

Otitis media (acute): antimicrobial prescribing

28 March 2018

Information for consultation

We have reviewed the evidence on ear drops containing an anaesthetic and an analgesic for acute otitis media. You are invited to comment on:

- the new recommendation 1.1.5 in the guideline, marked [2022]
- the evidence and committee rationale that supports it, marked [2022]
- Appendix K in the separate evidence review.

Sections 3.2.2 and 6.1.2 of the evidence review are available for information. We have not reviewed the evidence for other recommendations contained within the guideline and cannot accept comments on them. In some cases we may have made minor wording changes for clarification or changes related to updated safety information

Overview

This guideline sets out an antimicrobial prescribing strategy for acute otitis media (ear infection). It aims to limit antibiotic use and reduce antimicrobial resistance. Acute otitis media can be caused by viruses or bacteria. It lasts for about a week, and most children get better in 3 days without antibiotics. Serious complications are rare.

See a [2-page visual summary of the recommendations](#), including tables to support prescribing decisions.

There is also a [NICE guideline on antimicrobial stewardship: systems and processes for effective antimicrobial medicine use](#).

Who is it for?

- Health professionals

- 1 • Children and young people with acute otitis media, and their families and
2 carers

3 **Recommendations**

4 **1.1 Managing acute otitis media**

5 **All children and young people with acute otitis media**

6 1.1.1 Be aware that:

- 7 • acute otitis media is a self-limiting infection that mainly affects
8 children
- 9 • acute otitis media can be caused by viruses and bacteria, and it
10 is difficult to distinguish between these (both are often present at
11 the same time)
- 12 • symptoms last for about 3 days, but can last for up to 1 week
- 13 • most children and young people get better within 3 days without
14 antibiotics
- 15 • complications such as mastoiditis are rare. **[2018]**

16 1.1.2 Assess and manage children under 5 who present with fever as
17 outlined in the [NICE guideline on fever in under 5s](#). **[2018]**

18 1.1.3 Give advice about the usual course of acute otitis media (about
19 3 days, can be up to 1 week). **[2018]**

20 1.1.4 Offer regular doses of paracetamol or ibuprofen for pain. Use the
21 right dose for the age or weight of the child at the right time, and
22 use maximum doses for severe pain. **[2018]**

23 1.1.5 Consider ear drops containing an anaesthetic and an analgesic for
24 pain if an immediate oral antibiotic prescription is not given (see

1 [recommendations 1.1.8 to 1.1.14](#)) and there is no ear drum
2 perforation or otorrhoea. **[2022]**

3 1.1.6 Explain that evidence suggests decongestants and antihistamines
4 do not help symptoms. **[2018]**

5 1.1.7 Reassess at any time if symptoms worsen rapidly or significantly,
6 taking account of:

- 7 • alternative diagnoses, such as otitis media with effusion (glue
8 ear)
- 9 • any symptoms or signs suggesting a more serious illness or
10 condition
- 11 • previous antibiotic use, which may lead to resistant organisms.

12 **[2018]**

For a short explanation of why the committee made these recommendations, see the [evidence and committee discussion on non-antimicrobial treatments](#).

Full details of the evidence and the committee's discussion are in the [evidence review](#).

13

14 **Children and young people who may be less likely to benefit from
15 antibiotics (those not covered by recommendations 1.1.11
16 to 1.1.14)**

17 1.1.8 Consider no antibiotic prescription or a [back-up antibiotic
18 prescription](#) (see [recommendation 1.2.1 for choice of antibiotic](#)),
19 taking account of:

- 20 • evidence that antibiotics make little difference to symptoms (no
21 improvement in pain at 24 hours, and after that the number of
22 children improving is similar to the number with adverse effects)

- evidence that antibiotics make little difference to the development of common complications (such as short-term hearing loss [measured by tympanometry], perforated eardrum or recurrent infection)
- evidence that acute complications such as mastoiditis are rare with or without antibiotics
- possible adverse effects of antibiotics, particularly diarrhoea and nausea. **[2018]**

9 1.1.9 When no antibiotic prescription is given, give advice about:

- an antibiotic not being needed
- seeking medical help if symptoms worsen rapidly or significantly, do not start to improve after 3 days, or the child or young person becomes systemically very unwell. **[2018]**

14 1.1.10 When a back-up antibiotic prescription is given, give advice about:

- an antibiotic not being needed immediately
- using the back-up prescription if symptoms do not start to improve within 3 days or if they worsen rapidly or significantly at any time
- seeking medical help if symptoms worsen rapidly or significantly, or the child or young person becomes systemically very unwell. **[2018]**

For a short explanation of why the committee made these recommendations, see the [evidence and committee discussion on no antibiotic](#) and [back-up antibiotics](#).

Full details of the evidence and the committee's discussion are in the [evidence review](#).

1 **Children and young people who may be more likely to benefit from
2 antibiotics (those of any age with otorrhoea or those under 2 years
3 with infection in both ears)**

4 1.1.11 Consider no antibiotic prescription with advice (see
5 recommendation 1.1.9), a [back-up antibiotic prescription](#) with
6 advice (see recommendation 1.1.10) or an immediate antibiotic
7 prescription (see [recommendation 1.2.1 for choice of antibiotic](#)),
8 taking account of:

- 9 • evidence that acute complications such as mastoiditis are rare
10 with or without antibiotics
11 • possible adverse effects of antibiotics, particularly diarrhoea and
12 nausea. **[2018]**

13 1.1.12 When an immediate antibiotic prescription is given, give advice
14 about seeking medical help if symptoms worsen rapidly or
15 significantly, or the child or young person becomes systemically
16 very unwell. **[2018]**

For a short explanation of why the committee made these recommendations, see the [evidence and committee discussion on no antibiotic, back-up antibiotics and choice of antibiotic](#).

Full details of the evidence and the committee's discussion are in the [evidence review](#).

1 **Children and young people who are systemically very unwell, have
2 symptoms and signs of a more serious illness or condition, or are
3 at high risk of complications**

4 1.1.13 Offer an immediate antibiotic prescription (see [recommendation
5 1.2.1 for choice of antibiotic](#)) with advice (see
6 recommendation 1.1.12). **[2018]**

7 1.1.14 Refer children and young people to hospital if they have acute otitis
8 media associated with:

- 9 • a severe systemic infection (see the [NICE guideline on sepsis](#))
10 • acute complications, including mastoiditis, meningitis,
11 intracranial abscess, sinus thrombosis or facial nerve paralysis.
12 **[2018]**

For a short explanation of why the committee made these recommendations, see the [evidence and committee discussion on choice of antibiotic](#).

Full details of the evidence and the committee's discussion are in the [evidence review](#).

13

14 **1.2 Choice of antibiotic**

15 1.2.1 Follow table 1 when prescribing an antibiotic for children and young
16 people with acute otitis media. **[2018, amended 2022]**

17 **Table 1 Antibiotics for children and young people under 18 years**

Treatment	Antibiotic, dosage and course length
First-choice oral antibiotic	Amoxicillin: 1 month to 11 months, 125 mg three times a day for 5 to 7 days 1 year to 4 years, 250 mg three times a day for 5 to 7 days 5 years to 17 years, 500 mg three times a day for 5 to 7 days

Alternative first choice for penicillin allergy or intolerance (for people who are not pregnant)	<p>Clarithromycin:</p> <p>1 month to 11 years: under 8 kg, 7.5 mg/kg twice a day for 5 to 7 days 8 kg to 11 kg, 62.5 mg twice a day for 5 to 7 days 12 kg to 19 kg, 125 mg twice a day for 5 to 7 days 20 kg to 29 kg, 187.5 mg twice a day for 5 to 7 days 30 kg to 40 kg, 250 mg twice a day for 5 to 7 days 12 years to 17 years, 250 mg to 500 mg twice a day for 5 to 7 days</p>
Alternative first choice for penicillin allergy in pregnancy	<p>Erythromycin:</p> <p>8 years to 17 years, 250 mg to 500 mg four times a day or 500 mg to 1,000 mg twice a day for 5 to 7 days</p> <p>Erythromycin is preferred if a macrolide is needed in pregnancy, for example, if there is true penicillin allergy and the benefits of antibiotic treatment outweigh the harms. See the Medicines and Healthcare products Regulatory Agency (MHRA) Public Assessment Report on the safety of macrolide antibiotics in pregnancy.</p>
Second-choice oral antibiotic (worsening symptoms on first choice taken for at least 2 to 3 days)	<p>Co-amoxiclav:</p> <p>1 month to 11 months, 0.25 ml/kg of 125/31 suspension three times a day for 5 to 7 days 1 year to 5 years, 5 ml of 125/31 suspension three times a day or 0.25 ml/kg of 125/31 suspension three times a day for 5 to 7 days 6 years to 11 years, 5 ml of 250/62 suspension three times a day or 0.15 ml/kg of 250/62 suspension three times a day for 5 to 7 days 12 years to 17 years, 250/125 mg or 500/125 mg three times a day for 5 to 7 days</p>
Alternative second choice for penicillin allergy or intolerance	Consult local microbiologist

- 1 See the [BNF for children](#) for appropriate use and dosing in specific
- 2 populations, for example, hepatic impairment and renal impairment.
- 3 The age bands apply to children of average size. In practice, the prescriber
- 4 will use the age bands along with other factors such as the severity of the

1 condition and the child's size in relation to the average size of children of the
2 same age. Doses given are by mouth using immediate-release medicines,
3 unless otherwise stated. [2018]

For a short explanation of why the committee made these recommendations, see the [evidence and committee discussion on choice of antibiotic](#) and [antibiotic course length](#).

Full details of the evidence and the committee's discussion are in the [evidence review](#).

4

5 **Summary of the evidence**

6 The recommendations in this guideline are based on the evidence identified,
7 which was for children and young people under 18 years. [2018]

8 **Non-antimicrobial treatments**

9 **Oral analgesia (paracetamol and ibuprofen)**

- 10 Paracetamol and ibuprofen were both more effective than placebo in
11 reducing pain at 48 hours in children with acute otitis media (number
12 needed to treat [NNT] 6 to 7 [range 4 to 27] for no pain at 48 hours; low to
13 moderate quality evidence). This was based on a systematic review of
14 randomised controlled trials (RCTs; [Sjoukes et al. 2016](#)). There were no
15 significant differences in fever at 48 hours with paracetamol or ibuprofen
16 compared with placebo (very low quality evidence). [2018]
- 17 No significant differences were found between paracetamol and ibuprofen
18 for pain or fever at various time points (very low to low quality evidence).
19 Furthermore, using ibuprofen and paracetamol in combination was no more
20 effective than paracetamol alone, although this was based on very small
21 numbers of children (very low to low quality evidence; [Sjoukes et al. 2016](#)).
22 [2018]
- 23 Adverse events for paracetamol and ibuprofen were not significantly
24 different from placebo (very low to low quality evidence). However, this

1 should be interpreted cautiously because of the small number of children
2 and the infrequent occurrence of adverse events ([Sjoukes et al. 2016](#)).

3 **[2018]**

4 **Ear drops containing an anaesthetic and an analgesic**

- 5 Ear drops containing an anaesthetic and an analgesic statistically
6 significantly increased the proportion of children with a 50% and a 25%
7 reduction in pain compared with placebo (NNT 5 [range 3 to 16] for 50%
8 pain reduction 10 minutes after having ear drops; low quality evidence).
9 This was based on a systematic review and meta-analysis of RCTs ([Foxlee](#)
10 [et al. 2011](#)). These children were aged 3 years and over without ear drum
11 perforation and were also having oral analgesia. **[2018]**

- 12 Ear drops containing an anaesthetic and an analgesic statistically
13 significantly reduced antibiotic consumption at day 8 compared with usual
14 care (no or delayed antibiotic prescription; 2.6% compared with 29.0%;
15 moderate quality evidence). There was also a statistically significant
16 reduction in parent-reported pain scores at day 2 (low quality evidence).
17 This was based on an RCT in children aged 1 to 10 years who did not need
18 immediate antibiotics ([Hay et al. 2019](#)). Most children (88%) were also
19 having oral analgesia. **[2022]**

- 20 No adverse effects were seen with ear drops containing an anaesthetic and
21 an analgesic, but this was based on very small numbers of children (very
22 low to low quality evidence; [Foxlee et al. 2011](#), [Hay et al. 2019](#)). **[2018,**
23 amended 2022]

24 **Decongestants and antihistamines**

- 25 Overall, decongestants and antihistamines, used alone or in combination,
26 did not improve clinical outcomes in children with acute otitis media who
27 were taking antibiotics (used in 14 out of 15 RCTs; very low to low quality
28 evidence). This was based on a systematic review and meta-analysis of
29 RCTs ([Coleman et al. 2008](#)). There was a reduction in the rate of persistent
30 acute otitis media at 2 weeks with a combination of decongestant plus
31 antihistamine compared with placebo (NNT 11 [range 6 to 104]; low quality

1 evidence). However, a subgroup analysis of higher quality studies found no
2 benefit with treatment. [2018]

- 3 • Adverse effects (excluding drowsiness and hyperactivity) were significantly
4 increased with decongestants, but not with antihistamines or a combination
5 of decongestant plus antihistamine, compared with placebo (very low
6 quality evidence). However, there is considerable uncertainty about these
7 results ([Coleman et al. 2008](#)). [2018]

8 **Oral corticosteroids**

- 9 • Oral prednisolone taken for 5 days did not improve any clinical outcomes in
10 children aged 3 months to 6 years with acute otitis media who were at risk
11 of recurrence (at least 2 previous episodes of acute otitis media), compared
12 with placebo (very low quality evidence). Outcomes included treatment
13 failure during the first 2 weeks, duration of effusion and recurrence. This
14 was based on a small RCT ([Chonmaitree et al. 2003](#)). [2018]

- 15 • Adverse effects or discontinuations because of adverse effects did not
16 appear to be significantly different between prednisolone and placebo,
17 although the study was very small and full data were not reported (low
18 quality evidence; [Chonmaitree et al. 2003](#)). [2018]

- 19 • Systemic effects (mineralocorticoid and glucocorticoid) may occur with oral
20 corticosteroids, including a range of psychological or behavioural effects
21 (particularly in children; [Drug Safety Update on inhaled and intranasal](#)
22 [corticosteroids](#)). [2018]

Committee discussion on non-antimicrobial treatments

- The committee discussed the importance of managing a child's pain and felt that for parents this is the main priority. They agreed that paracetamol or ibuprofen needs to be taken at the right time and at the right dose, with maximum doses being used for severe pain. **[2018]**
- Based on evidence and their experience, the committee agreed that paracetamol or ibuprofen should be offered for pain associated with acute otitis media. Parents or carers could be advised to buy paracetamol or ibuprofen over the counter in line with local policies on the prescribing of such medicines. **[2018]**
- Based on evidence, the committee agreed that ear drops containing an anaesthetic and an analgesic (in addition to oral analgesics) may reduce antibiotic consumption and relieve pain in children who did not need immediate antibiotics. **[2022]**
- They recognised that these ear drops should not be used in children with ear drum perforation or otorrhoea. They discussed the rare adverse effect of methemoglobinemia (associated with topical anaesthetics in very young children). They noted that the age of the children varied in the studies (from 1 year), but that there is no age-based restriction for using the licensed preparation (Otigo ear drops). They were aware that there is currently only 1 licensed preparation, which was not the preparation used in the studies. **[2022]**
- There is no direct evidence to support the use of ear drops containing an anaesthetic and an analgesic in children who need immediate antibiotics. The committee agreed that it is uncertain whether these ear drops would provide additional benefit when used with oral analgesia in children having immediate antibiotics. Therefore, they recommended their use only for children who do not need an immediate oral antibiotic. **[2022]**
- The committee agreed that evidence does not support using decongestants or antihistamines to help symptoms of acute otitis media. **[2018]**

- The committee agreed, based on the evidence, not to make a recommendation on the use of oral corticosteroids to manage acute otitis media in children. [2018]

1 **No antibiotic**

- 2 • Acute otitis media is a self-limiting infection of the middle ear. It can be
3 caused by viruses or bacteria, and both are often present at the same time.
4 In most children acute otitis media resolves without treatment. [2018]
- 5 • The most common bacterial causes of acute otitis media are *Streptococcus*
6 , *Haemophilus influenzae*, *Moraxella catarrhalis* and
7 *Streptococcus pyogenes* (the [Canadian Paediatric Society's position](#)
8 [statement](#), 2016). [2018]
- 9 • More common complications of acute otitis media are recurrence of
10 infection, hearing loss (which is usually temporary) and perforated eardrum.
11 However, antibiotics make little difference to the rates of these (see [efficacy](#)
12 [of antibiotics](#)). [2018]
- 13 • Acute complications of acute otitis media (such as mastoiditis, meningitis,
14 intracranial abscess, sinus thrombosis and facial nerve paralysis) are rare.
15 The incidence of mastoiditis after otitis media is 1.8 per 10,000 episodes
16 after antibiotics compared with 3.8 per 10,000 episodes without antibiotics.
17 This gives a NNT of 4,831 to prevent 1 child from developing mastoiditis
18 ([Thompson et al. 2009](#)). [2018]

19 **Efficacy of antibiotics**

- 20 • Antibiotics did not significantly reduce pain at 24 hours compared with
21 placebo in children with acute otitis media; around 60% of children in both
22 groups had no pain (high quality evidence). Antibiotics did significantly
23 reduce pain at 2 to 3 days, but the absolute difference was small; 88% of
24 children had no pain in the antibiotic group compared with 84% in the
25 placebo group (NNT 24 [range 15 to 70]; moderate quality evidence). This
26 was based on a systematic review and meta-analysis of RCTs ([Venekamp](#)
27 [et al. 2015](#)). [2018]

- 1 • Antibiotics significantly reduced the number of children with abnormal
2 tympanometry findings (a surrogate measure for hearing loss) compared
3 with placebo at 2 to 4 weeks, but not at 6 to 8 weeks or 3 months.
4 However, the absolute difference was small; at 2 to 4 weeks, 39% of
5 children had abnormal tympanometry findings with antibiotics compared
6 with 48% with placebo (NNT 12 [range 18 to 21]; low quality evidence;
7 [Venekamp et al. 2015](#)). **[2018]**
- 8 • Antibiotics significantly reduced the number of children with eardrum
9 perforation. However, again the absolute benefits were small with 5% of
10 children having a perforation in the placebo group compared with 2% in the
11 antibiotic group (NNT 33 [range 20 to 100]; moderate quality evidence;
12 [Venekamp et al. 2015](#)). **[2018]**
- 13 • Antibiotics did not reduce the number of children with late recurrence of
14 acute otitis media (which was common in both groups: 18% of children
15 taking antibiotics compared with 20% of children taking placebo, moderate
16 quality evidence; [Venekamp et al. 2015](#)). **[2018]**
- 17 • Antibiotics seem to be more beneficial in 2 pre-defined groups of children,
18 based on subgroup analyses of intervention studies comparing antibiotics
19 with placebo. Firstly, children under 2 years with bilateral acute otitis media,
20 where the NNT was 4 for symptom resolution (low quality evidence).
21 Secondly, children with acute otitis media and otorrhoea (discharge
22 following eardrum perforation), where the NNT was 3 for symptom
23 resolution (moderate quality evidence). This was based on a meta-analysis
24 of individual patient data from RCTs ([Rovers et al. 2006](#)). However, the
25 literature search was not designed specifically to identify prognostic
26 evidence. **[2018]**
- 27 • No systematic reviews or RCTs of topical antibiotics were identified. **[2018]**

28 **Safety of antibiotics**

- 29 • Allergic reactions to penicillins occur in 1 to 10% of people and
30 anaphylactic reactions occur in less than 0.05%. People with a history of
31 atopic allergy (for example, asthma, eczema and hay fever) have a higher
32 risk of anaphylactic reactions to penicillins. People with a history of
33 immediate hypersensitivity to penicillins may also react to cephalosporins

1 and other beta-lactam antibiotics ([BNF information on](#)
2 [phenoxycephalpenicillin](#)). See the [NICE guideline on drug allergy](#) for more
3 information. **[2018]**

- 4 • Antibiotic-associated diarrhoea occurs in 2 to 25% of people taking
5 antibiotics, depending on the antibiotic used ([NICE Clinical Knowledge](#)
6 [Summary on diarrhoea – antibiotic associated](#)). **[2018]**
- 7 • Adverse events (vomiting, diarrhoea or rash) were significantly increased in
8 children with acute otitis media taking antibiotics compared with those
9 taking placebo (moderate quality evidence). The number needed to harm
10 (NNH) was 13 (range 9 to 25). This was based on a systematic review and
11 meta-analysis of RCTs ([Venekamp et al. 2015](#)). **[2018]**
- 12 • See the [summaries of product characteristics](#) for information on
13 contraindications, cautions and adverse effects of individual medicines.
14 **[2018]**

Committee discussion on no antibiotics

- Acute otitis media can be caused by viral or bacterial infections, both of which are usually self-limiting and do not routinely need antibiotics.

[2018]

- Based on evidence, the committee agreed that antibiotics make little difference to ear pain or to the rates of more common complications, such as recurrence of infection. The small increased risk of perforation was noted, but 33 children (range 20 to 100) would need to be treated with antibiotics to avoid 1 child experiencing perforation. Antibiotics also made little difference to short-term hearing loss as assessed by the surrogate marker of tympanometry. **[2018]**
- More serious complications of acute otitis media, such as mastoiditis, are rare and the NNT with antibiotics to prevent 1 child from developing mastoiditis is approximately 5,000. **[2018]**
- The committee acknowledged the recommendation in the NICE guideline on respiratory tract infections (self-limiting): prescribing antibiotics for no antibiotic or a back-up antibiotic prescription for most children with acute otitis media. **[2018]**

1 Back-up antibiotics

- A [back-up antibiotic prescription](#) or watchful waiting was as effective as immediate antibiotics in children with acute otitis media for reducing pain at 3 to 7 days (moderate quality evidence). There were also no significant differences between groups for abnormal tympanometry findings (a surrogate measure for hearing loss), eardrum perforation or recurrence of infection (very low to moderate quality evidence). This was based on a systematic review and meta-analysis of RCTs ([Venekamp et al. 2015](#)).

[2018]

- A back-up antibiotic prescription was compared with no antibiotics and immediate antibiotics in a systematic review of RCTs ([Spurling et al. 2013](#)). In 1 RCT there was no significant difference between back-up antibiotics and no antibiotics for pain or fever on day 3 (very low to low quality

evidence). In 1 RCT there was no significant difference between back-up antibiotics and immediate antibiotics for pain on day 3 (moderate quality evidence). [2018]

- Immediate antibiotics were associated with a significantly increased risk of adverse events (vomiting, diarrhoea or rash) compared with back-up antibiotics or watchful waiting (NNH 8 [range 5 to 19]; moderate quality evidence; [Venekamp et al. 2015](#)).
- The incidence of vomiting or rash was not significantly different with back-up antibiotics compared with immediate antibiotics (very low quality evidence), but there was significantly less diarrhoea with back-up antibiotics (NNH 8 [range 5 to 15]; data pooled by NICE; high quality evidence; [Spurling et al. 2013](#)). No safety data were available on back-up antibiotics compared with no antibiotics.

Committee discussion on back-up antibiotics

- Based on evidence, the committee agreed that no antibiotic prescription or a back-up antibiotic prescription could be considered for most children with acute otitis media.
- The committee discussed that acute otitis media could have a viral or a bacterial cause, and distinguishing between these is difficult. However, both are usually self-limiting and do not routinely need antibiotics. The committee discussed that a back-up antibiotic prescription may be preferred over no antibiotic in some children, but that prescribers need to weigh up the small clinical benefits from antibiotics against their potential to cause adverse effects.
- The committee agreed that a back-up antibiotic prescription could be used if symptoms significantly worsen or do not improve within 3 days (by which time most self-limiting infections would be starting to resolve), or if they worsen rapidly or significantly at any time.
- The committee acknowledged the recommendations in the previous NICE guideline on upper respiratory tract infections that, for acute otitis media, a no antibiotic prescribing strategy or a back-up antibiotic prescribing strategy should be agreed, but that depending on clinical assessment of severity, immediate antibiotics can also be considered for children under 2 years with infection in both ears or children of any age with otorrhoea (discharge following perforation of the eardrum). For these subgroups the committee agreed that an immediate antibiotic prescription could also be considered as an option, because antibiotics may be more likely to be beneficial in these subgroups. The committee discussed that an immediate antibiotic may be preferred over no antibiotic or a back-up antibiotic prescription in some children based on clinical judgement.
- The committee agreed that immediate antibiotics are important for children who are systemically very unwell, have symptoms or signs of a more serious illness, or are at high risk of serious complications because of pre-existing comorbidity. This includes children with significant heart,

lung, renal, liver or neuromuscular disease, immunosuppression, cystic fibrosis, and young children who were born prematurely.

1 **Choice of antibiotic**

- 2 • There were no major differences in treatment success between classes of
3 antibiotics, including penicillins, cephalosporins and macrolides for treating
4 uncomplicated acute otitis media in children. There was no difference in
5 treatment success between ampicillin or amoxicillin compared with
6 ceftriaxone; co-amoxiclav compared with ceftriaxone; co-amoxiclav
7 compared with azithromycin; or cefaclor compared with azithromycin (low
8 to moderate quality evidence). This was based on a systematic review and
9 meta-analysis of RCTs ([Shekelle et al. 2010](#)).
10 • Co-amoxiclav was associated with significantly more adverse events than a
11 cephalosporin (very low to moderate quality evidence) or azithromycin
12 (moderate quality evidence; [Shekelle et al. 2010](#)).
13 • [Shekelle et al. 2010](#) also considered evidence for treating recurrent or
14 persistent acute otitis media in children. None of the studies found a
15 significant benefit in treatment success for any particular antibiotic
16 (moderate quality evidence). There were 5 individual RCTs that compared
17 different antibiotic treatments: co-amoxiclav compared with gatifloxacin
18 (2 RCTs), co-amoxiclav compared with levofloxacin (1 RCT), co-amoxiclav
19 compared with azithromycin (1 RCT), and cefaclor compared with
20 cefuroxime (1 RCT).

Committee discussion on choice of antibiotic

- Based on evidence of no major differences in clinical effectiveness between classes of antibiotics, the committee agreed that the choice of antibiotic should largely be driven by minimising the risk of resistance.
- The committee discussed that, if an antibiotic is needed to treat an infection that is not life-threatening, a narrow-spectrum antibiotic should generally be first choice. Indiscriminate use of broad-spectrum antibiotics creates a selective advantage for bacteria resistant even to these ‘last-line’ broad-spectrum agents, and also kills normal commensal flora leaving people susceptible to antibiotic-resistant harmful bacteria such as *Clostridium difficile*. For infections that are not life-threatening, broad-spectrum antibiotics need to be reserved for second-choice treatment when narrow-spectrum antibiotics are ineffective.
- Based on evidence, their experience and resistance data, the committee agreed to recommend **amoxicillin** as the first choice because this is current practice for antibiotic treatment in children with acute otitis media, and the risk of resistance is acceptable. The dosage of 125 mg to 500 mg three times a day (based on age) is the usual dose, and was similar to that used in studies in the evidence review. The committee discussed that phenoxycephalothin has a lower risk of resistance than amoxicillin, and microbiologically would be expected to be equivalent. However, medicines adherence is particularly important for children, and acute otitis media most commonly presents in young children. Amoxicillin has a three times a day dosage rather than four times a day for phenoxycephalothin, and the liquid formulation is more palatable.
- Based on evidence, their experience and resistance data, the committee agreed to recommend **clarithromycin** as the alternative first-choice antibiotic for use in penicillin allergy or amoxicillin intolerance. In pregnancy, erythromycin was recommended if there is true penicillin allergy. The doses recommended (based on weight and age) are the usual doses for children, and were similar to those used in studies in the

evidence review. The committee discussed that there was evidence for another macrolide, azithromycin. However, they agreed not to recommend this because clarithromycin or erythromycin are current practice, and azithromycin should be reserved for more serious infections.

- The committee discussed the [MHRA Public Assessment Report on the safety of macrolide antibiotics in pregnancy](#). This found that the available evidence is insufficient to confirm with certainty whether there is a small increased risk of birth defects or miscarriage when macrolides are taken in early pregnancy. They agreed with the [UK Teratology Information Service monograph on the use of macrolides in pregnancy](#). They decided that there should be an informed discussion of the potential benefits and harms of treatment. Then, after such a discussion, macrolides can be used if there is a compelling clinical need and there are no suitable alternatives with adequate pregnancy safety data. Erythromycin is the preferred choice if a macrolide is needed during pregnancy, for example, if there is true penicillin allergy and the benefits of antibiotic treatment outweigh the harms. This is because there is more documented experience of its use than for other macrolides. **[2022]**
- Based on evidence, their experience and resistance data, the committee agreed to recommend **co-amoxiclav** as the second-choice antibiotic for use if symptoms worsen on a first-choice antibiotic taken for at least 2 to 3 days. This broad-spectrum treatment combines a penicillin (amoxicillin) with a beta-lactamase inhibitor, making it active against beta-lactamase-producing bacteria that are resistant to amoxicillin alone. People who do not respond to amoxicillin may be more likely to have an infection that is resistant to it. The dosage of 0.25 ml/kg of 125/31 suspension to 250/125 mg or 500/125 mg three times a day (based on weight and age) is the usual dose for children, and was similar to that used in studies in the evidence review. **[2018]**

1 Antibiotic course length

- 1 • A short course of antibiotics (more than 48 hours but less than 7 days) was
2 associated with significantly higher treatment failure at 8 to 19 days, or
3 1 month or less, compared with a long course (7 days or longer). Treatment
4 failure (defined as a lack of clinical resolution, relapse or recurrence of
5 acute otitis media within 1 month of starting treatment) occurred in 18.0%
6 of the short-course group compared with 14.4% of the long-course group at
7 8 to 19 days (NNT 28 [range 17 to 77]; very low quality evidence), and in
8 20.5% of the short-course group compared with 17.5% of the long-course
9 group at 1 month or less (NNT 34 [range 20 to 124]; low quality evidence).
10 However, there was no difference in treatment failure between short and
11 long courses at other time points. This was based on a systematic review
12 and meta-analysis of RCTs ([Kozyrskyj et al. 2010](#)). **[2018]**
- 13 • There were significantly fewer gastrointestinal adverse events with a short
14 course of antibiotics (more than 48 hours but less than 7 days) compared
15 with a long course (7 days or longer; very low quality evidence). However,
16 this result was based on the reported odds ratio and was not statistically
17 significant when the relative risk was calculated ([Kozyrskyj et al. 2010](#)).
18 **[2018]**

Committee discussions on antibiotic course length

- The committee agreed that, when an antibiotic is appropriate, the shortest course that is likely to be effective should be prescribed to minimise the risk of antimicrobial resistance. [2018]
- Based on evidence, their experience and resistance data, the committee agreed that a 5- to 7-day course of all the recommended antibiotics was sufficient to treat acute otitis media in children. This takes into account both the evidence for clinical effectiveness and the evidence for safety and tolerability of antibiotics, and minimises the risk of resistance. Studies on the use of specific antibiotics to treat acute otitis media sometimes had longer course lengths than 7 days. [2018]
- The committee noted that no studies were identified that directly compared a 5-day course of antibiotics with a 7-day course. [2018]
- Based on evidence, the committee recognised that more children may have treatment failure with an antibiotic course of less than 7 days compared with a course of 7 days or more. However, the absolute difference is small. At 8 to 19 days, 82% of children taking antibiotics for less than 7 days were better, compared with 86% of those taking antibiotics for 7 days or more. They agreed that, if a decision to prescribe an antibiotic is made, a 5-day course may be sufficient for many children, reserving 7-day courses for those with a clinical assessment of more severe or recurrent infection. [2018]

1 Antibiotic dose frequency

- 2 • Once or twice daily dosing of amoxicillin or co-amoxiclav was as effective
3 as three times a day dosing for clinical cure rates at the end of antibiotic
4 treatment (high quality evidence). The duration of treatment was 10 days in
5 most studies, and the dose of amoxicillin or co-amoxiclav varied. There
6 were no significant differences in the rates of recurrence (very low to low
7 quality evidence), adverse effects (very low to low quality evidence) and
8 adherence (high quality evidence). This was based on a systematic review
9 and meta-analysis of RCTs ([Thanaviratananich et al. 2013](#)). [2018]

Committee discussions on antibiotic dose frequency

- The committee discussed the evidence for once or twice daily dosing of amoxicillin and co-amoxiclav, but it is unknown if this would have a detrimental effect on the risk of resistance to these antibiotics. The evidence supporting once or twice daily dosing is for different doses and longer treatment durations. This goes against the general principle of antimicrobial stewardship to prescribe the shortest course that is effective. [2018]
- The committee agreed that, when prescribing amoxicillin or co-amoxiclav, a dosing frequency of three times a day should be prescribed, as is current practice. [2018]

1 See the [full evidence review](#) for more information.

2 Other considerations

3 Medicines adherence

4 • Medicines adherence may be a problem for some people with medicines
5 that require frequent dosing (for example, some antibiotics) or longer
6 treatment duration (see the [NICE guideline on medicines adherence](#)).
7 [2018]

8 Resource implications

9 • Respiratory tract infections, including acute otitis media, are a common
10 reason for consultations in primary care, and therefore are a common
11 reason for potential antibiotic prescribing. [2018]
12 • There is potential for resource savings if no antibiotic or a [back-up antibiotic](#)
13 [prescription](#) is used. There was significantly lower antibiotic use with
14 back-up antibiotics compared with immediate antibiotics, both when the
15 back-up antibiotic prescription was given at the time of consultation (38%
16 compared with 87%; moderate quality evidence) and when the prescription
17 had to be collected on a separate visit (24% compared with 87%; high
18 quality evidence). There was no significant difference between groups in

- 1 re-consultation rates (low quality evidence). This was based on a
2 systematic review of RCTs ([Spurling et al. 2013](#)). **[2018]**
- 3 • Recommended antibiotics are all available as generic formulations. Ear
4 drops containing an anaesthetic and an analgesic (Otigo ear drops) are a
5 prescription only medicine so are not appropriate for self-care. See the
6 [Drug Tariff](#) for costs. **[2022]**

7 **Update information**

8 **Minor changes since publication**

9 **May 2021:** In recommendation 1.1.10 we clarified that children and young
10 people who are at high risk of serious illness should be offered an immediate
11 antibiotic.

12 **March 2022:** We added a new recommendation on ear drops containing an
13 anaesthetic and an analgesic (recommendation 1.1.5) because a licensed
14 preparation is now available in the UK. We moved recommendations on
15 non-antimicrobial treatments earlier in the guideline. We also made minor
16 wording changes to reflect updated advice on using macrolides in pregnancy.

17 **Finding more information and committee details**

18 You can see everything NICE says on this topic in the [NICE Pathway on self-
19 limiting respiratory tract and ear infections – antibiotic prescribing](#).

20 To find NICE guidance on related topics, including guidance in development,
21 see the [NICE webpage on ear, nose and throat conditions](#).

22 For full details of the evidence and the guideline committee's discussions, see
23 the [evidence review](#). You can also find information about [how the guideline
24 was developed](#), including [details of the committee](#).

25 NICE has produced [tools and resources to help you put this guideline into
26 practice](#). For general help and advice on putting our guidelines into practice,
27 see [resources to help you put NICE guidance into practice](#).

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