The Dutch College of General Practitioners (NHG) Practice Guideline
This NHG Practice Guideline is a translation of the Dutch guideline. It is specifically written for Dutch general practitioners in the Dutch environment. The advice which is given may therefore not be in accordance with the views of general practitioners in other countries.

NHG Practice Guideline 'Acute otitis media' (July 1999)
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The guideline and its scientific basis have been updated with respect to the previous version (Huisarts Wet 1990;33:242-5). The recommendations have been revised. The most important changes are:

- The usual symptomatic treatment policy (pain relief) for acute otitis media in children aged 2 years and over is now also recommended for children aged 6 months to 2 years.
- When otorhoea has ceased spontaneously or with antibiotic treatment, a follow-up is recommended after 2 months (instead of 2 weeks) to determine whether the perforation of the tympanic membrane has closed spontaneously.

INTRODUCTION
The NHG Practice Guideline 'Acute otitis media' provides guidance for the diagnosis and treatment of acute otitis media. The treatment of acute otitis media in adults is not considered because of the lack of relevant research data. Acute otitis media is understood to mean an infection of the middle ear which starts suddenly and lasts for no more than 3 weeks. Acute otitis media is characterized by a red tympanic membrane and can be accompanied by earache, malaise, fever, or otorhoea.¹ Its characteristics of an acute infection distinguish it from otitis media with effusion, which is discussed in the NHG Practice Guideline, 'Otitis media with effusion in children'.

The incidence of acute otitis media in general practice is about 20 per 1,000 patients per year. It occurs predominantly in children, more than half of the cases being diagnosed in children less than 4 years of age. It is rarely observed after puberty.² It is usually a harmless condition and in about 90% of cases the worst symptoms have subsided within 3 days (range: 2-7 days).³ In most patients symptomatic treatment is sufficient. Antibiotics are only prescribed if the clinical course is abnormal (increasing illness, decreased drinking, increasing earache, or no improvement after 3 days), and for children under 6 months of age.⁴ The general practitioner can treat almost all cases of acute otitis media. Referral to an ENT specialist is only indicated if there are persistent complaints or abnormal findings despite adequate therapy.⁵

Background
Pneumococci are the most prevalent infective agents in acute otitis media, being found in 40-50% of cases. In 10-25% of cases the infective agent is either Haemophilus influenzae or Moraxella catarrhalis.² Haemolytic streptococci are found in only a few cases. In 40% of the cultures from the middle ear no infective bacteria are found. It is not clear whether acute otitis media can also be caused by a virus, but viruses do play a role in the pathogenesis via 'viral preparation' of the mucous membranes prior to bacterial infection.⁶ In about three-quarters of the cases an episode of acute otitis media is preceded by an upper respiratory tract infection.⁷ Acute otitis media is often recurrent, the probability of this being greater if the first episode occurred during the first year of life.⁸ Those at risk for an abnormal clinical course include children under 2 years in whom there is a recurrence of acute otitis media within 12 months, and patients with Down's syndrome, cleft palate, or a compromised immune system. In children under 6 months, an increased
risk of complications can be assumed because they are more susceptible to infection. Complications of acute otitis media such as mastoiditis and meningitis are rare.

**DIAGNOSTIC GUIDELINES**

Various complaints may lead to consideration of the diagnosis acute otitis media. There is usually earache. In young children, general symptoms such as an increased temperature, irritability, nocturnal restlessness, or gastrointestinal symptoms (abdominal pain, diarrhoea, vomiting, lack of appetite) often predominate.

**Anamnesis**
The general practitioner enquires about:
- age
- earache, otorrhoea
- duration and clinical course of the complaints
- symptoms of upper respiratory tract infection (coughing, runny nose, sore throat)
- general symptoms: fever, vomiting, diarrhoea, drinking little, drowsiness
- episodes of ear inflammation in the preceding 12 months, ENT surgery in the medical history

Advice about ear complaints is often sought from the general practitioner by telephone. Although physical examination is required for a definitive diagnosis, a probable diagnosis of acute otitis media can often be made on the basis of the anamnesis. A recommendation given by telephone is deemed responsible if the parents agree and if the earache has been present for less than 3 days and there are no serious accompanying symptoms indicating increased risk of an abnormal clinical course.

**Physical examination**
The general practitioner examines both tympanic membranes, comparing them and if necessary removing cerumen or detritus with a cotton swab, a cerumen loop, or a suction device. Syringing of the ear is not advisable, because in acute otitis media it can be very painful and there can be an unrecognized perforation of the tympanic membrane. In infants, assessing the tympanic membrane through the narrow auditory canal can be difficult. The following should be observed during an otoscopy:
- appearance of the tympanic membrane: colour, vessel injection
- position of the tympanic membrane: bulging, retracted, normal, light reflection
- otorrhoea, perforated tympanic membrane

In patients who appear to be ill and in whom the clinical course is abnormal, the general practitioner should be particularly aware of such symptoms of a complication as protrusion of the ear, tender mastoid, stiff neck, or a reduced level of consciousness.

**Evaluation**
The general practitioner makes the diagnosis acute otitis media by means of a positive anamnesis (earache, feeling ill) together with one of the following:
- a red or bulging tympanic membrane, or
- a clear difference in redness between the left and right tympanic membranes, or
- a brief episode of otorrhoea and a perforated tympanic membrane

Vessel injection of the tympanic membrane is not a specific symptom of an acute otitis media, for it can also occur if the patient has a cold or is crying.

**TREATMENT POLICY GUIDELINES**
Information
The general practitioner explains the characteristics of acute otitis media and the generally favourable clinical outcome. In about 90% of cases the worst symptoms have subsided within 3 days and a subsequent follow-up is not necessary. Sometimes acute otitis media results in otorrhoea due to a perforated tympanic membrane.\textsuperscript{11} The otorrhoea usually disappears spontaneously within 2 weeks. If the tympanic membrane is perforated, the patient should abstain from swimming with the head under water, because stimulation of the labyrinth can cause dizziness. Showering is permitted, for it offers little chance of water entering the middle ear.\textsuperscript{12} There is no scientific basis for advising children with frequently recurring acute otitis media not to swim. Loss of hearing during or after acute otitis media can result from accumulation of fluid behind the tympanic membrane, impairing conduction. This is usually resolved spontaneously after several weeks to months.

Medicinal treatment
Symptomatic treatment
Symptomatic treatment is provided in all cases. It consists of adequate pain relief, for which paracetamol is preferred. Pain relief is achieved more quickly by oral administration (in 0.5 to 2 hours) than by rectal administration, although rectal administration provides longer-lasting pain relief.\textsuperscript{13} In general practice oral medication is preferable, yet experience teaches that for children rectal administration is often chosen for practical reasons.

Paracetamol dosage

<table>
<thead>
<tr>
<th>age</th>
<th>oral dose</th>
<th>rectal dose</th>
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<tbody>
<tr>
<td>3-12 months</td>
<td>60 mg 4-6 dd</td>
<td>120 mg 2-3 dd</td>
</tr>
<tr>
<td>1-2 years</td>
<td>120 mg 4-6 dd</td>
<td>240 mg 2-3 dd</td>
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<tr>
<td>2-4 years</td>
<td>120-180 mg 4-6 dd</td>
<td>240 mg 3 dd</td>
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<tr>
<td>4-6 years</td>
<td>180 mg 4-6 dd</td>
<td>240 mg 4 dd</td>
</tr>
<tr>
<td>6-9 years</td>
<td>240 mg 4-6 dd</td>
<td>500 mg 2-3 dd</td>
</tr>
<tr>
<td>9-12 years</td>
<td>360 mg 4-6 dd</td>
<td>500 mg 3 dd</td>
</tr>
<tr>
<td>&gt;12 years</td>
<td>500-1,000 mg (max. 4 dd)</td>
<td>1,000 mg 2-3 dd</td>
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</table>

The effectiveness of decongestive nose drops in the treatment of acute otitis media has not been demonstrated. Nose drops (xylometazoline or physiological saline solution) can be given for a blocked nose.\textsuperscript{14} The effectiveness of lidocaine ear drops for pain relief in acute otitis media has not been investigated, but their use is not recommended because they can hinder the assessment of the tympanic membrane.

The patient or the parents are instructed to contact the general practitioner if there is an abnormal clinical course, in other words:
- increasing illness, decreased drinking, or increasing earache
- no improvement within 3 days

Antibiotics
Antibiotics are not indicated for the majority of children with acute otitis media. However, an antibiotic is recommended for:
- children <6 months, as soon as acute otitis media has been diagnosed
- children >6 months, if the clinical course is abnormal (see above)

For children <2 years in whom otitis media recurs within 12 months\textsuperscript{15} and for patients with Down's syndrome, cleft palate, or a compromised immune system—also depending on the accompanying symptoms—antibiotics are prescribed sooner, due to the increased risk of
an abnormal clinical course.
In all of these cases the preferred antibiotic is amoxicillin, for one week:\textsuperscript{16}
- for children aged 1 year or older (10 kg) 3 dd 125 mg
- for children aged 4 years or older (20 kg) 3 dd 250 mg
- for patients aged 10 years or older 3 dd 375 mg
If amoxicillin is contraindicated, erythromycin or cotrimoxazole should be administered:
- erythromycin for a child aged 1 year or older (10 kg) 4 dd 125 mg, for a child aged 4 years or older (20 kg) 4 dd 250 mg, and for a patient aged 12 years or older 4 dd 500 mg
- cotrimoxazole for a child aged 1 year or older (10 kg) 2 dd 180 mg, for a child aged 4 years or older (20 kg) 2 dd 360 mg, and for a patient aged 12 years or older 2 dd 960 mg\textsuperscript{17}
When an antibiotic is indicated, the patient or the parents are instructed to contact the general practitioner if the symptoms have not been reduced within 24-48 hours after starting the antibiotic.

Follow-ups
Follow-ups are not generally necessary unless there is persistent otorrhoea or the tympanic membrane is perforated. If there is otorrhoea the general practitioner instructs the patient to return if the ear is not dry in 2 weeks. If otoscopic examination reveals perforation of the tympanic membrane and otorrhoea, the general practitioner should prescribe an antibiotic (see above).
If otorrhoea ceases spontaneously or with antibiotic treatment, a follow-up after 2 months is recommended to determine whether the perforated tympanic membrane has closed spontaneously.

Consultation or referral
If mastoiditis or meningitis is suspected, the general practitioner should refer the patient to an ENT specialist or paediatrician, or a neurologist.\textsuperscript{18} Consultation with or referral to an ENT specialist should be considered in the following cases:
- lack of improvement 24-48 hours after starting an antibiotic
- persistence of otorrhoea after a course of antibiotics therapy\textsuperscript{19}
- persistence of perforation of the tympanic membrane 2 months after development of otorrhoea\textsuperscript{20}
- three or more episodes of otitis media in one year\textsuperscript{21}

\textbf{note 1} 
There is disagreement about the definition of acute otitis media.\textsuperscript{1} The definition used in this guideline is in accordance with current Dutch opinion and general practice procedures.\textsuperscript{2} The ICHPPC-II definition requires one of the following five criteria: 1) recently perforated tympanic membrane with discharge of pus, 2) inflamed and bulging tympanic membrane, 3) one tympanic membrane clearly redder than the other, 4) red tympanic membrane together with pain, 5) bullous myringitis.\textsuperscript{3}
3. International Classification of Health Problems in Primary Care. 3rd ed. Oxford:
Oxford University Press, 1983.

note 2
The incidence of acute otitis media in general practice is about 20 per 1,000 patients per year. The Transition Project, the National Study, and the Continuous Morbidity Registration have reported the incidence to be 17, 27, and 24 per 1,000 patients per year, respectively.\textsuperscript{1} \textsuperscript{2} \textsuperscript{3} For children up to 4 years of age the incidence and prevalence are very high; in the Transition Project the prevalence was 174 and in the National Study and the Continuous Morbidity Registration the incidence was 204 and 197 per 1,000 patients per year, respectively. In the age group 5-14 years the incidence and prevalence decrease; in the Transition Project the prevalence was 58, and in the National Study and the Continuous Morbidity Registration the incidence was 27 and 58 per 1,000 patients per year, respectively. Acute otitis media rarely occurs after the 15th year; in the age group 15-24 years the incidence is about 10 per 1,000 patients and at 25 years and over the incidence is only about 2 per 1,000 patients per year.


note 3
A prospective study in general practice by Van Buchem et al. in 4,860 children aged 2-12 years revealed that more than 90\% of the cases of otitis media were resolved within days by symptomatic treatment; the number of complications was extremely low (2 cases of mastoiditis).\textsuperscript{1} In a double-blind placebo-controlled study in general practice, Burke et al. studied of the effect of treatment with amoxicillin 3 dd 125mg in 232 children aged 3-10 years. The treatment was considered to have failed if within 9 days there was no improvement or there was a recurrence or there was perforation of the tympanic membrane. The treatment failed in 14.4\% of cases in the placebo group and in 1.8\% of cases in the antibiotic treatment group.\textsuperscript{2}


note 4
In a meta-analysis by Del Mar et al. of antibiotic treatment for acute otitis media in children aged 7 months to 15 years, the following outcome measures were examined: pain after 24 hours, pain from day 2 to day 7, perforation of the tympanic membrane, vomiting, diarrhoea, rash, hearing impairment after 1 and 3 months, contralateral acute otitis media, and recurrent acute otitis media. There was no effect on pain during the first 24 hours, a moderate reduction in pain from day 2 to day 7, moderate reduction in the occurrence of contralateral acute otitis media, no effect on recurrence, no effect on hearing impairment after 1 month, and limited effect on hearing impairment after 3 months. Vomiting, diarrhoea, and rash were clearly more prevalent with antibiotic treatment. In summary, quickly starting an antibiotic in acute otitis media has limited benefit: 17 children must be treated with an antibiotic to prevent 1 child from still having an earache after 2-7 days.\textsuperscript{1} The results of this
meta-analysis support the conservative antibiotic policy in the Netherlands for acute otitis media, which is based on the studies of Van Buchem.  


note 5  
Paracentesis is now rarely performed because according to current insights there is rarely an indication for it. Some are of the opinion that it can still be useful to relieve pain when there is a bulging tympanic membrane with particularly intense pain, but this is only effective in the initial phase. Paracentesis may also be performed by a specialist to verify the diagnosis of acute otitis media in infants or to obtain culture material.

note 6  
In all of the reported studies, a pneumococcus was found to be the most prevalent infective agent in acute otitis media. Haemophilus influenzae and Moraxella catarrhalis are also highly prevalent infective agents. However, up to about 40% of cultures obtained from the middle ear are negative. Although viruses have been demonstrated in middle ear fluid in acute otitis media, it is not clear whether a virus can be the causative agent. There are, however, indications that inflammation caused by viruses increase the susceptibility of the middle ear to bacterial infection. In a prospective study in 363 children with acute otitis media, Arola found a respiratory virus in the nasopharynx in 42% of the cases at the time that the diagnosis was made. Rhinovirus and respiratory syncytial virus were found most often, but adenovirus, parainfluenza virus, and corona virus were also found. It was suggested that a virus could be the underlying cause of persistent complaints following antibiotic therapy. Heikkinen et al. investigated the prevalence of various respiratory viruses in middle ear fluid in children with acute otitis media who were aged 2 months to 7 years. In 41% of the cases a specific virus could be identified in the nasopharynx and in 81% of these the virus was respiratory syncytial virus, parainfluenza virus, influenza virus, enterovirus, or adenovirus. Respiratory syncytial virus was also found in the middle ear in 74% of the children infected with this virus. In infections with parainfluenza virus, influenza virus, enterovirus, or adenovirus, the virus was also found in the middle ear in 52%, 42%, 11%, and 4% of cases, respectively. The viruses therefore differ greatly in their ability to penetrate the middle ear. The study of Van Buchem, et al. revealed that in patients in whom acute otitis media had a serious clinical outcome, a pneumococcus or a haemolytic streptococcus group A was the most frequent infective agent.


note 7
Pukander found that there was a prior upper respiratory tract infection in about 80% of the cases of acute otitis media in children younger than 16 years (n = 2,254). Bacterial or viral infection is thought to cause dysfunction of the Eustachian tube or disruption of cochlear hair activity and because the Eustachian tube is wider, shorter, and more horizontal in young persons, bacteria can more easily penetrate the middle ear from the nasopharynx. Young age, male gender, winter season, attending a day-care centre, and adenoid hypertrophy are considered to be risk factors for acute otitis media. Smoking within the family is a risk factor for the occurrence of upper respiratory tract infections. There is no evidence of a relation between atopy and acute otitis media, but in the Finnish consensus allergic rhinitis is considered to be a risk factor.


note 8
In a Dutch cohort study in 406 children, 20% of them had acute otitis media on one occasion during the first 6 years of life and 40% did on various occasions. In a Swedish cohort study, 54% of the children had acute otitis media on at least one occasion before reaching 4 years of age and 48% had more than one episode. In an American cohort study 62% of the children had one or more episodes of acute otitis media before the age of 1 year and 17% had three or more episodes. By 3 years of age, 83% had one or more episodes and 26% had three or more episodes. However, the diagnosis acute otitis media was made on a different basis than in the Dutch study, being based on the presence of effusion together with one or more signs of an acute infection such as earache, otorrhea, the child’s touching its ear, fever, irritability, lethargy, anorexia, vomiting, or diaphorrea. A subgroup could be differentiated, being characterized by a high rate of recurrence of acute otitis media, so-called 'otitis-prone' children. This condition is related to the occurrence of the first episode of acute otitis media during the first year of life.

Note 9
There is a consensus that antibiotics should be administered as soon as the diagnosis of acute otitis media has been established in seriously ill patients and children below 6 months of age. In the latter group it is assumed that there is an elevated susceptibility to infection and an increased risk of complications. In addition, other micro-organisms could be the cause of acute otitis media in younger children. The administration of antibiotics is also advocated for patients with cleft palate, Down's syndrome, or immune system disorders. Otitis media with effusion is found in almost all children in patient groups with Down's syndrome or cleft palate, in whom it is assumed that the chance of complications is greater. However, there have been no clinical trials which support the active treatment policy in children below 6 months of age and in patients with cleft palate or Down's syndrome.


Note 10
Roelink found that prior to World War II, mastoidectomy was carried out in 10-40% of the episodes of acute otitis media; in some of these cases the intervention was carried out because of mastoiditis. Since World War II the percentage has decreased greatly because of the use of antibiotics and because the clinical picture has become less serious. In the Nijmegen Continuous Morbidity Registration, there were 13 cases of mastoiditis during the registration period 1971-1988, i.e., less than 1 case per 5 years per general practice, which is equivalent to about 0.2% of the episodes of acute otitis media.


Note 11
In a Finnish population of 14,200 children under 16 years of age, Pukander found 2,254 cases of acute otitis media. In 4.6% of these cases there was spontaneous perforation of the tympanic membrane.


Note 12
Swimming with the head under water can lead to stimulation of the labyrinth if the tympanic membrane is perforated. It is assumed that water can enter the middle ear through the perforation. The advice for children with a perforated tympanic membrane therefore differs from that for children with grommets, in which the chance of water entering the middle ear through the narrow lumen of a grommet is considered to be small.¹


note 13 ➡️
In the Pharmaceutical Compass paracetamol is said to be the medicine of choice for pain.¹ In its discussion of medicinal treatment for pain in children, the Medicine Bulletin advises that analgesic therapy should be adapted to the seriousness and intensity of the pain and that where possible, the oral administration of paracetamol is preferred. In addition, the importance of a pain-control scheme is underlined and use of analgesics on an 'as needed' basis is discouraged.²


note 14 ➡️
The assumed mode of action of decongestive nose drops is reduction of the swelling of the mucous membrane in the nasopharynx, resulting in improved drainage of the middle ear. Eight controlled studies were cited in the Finnish consensus, none demonstrating that treatment with a decongestant was effective in either preventing or resolving acute otitis media.³ The temporarily improved opening of the nasal passages is valued positively by some patients. Since short-term use has no negative effects, the guideline deals with the use of decongestants in facultative terms.


note 15 ➡️
Appelman and Claessen carried out a placebo-controlled study in general practice in 121 children aged 6 months to 12 years with recurrent acute otitis media, in which treatment with amoxicillin-clavulanic acid was compared with a placebo.¹ Recurrent acute otitis media was understood to be acute otitis media that recurred in 4-12 weeks. The outcome measure was an irregular clinical course, defined as the presence of earache or a temperature higher than 38°C after 3 days. No significant difference was found between the two groups. However, for a subgroup of children below 2 years of age (n=27), the probability of an irregular clinical course seemed to be higher; among these children, 26.7% of those treated with an antibiotic had an irregular clinical course compared with 58% of those treated with a placebo. Although this difference was not significant, because of the small number of children, the work group is of the opinion that in children of this age, the administration of an antibiotic should be considered at an early stage.

1. Appelman CLM, Claessen JQPJ, Touw-Otten FWMM, Hordijk GJ, De Melker RA. Efficacy of amoxicillin-clavulanate in recurrent acute otitis media. A

note 16
There have been few comparative studies of antibiotics based on the indications formulated in this guideline. The Finnish consensus preferred penicillin-V.\(^1\) Differences in the effectiveness of small-spectrum penicillin and amoxicillin or amoxicillin-clavulanic acid for acute otitis media could not be demonstrated in a meta-analysis.\(^2\) However, based on the pathophysiological consideration of better penetration in the middle ear, in most western countries preference is given to a broad-spectrum antibiotic (ampicillin, amoxicillin, or amoxicillin-clavulanic acid, with cotrimoxazole as an alternative).\(^3\) In the Netherlands amoxicillin has had a good record over many years.


note 17
Erythromycin and cotrimoxazole can be administered if there is a contraindication for amoxicillin.\(^1\) Erythromycin must be administered 2-4 times per day due to, among other reasons, the variable biological availability after oral administration and the short elimination half-life. The newer macrolides do not need to be given as often, but there is less experience with them.\(^2\)


note 18
The clinical picture of an acute mastoiditis includes one or more of the following symptoms: malaise, protrusion of the ear, lowering of the posterosuperior wall in the auditory canal, increasing temperature, and pain, both spontaneously and upon palpation of the mastoid. X-ray examination (Schüller photo) confirms the diagnosis. The therapy consists of paracentesis, antibiotics, and, if necessary, mastoidectomy.\(^1\)


note 19
Otorrhoea of longer duration may indicate involvement of the mastoid or chronic inflammation of the middle ear, with or without cholesteatoma formation.\(^1\)


note 20
If perforation of the tympanic membrane persists after treatment of otitis media, its closure is generally indicated to correct the hearing loss (5-30 dB) and to prevent renewed infection via the auditory canal.\(^1\)

1. Huizing EH, Snow GB, eds. Leerboek Keel-, neus- en oorheelkunde [Textbook ear,
note 21
In patients with frequent recurrences, sources of infection (adenoid and sinuses) are sought and where possible removed (e.g., adenoidectomy). Although there are no scientific data on the effect of adenoidectomy on the recurrence of acute otitis media, this intervention has been found to be useful. Maintenance therapy with antibiotics or placement of grommets are also therapeutic possibilities for preventing frequently-recurring episodes of acute otitis media. Williams et al. conducted a meta-analysis of the effectiveness of antibiotic maintenance therapy for frequently-recurring acute otitis media (at least 3 episodes in 12 months). The outcome measure was the number of episodes per patient-month.\(^1\) Pooling of data revealed that the group treated with antibiotics (n = 490) had about one less episode per patient per year than the placebo group (n = 468) (antibiotic group versus placebo group: 0.08 and 0.19 episode per patient-month, respectively, difference 0.11, 95% CI 0.03-0.19). Casselbrant et al. carried out a randomized placebo-controlled study in 264 children aged 7-35 months, in which maintenance use of amoxicillin, placing of grommets, and placebo were compared for preventing recurrent episodes of acute otitis media during a period of 2 years.\(^2\) Recurrent acute otitis media was understood to mean 3 episodes in 6 months or 4 or more episodes in 12 months. The average number of recurrences in a year was 1.08 in the placebo group, 0.6 in the group treated with amoxicillin (significant compared with placebo), and 1.02 in the group in which grommets were placed (not significant compared with placebo). The authors concluded that antibiotic prophylaxis did result in fewer recurrences but that placing grommets resulted in fewer symptoms (less pain) during the episodes.

In conclusion, placing grommets, with or without adenoidectomy, to prevent recurrent episodes of acute otitis media is an alternative when antibiotic prophylaxis gives insufficient relief or parents reject the use of antibiotics. However, both have a limited effect.\(^1\)\(^2\)


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