g. cough can last for up to four weeks, and ensure they understand when to seek further assessment if their condition deteriorates
- For patients who expect to receive an antibiotic when one is not necessary, discuss why this is not appropriate, including adverse effects of antibiotics and the self-limiting nature of most winter illnesses
- Antibiotics remain appropriate in some clinical circumstances, e.g. people with suspected pneumonia or pertussis, some children with otitis media, people with a Group A Streptococcus (GAS) throat infection who are at high risk of rheumatic fever or in severe illnesses such as bacterial meningitis

Antibiotics are usually unnecessary for common "winter illnesses"

Over the winter months, thousands of people across New Zealand will present to primary care with sore ears and throats, nasal and sinus congestion, coughs and colds*. Many of these symptoms are caused by viral infections and antibiotic treatment is not appropriate. In some cases there may be bacterial infection present but the infection will be self-limiting and the adverse effects of antibiotics may outweigh potential benefits. Antibiotic dispensing in New Zealand is 40% higher in winter than summer months, and it is likely that much of this is unnecessary.[1]

Asking patients "What would you like me to do for you today?" is a useful conversation opener because it allows the patient to tell you about their symptoms but can also lead into a discussion about their expectations for treatment. People generally want relief from their symptoms but they also want to be informed about the likely cause of their

* For the purposes of this article, this group of symptoms will be referred to as "winter illnesses", but it is acknowledged that these illnesses occur at any time of the year.

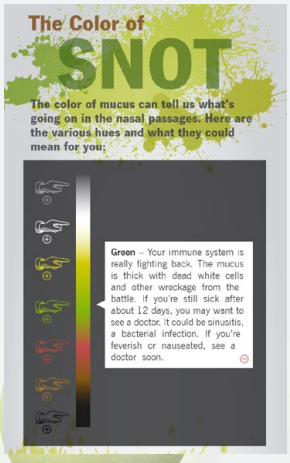
What is snot?

Nasal membranes, like the rest of the upper respiratory tract, are lined with goblet and ciliated cells that produce mucus. The mucus lining of the nasal cavity traps inhaled particles, viruses and bacteria. The ciliated cells move mucus down the nasal cavity to the nasopharynx where it is swallowed and enters the gastrointestinal tract (mucociliary clearance). People usually produce around 1–2 L of mucus over 24 hours, but this volume can double or more if the sinuses or other parts of the respiratory tract are inflamed, e.g. due to environmental allergens, irritants or infection.[2]

During infection, the amount of mucus produced is increased to improve trapping and clearance of viruses, and in addition, mucociliary clearance is disrupted. The excessive mucus from the sinuses that is not swallowed exits the nose ("snot"). Nasal discharge during an upper respiratory tract infection is a mix of secretions from nasal and lacrimal glands, goblet cells, plasma cells, inflammatory cells, mucosal epithelial cells and plasma exudates from capillaries.[3] The yellow-green colour of nasal discharge during an upper respiratory tract infection is due to the increased presence of neutrophils, which contain a green pigmented enzyme.[3]

The same process occurs with production of sputum from the lower respiratory tract. Mucus is produced in the surface epithelium and connective tissue, where it keeps the tissue moist to assist the passage of air. Cilia move the mucus up towards the pharynx where it is swallowed. During infection, the excess mucus that is produced triggers an increased coughing reflex, and the mucus is expectorated as sputum. Coughing further irritates the respiratory tract and leads to even greater production of mucus. Sputum contains similar secretions and cells as nasal discharge, including neutrophils.

Therefore, the colour of snot or sputum reflects the severity of an inflammatory response rather than indicating whether an infection is viral or bacterial.[3] Discoloured snot is a non-specific clinical sign and should not be considered a justification for prescribing or requesting antibiotics.



Click here for an infographic about snot: **https://health.clevelandclinic.org/what-the-color-of-your-snot-really-means/**
(with kind permission from the Cleveland Clinic)

illness and reassured that they have been assessed for other possible diagnoses. Some people will think that they require a prescription for antibiotics as "they got one last time" or they may think that only antibiotics will provide relief from their symptoms. Many caregivers, for example, believe that antibiotics are automatically indicated if their child has otitis media, or people think that having discoloured nasal discharge or sputum means they require an antibiotic (see: "What is snot?").

Discussion with patients and caregivers may cover:

- What an infection is and how the immune system responds to infection
- The difference between a viral and bacterial infection and the role of antibiotics
- Adverse effects of antibiotics, including gastrointestinal effects, rash, disruption of normal flora (e.g. leading to *Clostridium difficile* or *Candida albicans* infection), antibiotic resistance
- Self-limiting nature of winter illnesses, including expected duration of symptoms
- Symptomatic treatments, e.g. analgesia, decongestants (see: "Symptomatic treatment for winter illnesses")
- When to seek reassessment, e.g. persistent or worsening symptoms

In many cases, the most important treatment for winter illnesses is effective communication; the patient should leave the consultation understanding what illness they are likely to have, how long their symptoms should last, what they should do to manage their symptoms and when to seek further assessment.

For further information about strategies for discussing antibiotics with patients, see: "Antibiotics: the future is short", available from: **www.bpac.org.nz/2018/antibiotics.aspx**

Ensure people who need antibiotics get antibiotics

While in most cases antibiotics are not required for winter illnesses, there will always be people who do need antibiotics. The challenge is in identifying these situations. Patient history and clinical features on examination, such as hydration status, temperature and other vital signs and the presence or absence of chest signs, remain essential to help achieve a correct diagnosis, assess severity and hence guide appropriate management.

A difficulty is that people can present with symptoms and signs that may suggest a viral upper respiratory tract infection but that also could be consistent with the early stages of a serious infection, such as pneumonia. It is important to put a "safety net" in place so that if the person were to deteriorate, further medical assistance would be sought.

Clinical predictors of moderate to severe systemic infection in adults include: respiratory rate > 21–24 breaths per minute, systolic blood pressure < 90–100 mmHg, heart rate > 90–130 beats per minute, temperature < 36°C (or fever >39°C).[4]

Refer to the NICE traffic light system for identifying risk of serious illness in children: **https://pathways.nice.org.uk/pathways/fever-in-under-5s**

Coming soon: "Sepsis: recognition, diagnosis and early management", a bpac^{nz} contextualisation of the NICE clinical guideline, see: **www.bpac.org.nz/guidelines**

Indications for antibiotics

In general, antibiotic treatment for winter illnesses should be considered in people who have a known or likely bacterial infection and are at increased risk of developing systemic complications; this includes those who are systemically very unwell, young infants, frail elderly people or those who have co-morbidities such as immune suppression, diabetes or significant heart, lung, renal, liver or neuromuscular disease. People with a history of hospitalisations and children of premature birth are also often at increased risk.

Antibiotic treatment is indicated for people with the following infections:[6]

- **Pertussis** –antibiotics should be given to reduce transmission if within three weeks of the onset of cough (or unknown onset, or pregnant women) and for high risk contacts, e.g. infants aged <1 year, pregnant women. Antibiotics will not alter the course of illness unless given in the first few days of infection.
- **Pneumonia** – antibiotics are appropriate for all people with suspected pneumonia

Antibiotic treatment may be appropriate in some cases for people with the following infections:[6]

- **Acute otitis media** – antibiotics are usually unnecessary as infection will resolve without treatment. Antibiotics may be considered for children with systemic or severe symptoms, perforation and/or otorrhoea, no improvement after 48 hours, infants aged under six months or infants aged under two years with bilateral infection. Antibiotics should also be considered for children with persistent or recurrent infection (≥ 3 infections in six months or ≥ 4 infections in 12 months).
- **Sore throat** – antibiotic treatment unnecessary unless Group A Streptococcus (GAS) positive and high risk of rheumatic fever (personal, family or household history of rheumatic fever or two or more of the following: Māori or Pacific ethnicity, age 3–35 years, living in crowded/ low socioeconomic circumstances), or severe or systemic symptoms, e.g. quinsy, severe inflammation, scarlet fever.
- **Sinusitis** – antibiotic treatment is usually unnecessary as most infections are viral and self-limiting. Intranasal corticosteroids and nasal saline irrigation may be of benefit.[7] Antibiotics may be considered for people with symptoms for > 10 days or severe symptoms, e.g. fever >39°C, facial pain lasting ≥ 3 days, worsening symptoms.

For further information and recommended antibiotic dosing regimens, see: **www.bpac.org.nz/antibiotics/guide.aspx**

Bronchiolitis is a lower respiratory tract infection, usually caused by a respiratory virus, therefore it is not treated with antibiotics. It typically affects children aged under 12 months. Consider the possibility of this infection in young children with respiratory symptoms. For further information, see: **www.bpac.org.nz/2017/bronchiolitis.aspx**

Can CRP levels be used to diagnose bacterial infection?

In bacterial infection, C-reactive protein (CRP) increases within four to six hours of infection and peaks at around 36 hours. The level of elevation usually corresponds to the severity of the infection.[5] Bacterial respiratory tract infections generally cause a greater elevation in CRP than viral infections; CRP < 10 mg/L most likely indicates a viral infection or a very mild bacterial infection. However, there are some exceptions to this, e.g. a CRP of 10–80 mg/L is not unusual in people with influenza. A person with a severe bacterial infection is likely to have a CRP > 100 mg/L.[5] Therefore CRP can be used to assess severity of infection and the higher the value, the more likely it is a bacterial infection, but there is no particular "cut-off" that predicts bacterial infection with complete accuracy. In practice, if a CRP level was requested for a patient, it is likely that other parameters would also be investigated that may add information to the overall clinical picture, such as full blood count including neutrophil, lymphocyte and platelet levels.

Point-of-care testing devices that combine CRP with other biomarkers of infection such as procalcitonin (PCT) and myxovirus A (MxA) are currently being evaluated for accuracy of predicting viral or bacterial infection.[5]

For further information on point-of-care CRP testing, see: **www.bpac.org.nz/BPJ/2015/June/crp.aspx**

Evidence shows antibiotics have limited effectiveness for otitis media, sore throat and sinusitis

Acute otitis media: Antibiotics make little difference to the outcomes of children with acute otitis media in terms of effects on pain, short-term hearing or eardrum perforations.[11] A meta-analysis of randomised controlled trials in children with acute otitis media found an NNT of 24 for a small reduction in pain in children taking antibiotics compared to placebo at two to three days.[12] For further discussion on the efficacy of antibiotics for acute otitis media, see**: www.nice.org.uk/guidance/ng91/chapter/Summary-of-the-evidence#no-antibiotic**

Sore throats: Patients with an acute sore throat will improve after approximately one week, regardless of whether the infection is viral or bacterial.[8] Antibiotic treatment results in only small improvements in symptoms, on average reducing the duration of a sore throat by 16 hours over seven days.[8] A meta-analysis of clinical trials where adults or children presenting to primary care with symptoms of sore throat were given an antibiotic or placebo found that after one week, 87% of people with a sore throat taking an antibiotic were free of symptoms compared to 82% of people taking a placebo, resulting in a number needed to treat (NNT) of 21. Rheumatic fever prevention should, however, always be considered in people at high risk: personal, family or household history of rheumatic fever or two or more of the following: Māori or Pacific ethnicity, age 3–35 years, living in crowded/low socioeconomic circumstances.

Sinusitis: In clinical trials the rate of clinical improvement from seven to 15 days after an infection ranges from 77–88% with antibiotics compared to 73–85% with placebo treatments.[9] Meta-analyses of clinical trials have found that 18 patients would need to be treated for one patient to have a meaningful reduction in symptom duration (NNT of 18).[10]

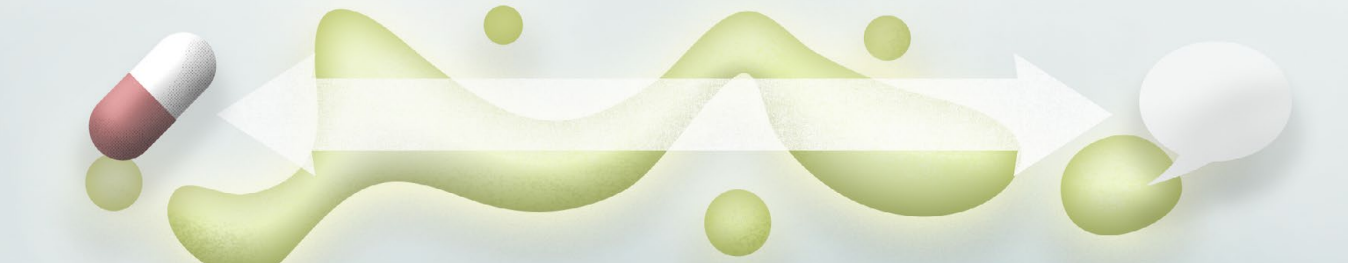
N.B. The NNTs quoted in relation to the studies above mostly refer to the benefit of antibiotics in terms of symptom improvement. Reduction in the progression of symptoms and development of complications is also an important benefit of antibiotics, when indicated.

What makes decisions about antibiotics so hard?

Winter illnesses can present a challenge for clinicians in primary care, as the decision of whether or not to prescribe antibiotics is complicated by factors such as:

- Difficulty distinguishing between a bacterial or viral infection; symptoms and signs may not provide reliable differentiation, point of care testing is not widely available and does not always provide an clear answer
- Concern about missing a diagnosis where antibiotics are required, e.g. bacterial pneumonia
- Determining which patients are most likely to benefit from antibiotics or who may worsen in the absence of antibiotics as not all patients with bacterial infections require antibiotic treatment
- Whether the patient is able to promptly return for a follow-up assessment if their symptoms worsen if an antibiotic was not indicated and prescribed at the initial presentation

It is important that people are not inadvertently discouraged from seeking medical attention when they are unwell by providing negative messages about antibiotic use. Anxiety is one of the key emotions that drives antibiotic use. This includes both the patient's anxiety about feeling unwell and not knowing what is wrong with them and also the clinician's anxiety about not missing something crucial and wanting to do their best for the patient. Anxiety can act to decrease understanding of the issues and lead to poor decision making for both patients and clinicians. Clear communication, provision of symptomatic management advice and a contingency plan are essential components of a non-antibiotic approach to managing winter illnesses. Many people think that if they do not get prescribed an antibiotic, it means they are not really unwell. It is important to validate the patient's decision to seek treatment and explain that viral infections can make people feel just as unwell as bacterial infections.



Symptomatic treatment for winter illnesses

Patients and caregivers can be given advice about general supportive measures that may provide symptom relief for winter illnesses. This includes pharmacological treatments, over-the-counter or home treatments and advice about maintaining adequate fluid intake, rest and time off work or school, and a warm, dry, smoke-free environment.

Patient information on colds, sore throats, bronchitis and otitis media is available from: **www.healthnavigator.org.nz**

Firstly, provide information on the likely duration of symptoms

A discussion about expected duration of symptoms can help reassure the patient that the course of their illness is normal. The natural course of symptoms associated with common winter illnesses is usually up to:[8, 13]

- Three to five days for fever
- One week for headache or sore throat
- A week to ten days for nasal obstruction
- Two weeks for nasal discharge
- Two to four weeks for cough

Analgesia

Paracetamol can be recommended to relieve pain and discomfort associated with respiratory tract infections, e.g. headache, sinus pain. Mild fever does not need to be treated unless it is causing discomfort; fever is a beneficial immune response. NSAIDs may also be appropriate for some patients, depending on co-morbidities and hydration status.

Oral decongestants

Nasal congestion can occur as a result of increased mucus in the nasal cavity and from the dilation of large veins leading to swelling of nasal tissue.[3] This swelling is influenced by sympathetic activity and signals such as adrenaline or noradrenaline.[3] Oral decongestants such as pseudoephedrine*, a sympathomimetic, therefore may be modestly beneficial in reducing nasal congestion. Phenylephrine may be a less effective oral decongestant, but it is readily available as a component of several over-the-counter "cold and flu tablets". The use of oral decongestants can cause increased blood pressure and tachycardia, and contribute to insomnia.[14]

* Restricted medicine; products containing pseudoephedrine can be sold in a pharmacy by a registered pharmacist without a prescription.

Nasal decongestants, sprays and rinses

Intranasal ipratropium is fully subsidised and approved for the treatment of rhinitis or rhinorrhoea associated with the common cold. Evidence from clinical trials shows that intranasal ipratropium is effective at reducing rhinorrhoea but does not improve nasal congestion. Adverse effects include nasal dryness, nose bleeds and bloody mucus.[15]

Xylometazoline (Otrivin), a topical nasal decongestant, is available over-the-counter. It is a sympathomimetic and reduces oedema of the nasal mucosa through vasoconstriction. Patients should be advised that it is only suitable for short term use (no more than 5–7 days) due to the potential for rebound congestion.

Nasal saline rinses are available over-the-counter, or a solution can be prepared at home and administered with a suitable device (see below for further information). Saline irrigation thins and enhances the flow of mucus, and is not usually associated with adverse effects. However, the evidence for benefit is weak as a number of studies have found that patients on average experience either small or no improvements.[16] Saline irrigation may provide some benefit for patients with sinusitis in conjunction with other treatments.[7] Saline rinse or spray is one of the few treatments that can be safely used in infants.

For further information on performing a saline sinus rinse and making a home-made solution, see: **www.healthnavigator.org.nz/medicines/s/saline-nasal-sprays-drops-rinses/**

Intranasal corticosteroids, e.g. fluticasone nasal spray, may improve symptoms in patients with sinusitis but is unlikely to influence symptom duration, and could cause systemic adverse effects.[7, 14] There is no evidence that intranasal corticosteroids improve symptoms of rhinitis associated with the common cold.

Throat lozenges and sprays

Patients may find over-the-counter lozenges or throat sprays containing an analgesic, NSAID or antiseptic useful; however, the effect of these medicines may be small and short-lived.[8] A range of lozenges and throat sprays with different active ingredients have been assessed in clinical trials, but there is not enough evidence to determine which of these are better.[8] Lozenges containing flurbiprofen, a NSAID, produce some reduction in pain, however, are likely to have higher rates of adverse effects than other lozenges, including taste disturbances, numbness, dry mouth or nausea in 30–50% of people.[8]

Cough syrups

There is a lack of evidence for or against the effectiveness of liquid cough medicines for acute cough.[17] This is largely due to a lack of quality trials that can demonstrate clinically relevant outcomes. Cough and cold medicines are contraindicated

in children aged under six years, and some products, e.g. containing codeine, are contraindicated in children aged under 12 years.[18]

A list of cough and cold preparations available in New Zealand with age restrictions is available from: **www.medsafe.govt.nz/hot/alerts/coughandcold/affectedmedicinesoct2009.asp**

Oral corticosteroids

Oral corticosteroids have been investigated in some clinical trials as a treatment for patients with sore throat, however, they are not recommended in guidelines due to uncertainties about long-term safety.[8] Pooled results from multiple trials suggest oral corticosteroids can reduce the duration of pain by approximately 14 hours, with a NNT of 4; however, the studies to date have been conducted in patients with severe symptoms, e.g. presenting to emergency departments, and there is little evidence available regarding possible long-term adverse effects.[8]

Further reading: "Short-term steroids may be associated with sepsis, thrombosis and fractures", **www.goodfellowunit.org/gems/short-term-steroids-may-be-associated-sepsis-thrombosis-and-fractures**

Complementary and alternative treatments

A large number of remedies are available for winter illnesses at pharmacies or supermarkets with variable degrees of evidence for benefit (Table 2 lists some common products). It is likely that some of the perceived benefit of using these products is due to a placebo effect; for example, patients are more likely to report improvements in their symptoms with echinacea treatment if they believe that echinacea works.[19]

Treatments for children: As there are limited options for managing winter illness symptoms in children, caregivers may wish to trial alternative treatments. There is some evidence that a teaspoon of honey before bedtime may improve the frequency and severity of cough in children;[20] honey is not recommended in children aged under one year due to a risk of botulism. An aromatic vapour rub applied before bedtime may improve sleep for children and therefore their parents.[21] N.B. Vapour rubs contain volatile oils that may irritate the skin; if this is an issue, products are available specifically for children that contain lower amounts of irritants, or alternatively, apply the product to a tissue or handkerchief and place it in a pyjama pocket, inside a pillow case or under the sheets (keep out of reach of young children).

Health professionals should give unbiased, evidence-based advice (where available) to patients about the treatments that they are using or wish to trial. Discuss the benefits, or lack of benefits, and the potential harms. Remind the patient that most winter illnesses are brief and will resolve without treatment.

Coming soon: Winter illnesses clinical audit, see: **www.bpac.org.nz/audits**

Preventing infection

Steps patients and caregivers can take to reduce the risk of contracting or spreading upper respiratory tract and ear infections over winter include:

- Hand washing to reduce the risk of catching or spreading infections; washing with soap and water is sufficient, and is more effective at prevention the spread of influenza than alcohol hand washes[22]
- Covering mouth or nose when coughing or sneezing
- Influenza and pneumococcal vaccination*
- Stopping smoking,: smoking is a risk factor for respiratory tract infections[13]
- A healthy home environment: warm, dry, smoke-free home, warm clothing and good nutrition

* Influenza vaccination is subsidised for pregnant women, people aged 65 years and older and people with eligible conditions. Pneumococcal vaccination with the PCV10 vaccine is funded for children at ages 6 weeks, 3, 5 and 15 months; vaccination with PCV13 or 23PPV is funded for children and adults with eligible conditions. See the Immunisation Handbook 2017 for further details: **www.health.govt.nz/publication/immunisation-handbook-2017**

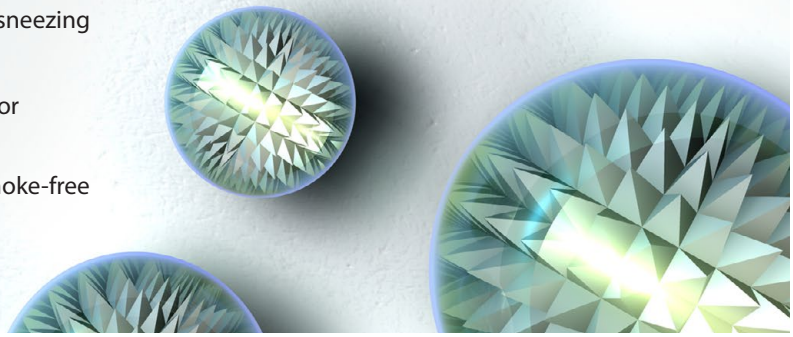


Table 1: Over-the-counter and self-care treatments for upper respiratory tract and ear infections; evidence of benefit. N.B. the placebo effect may be a factor in perceived benefit.

Condition or symptom	Treatment	Source of evidence	Evidence for benefit?
Sinus symptoms/ rhinitis	Nasal decongestants, e.g. pseudoephedrine	National Institutes for Health and Care Excellence (NICE) guideline[14], systematic review of 15 trials[23]	Multiple doses may have small beneficial effects, but can cause rebound congestion and should not be used for more than seven days.
	Nasal saline irrigation	Systematic review of five trials[16]	May produce improvements for some patients, however, the evidence for benefit is weak as a number of studies have found that patients on average experience either small or no improvements.
	Steam inhalation, humidified air	NICE guideline[14], Systematic review of 6 trials[24]	No evidence of benefit or harm due to a lack of studies
	Aromatic inhalants, e.g. vapour rub	Single randomised controlled trial[21]	Compared to either no treatment or a petroleum rub, vapour rub applied at night resulted in improved sleep for children and therefore parents.
	Antihistamines	Systematic review of 18 trials[25], NICE guideline[14]	Clinical guidelines do not recommend. No meaningful improvements for individual symptoms such as nasal obstruction, rhinorrhoea or sneezing, but overall combined severity of symptoms improved in the first few days of use.
Cold symptoms	Echinacea	Systematic review of 24 trials[26]	Has not been shown to reduce the incidence or duration of common colds; evidence suggests any benefit is unlikely to be clinically meaningful.
	Zinc lozenges (dissolvable)	Meta-analysis of seven trials[27]	Data from three trials suggest zinc acetate or gluconate lozenges may reduce cold duration by 2–3 days.[27] Studies used 80–90 mg/day of zinc, which is above recommended upper intake limit of 40 mg for adults.[28]
	Vitamin C	Systematic review of 12 trials[29]	No reduction in duration of symptoms when taken at the time of a cold. Daily use beginning before a cold does not reduce incidence of colds for the general population but may have an 8–18% reduction in duration of symptoms if cold occurs. Regular supplementation may reduce the incidence of colds in people engaging in high intensity physical exercise, e.g. marathon runners.
	Probiotics, e.g. products containing *Lactobacillus* or *Bifidobacterium* strains	Systematic reviews of 12 trials[30, 31]	May reduce the incidence of colds and duration of symptoms by approximately one to two days. However, this effect has not been consistent across different trials.
Cough	Over-the-counter cough syrups and suppressants	Systematic review of 29 trials[17]	There is no clear evidence in favour of cough syrups or suppressants. Cough syrups and suppressants are contraindicated in children aged under six years or under 12 years if containing codeine or other opioids[18]
	Honey	Systematic review of six trials in children[20]	Honey may improve the frequency and severity of cough; studies mainly assessed the effect of one dose at night before bedtime in children. Do not use in children aged under one year.
Ear pain	Anaesthetic ear drops, e.g. Auralgan	NICE guideline[11], systematic review of five trials[32]	Anaesthetic ear drops have an NNT of five for a 50% reduction in pain 10 minutes later. The effect is short-term, however, caregivers may find this useful if despite the use of paracetamol children have significant discomfort and additional relief is required, e.g. for falling asleep.

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