Acute otitis media - Emergency management in children

Purpose

This document provides clinical guidance for all staff involved in the care and management of a child presenting to an Emergency Department (ED) with symptoms of acute otitis media (AOM) in Queensland.

This guideline has been developed by senior ED clinicians and Paediatricians across Queensland, with input from senior staff in Infectious Diseases, ENT and Pharmacy, Lady Cilento Children’s Hospital, Brisbane. It has been endorsed for use across Queensland by the Statewide Emergency Care of Children Working Group in partnership with the Queensland Emergency Department Strategic Advisory Panel and the Healthcare Improvement Unit, Clinical Excellence Division.

Key points

- A diagnosis of AOM should be considered in any young child who presents with irritability, lethargy, otorrhoea and fever with or without localised ear pain.
- Diagnosis is routinely based on symptoms and otoscopy findings.
- Primary treatment is aimed at reducing pain.
- Symptoms in isolated, unilateral AOM usually resolve after 2 days without antibiotic treatment.
- Always consider the possibility of sepsis in an unwell child with a fever.

Introduction

AOM is a rapid onset active infection of the middle ear, characterised by otalgia (earache), irritability and fever.¹ It is a common problem with 66% of children having an episode by 3 years of age, and 90% having at least one episode by 6 years.²,³

AOM is primarily a result of a dysfunctioning eustachian tube. In a viral upper respiratory tract infection, physical and immunologic changes in the nasopharynx allow the normal bacterial colonizers (commonly Streptococcus pneumonia, Haemophilus influenza, and Moraxella catarrhalis)³,⁴ to enter the eustachian tube. The anatomy of the eustachian tubes (short, wide, straight and relatively horizontal plane)⁵ in infants and young children predisposes them to infection. The aetiology can be either bacterial (estimated to be 27%), viral (<5%) or a combination of bacterial and viral (66%).⁴,⁶

Risk factors for recurrent otitis media include:
- exposure to cigarette or wood smoke
- day care attendance
- use of a dummy
- Indigenous or Torres Strait Islander background
- short duration of breastfeeding⁷,⁸
Most cases resolve without complications. Tympanic membrane perforation presents as discharge from the ear with relief of pain and occurs as a complication of AOM in approximately 7% of cases.\(^9\) Spontaneous healing occurs in > 90% of cases.\(^10\) Chronic suppurative otitis media is described as persistent perforation with draining exudate for > 6 weeks.

Rare but serious complications of AOM include mastoiditis, meningitis, lateral sinus thrombosis and facial nerve palsy.\(^11\)

### Assessment

There is no gold standard for the diagnosis of AOM.\(^1\) Pain is the major symptom of AOM but the diagnosis should be considered in any child who presents with irritability, lethargy, otorrhoea and fever, with or without localised ear pain. Infants may present with feeding difficulties.

**WARNING** – Always consider the possibility of sepsis and do not accept AOM as lone focus of fever in sick febrile child.

### History

History should include specific information on:

- pain (including location and onset)
- discharge from the ear
- behaviours such as rubbing or tugging at ear
- history of fever and use of anti-pyretics
- systemic symptoms
- previous ear infections

### Examination

**Otoscopy**

Otoscopy is the most important examination procedure in the diagnosis of AOM.

Parental assistance can help ensure adequate immobilisation of the child and improve visualisation of the tympanic membrane. Most parents feel comfortable holding the child in their arms with the head held resting against the parent’s shoulder or chest and holding the child's arms.

The auditory canal and tympanic membrane should be assessed for:

- presence or absence of discharge
- position of tympanic membrane (neutral, retracted or bulging)
- colour
- translucency
- mobility
- perforation

**Source:** 2012 UpToDate in Pediatrics\(^{12}\)
One of the challenges in diagnosis of AOM and otoscopy is differentiating between the effusion seen in AOM and that seen in otitis media with effusion (OME). OME, also known as “glue ear”, is a collection of non-purulent fluid (effusion) in the middle ear. It is usually seen as a result of AOM, is often asymptomatic, and if persists can lead to hearing impairment.

### Differentiating AOM from OME

<table>
<thead>
<tr>
<th>Complication</th>
<th>Incidence</th>
<th>Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AOM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tympamic membrane is usually bulging</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tympamic membrane is typically red,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>white or pale yellow</td>
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<td></td>
</tr>
<tr>
<td><strong>OME</strong></td>
<td></td>
<td></td>
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<tr>
<td>Tympamic membrane is usually retracted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or in the neutral position</td>
<td></td>
<td></td>
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<tr>
<td>Tympamic membrane is typically amber</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or blue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A fluid level or bubbles may be seen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>behind the tympanic membrane</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Clinical diagnosis of AOM requires ALL of the following:
- onset < 48 hours
- redness and bulging of the tympanic membrane (middle ear inflammation)
- middle ear effusion

Redness of the tympanic membrane alone is not suggestive of AOM. Redness can also be caused by many other processes including crying, fever, URTI and trauma.

### Serious complications of AOM

<table>
<thead>
<tr>
<th>Complication</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Mastoiditis</strong> (infection spreads from the middle ear to the nearby mastoid</td>
<td>1:1000 cases of AOM in</td>
<td>May present with fever, ear pain, retro-auricular swelling and/or erythema with mastoid tenderness.</td>
</tr>
<tr>
<td>air cells).</td>
<td>developed countries, more</td>
<td>The affected ear may be pushed forward and downward.</td>
</tr>
<tr>
<td></td>
<td>common in Indigenous children</td>
<td></td>
</tr>
<tr>
<td><strong>Facial nerve palsy</strong></td>
<td>&lt; 1 per 100, 000 AOM cases</td>
<td>Unilateral facial droop of lower motor neurone type.</td>
</tr>
<tr>
<td>**Intracranial complications such as meningitis, brain abscess, subdural</td>
<td>Rare</td>
<td>AOM plus fever, headache, vomiting, irritability, or altered conscious state, with or without focal</td>
</tr>
<tr>
<td>empyema (caused by direct bacterial invasion from the middle ear and mastoid,</td>
<td></td>
<td>neurologic signs.</td>
</tr>
<tr>
<td>or haematogenous spread to the intracranial space)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sepsis</strong></td>
<td>Rare</td>
<td>Toxic</td>
</tr>
</tbody>
</table>

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Investigations

As AOM is a clinical diagnosis, investigations are not routinely recommended.

Tympanocentesis (to obtain middle ear fluid for culture) should only be performed by an ENT surgeon and is usually not required since antimicrobial therapy (if indicated) should be started empirically.

Where there is AOM with perforation, a bacterial swab from the ear canal should be taken if there is reason to suspect resistant organisms (e.g. failure of initial antibiotic treatment).

Management

Refer to Appendix 1 and 2 for a summary of the recommended emergency management and medications for a child presenting with symptoms suggestive of AOM.

Seek urgent ENT advice if any serious complications of AOM are suspected.

Pain relief

Acute otitis media is a painful condition and oral analgesics should be used early to minimise pain.

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<tr>
<td>Paracetamol (PO)</td>
<td>Age over 3 months: 15mg/kg/dose (maximum 1g) every four hours, maximum 4 doses in 24 hours</td>
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<tr>
<td>Ibuprofen (PO)</td>
<td>Age over 3 months: 10mg/kg/dose (maximum 400mg) every six to eight hours, maximum three doses in 24 hours</td>
</tr>
<tr>
<td>Oxycodone (PO)</td>
<td>0.1mg/kg/dose (max 10mg) orally every 4 hours when required</td>
</tr>
</tbody>
</table>

Antibiotic therapy

Antibiotics do not alter the course for most children with mild, uncomplicated AOM. Without antibiotic treatment, pain resolves after 24 hours in 60% of children, and most infections resolve spontaneously within 7 days. There is evidence that antibiotics may reduce the risk of TM perforation or AOM in the contralateral ear, however the incidence of side effects such as vomiting, diarrhoea and rash is increased. There is insufficient evidence to determine if antibiotic use reduces the risk of mastoiditis or meningitis.

The recommended approach for mild uncomplicated AOM is to defer the use of antibiotics for 24-48 hours, and proceed to antibiotics only if symptomatic after this time. Antibiotics may then be initiated following clinical review or at the parent’s discretion (if provided with a script at the initial consultation). Evidence suggests relying on parental assessment reduces antibiotic usage by up to two thirds with equivalent parental satisfaction rates when compared to early antibiotic treatment.
Most children with isolated unilateral AOM do not require antibiotic therapy.

Initial antibiotic therapy is recommended for all children with systemic features (defined as fever > 39°C, vomiting and lethargy).

Consider initial antibiotic treatment for the following children:

- age < 6 months
- age < 2 years with bilateral acute otitis media
- symptoms > 48 hrs
- severe symptoms (fever > 39°C and moderate to severe otalgia)
- evidence of perforation (purulent otorrhoea or perforation visualised)
- those at higher risk of complications (such as chronic suppurative otitis media or mastoiditis) including the following children:
  - Indigenous or Torres Strait Islander background
  - immunocompromised
  - uncertain access to follow-up

Refer to the [CHQ Antibiocard](#) (outlined below) or local protocols for antibiotic therapy recommendations.

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxycillin (PO)</td>
<td>25mg/kg/dose (maximum 1000 mg) 8-hourly for 5 days OR</td>
</tr>
<tr>
<td></td>
<td>If suspect non-compliance:</td>
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<tr>
<td></td>
<td>45mg/kg/dose orally (maximum 1000mg) 12-hourly for 5 days</td>
</tr>
<tr>
<td>Amoxycillin + clavulanate (PO)</td>
<td>Consider broadened cover with Amoxycillin + clavulanate for children:</td>
</tr>
<tr>
<td></td>
<td>• who have an inadequate response within 48-72 hours of</td>
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<tr>
<td></td>
<td>Amoxycillin (to cover against beta-lactamase producing strains of</td>
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<tr>
<td></td>
<td>Haemophilus influenza or Moraxella catarrhalis)</td>
</tr>
<tr>
<td></td>
<td>• with a concurrent conjunctivitis (conjunctivitis-otitis syndrome)</td>
</tr>
<tr>
<td></td>
<td>to cover for Haemophilus influenza</td>
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<tr>
<td></td>
<td>22.5mg/kg Amoxycillin component (up to maximum 500mg amoxicillin/125mg</td>
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<tr>
<td></td>
<td>clavulanate per dose) 8-hourly for 5-7 days</td>
</tr>
<tr>
<td>Cephalexin (PO)</td>
<td>If delayed type hypersensitivity (e.g. rash) to penicillins:</td>
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<tr>
<td></td>
<td>30 mg/kg/dose (maximum 1gram/dose) 8-hourly for 5 days</td>
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<tr>
<td>Trimethoprim+ sulfamethoxazole</td>
<td>For children ≥ 1 month with immediate hypersensitivity to</td>
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<tr>
<td>(PO)</td>
<td>penicillins/cephalosprins:</td>
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<td></td>
<td>4mg/kg/dose Trimethoprim component (up to 160mg Trimethoprim/800mg</td>
</tr>
<tr>
<td></td>
<td>Sulfamethoxazole) 12-hourly for 5 days</td>
</tr>
<tr>
<td>Ciprofloxacin (Topical)</td>
<td>5 drops BD</td>
</tr>
<tr>
<td>(3mg/mL Clloxan® eardrops)</td>
<td>May shorten the duration of symptoms if a perforation or tympanostomy</td>
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<tr>
<td></td>
<td>tube (grommet) is present with purulent otorrhoea\textsuperscript{18,19}</td>
</tr>
</tbody>
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Other treatments

The following treatments are not recommended as trials have demonstrated a failure to show any benefit:

- antihistamines
- decongestants

When to escalate care

Follow your local facility escalation protocols for children of concern. Transfer is recommended if the child requires care beyond the level of comfort of the treating hospital. Clinicians can contact the services outlined below to escalate the care of a paediatric patient.

<table>
<thead>
<tr>
<th>Service</th>
<th>Reason for contact by clinician</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Paediatric service</td>
<td>For specialist paediatric advice and assistance with local transfers as per local arrangements.</td>
<td>As per local arrangements</td>
</tr>
<tr>
<td>Children's Advice and Transport Coordination Hub (CATCH)</td>
<td>For access to specialist paediatric advice and assistance with inter-hospital transfer of non-critical patients into and out of Lady Cilento Children’s Hospital. For assistance with decision making regarding safe and appropriate inter-hospital transfer of children in Queensland. For QH staff, click here for further information including the QH Inter-hospital transfer request form (access via intranet).</td>
<td>(07) 3068 4510 24 hours CATCH website</td>
</tr>
<tr>
<td>Telehealth Emergency Management Support Unit (TEMSU)</td>
<td>For access to generalist and specialist acute support and advice via videoconferencing, as per locally agreed pathways, in regional, rural and remote areas in Queensland. For QH staff, click here for further information (access via intranet).</td>
<td>TEMSU QHEPS website 24 hours</td>
</tr>
<tr>
<td>Retrieval Services Queensland (RSQ)</td>
<td>For access to telehealth support for, and to notify of, critically unwell patients requiring retrieval in Queensland. For any patients potentially requiring aeromedical retrieval or transfer in Queensland. For QH staff, click here for further information and relevant forms (access via intranet).</td>
<td>RSQ QHEPS website 24 hours</td>
</tr>
</tbody>
</table>
When to consider discharge

Most children with isolated AOM without systemic illness can be discharged home.

On discharge provide the parent with:

- prescription for antibiotics (if needed)
- advice regarding the management at home (including analgesia, taking care not to get water in ear if TM perforation) and criteria for medical review
- [Acute Otitis Media Factsheet](#)

Follow-up

- with GP in 24-48 hours or up to 10 days depending on the management option chosen and the severity of the symptoms.

All children with a TM perforation should be reviewed by a GP to ensure the perforation has healed (usually around 10 days).

All children with AOM should be seen by their GP at 3 months to ensure the effusion has resolved

Referral to ENT specialist may be considered for children who meet the following criteria:

- effusion or perforation for > 6 weeks
- hearing impairment for > 6 weeks
- premature
- Indigenous or Torres Strait Islander background

Aeroplane travel

Parents frequently present to the ED to have their child with AOM assessed before flying. Airlines recommend against flying if the passenger is unable to clear their eustachian tubes. This is difficult to assess in younger children. Recommendations for young children are based on expert opinion in the absence of evidence. Children should be safe to fly 2 weeks after an adequately treated AOM, however many clinicians recommend waiting only 48hrs. These children should be given a nasal decongestant at least 30 minutes prior to take-off and landing and analgesia prior to flying. During take-off and landing they can be encouraged to suck, chew or swallow or, if old enough, perform a Valsalva manoeuvre to help equalise pressure.

When to consider admission

Consider hospital admission for children with AOM who have:

- failed outpatient treatment
- serious complications
- severe disease
- significant co-morbidities
Related documents

Guidelines
- Sepsis – Emergency management in children

Factsheet
- Acute Otitis Media Factsheet

References

Guideline approval

<table>
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<tr>
<th>Document ID</th>
<th>CHQ-GDL-60000</th>
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<th>2.0</th>
<th>Approval date</th>
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<td>Effective date</td>
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<tr>
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<td>Queensland Emergency Care Children Working Group</td>
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Keywords: Otitis, media, middle ear, infection, 00710, paediatric, children, emergency, guideline,60000

Accreditation references: NSQHS Standards (1-8): 1, 4, 8

Disclaimer

This guideline is intended as a guide and provided for information purposes only. The information has been prepared using a multidisciplinary approach with reference to the best information and evidence available at the time of preparation. No assurance is given that the information is entirely complete, current, or accurate in every respect.

The guideline is not a substitute for clinical judgement, knowledge and expertise, or medical advice. Variation from the guideline, taking into account individual circumstances may be appropriate.

This guideline does not address all elements of standard practice and accepts that individual clinicians are responsible for:

- Providing care within the context of locally available resources, expertise, and scope of practice
- Supporting consumer rights and informed decision making in partnership with healthcare practitioners including the right to decline intervention or ongoing management
- Advising consumers of their choices in an environment that is culturally appropriate and which enables comfortable and confidential discussion. This includes the use of interpreter services where necessary
- Ensuring informed consent is obtained prior to delivering care
- Meeting all legislative requirements and professional standards
- Applying standard precautions, and additional precautions as necessary, when delivering care
- Documenting all care in accordance with mandatory and local requirements

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Appendix 1

Acute Otitis Media - Emergency Management in Children - Flowchart

Child presents to ED with symptoms suggestive of acute otitis media (AOM)

Assessment (including vital signs and otoscopy)

Otoscopy findings suggest AOM? (A)

Fever ≥ 39°C, vomiting and lethargy?

Yes

Treatment
• antibiotics
• analgesia

Meet criteria for antibiotics? (C)

• Education re antibiotics
  - 60% resolve by 2 days without antibiotics
  - side effects
  • Consider providing antibiotic script for use if pain > 2 days

Yes

Consider antibiotics

Discharge
GP review in 7-10 days
(or 2 days if pain and no script provided)

No

Discharge
GP review in 1-2 days
Consider admission if very unwell

No

• Consider otitis media with effusion (OME) diagnosis (B)
• Consider ENT referral if > 6 week history of:
  - effusion or perforation
  - hearing impairment

Discharge
Follow up as appropriate

A. AOM Otoscopy findings
Tymanic membrane is:
• bulging
• red, white or pale yellow
Redness alone is not suggestive of AOM

B. OME Otoscopy findings
Tymanic membrane is:
• retracted or in the neutral position
• amber or blue
A fluid level or bubbles may be seen behind the tympanic membrane

C. Consider antibiotic therapy if:
• age < 6 months
• age < 2 years with bilateral AOM
• symptoms > 48 hrs
• severe symptoms
• evidence of perforation (purulent otorrhoea or perforation visualised)
• those at higher risk of complications (such as CSOM or mastoiditis) including:
  - Indigenous and Torres Strait Islander
  - immunocompromised
  - uncertain access to follow-up

For more information refer to the Statewide Paediatric Guideline: Acute Otitis Media - Emergency Management in Children
Appendix 2

Acute Otitis Media- Emergency Management in Children – Medications

### Analgesic dosing for the management of acute otitis media in children

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### Antibiotic therapy for the treatment of acute otitis media in children - CHQ AntiBiocard*

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<td>Amoxycillin + clavulinate (PO)</td>
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<td>• who have an inadequate response within 48-72 hours of Amoxycillin (to cover against beta-lactamase producing strains of <em>Haemophilus influenza</em> or <em>Moraxella catarrhalis</em>)</td>
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<td></td>
<td>• with a concurrent conjunctivitis (conjunctivitis-otitis syndrome) to cover for <em>Haemophilus influenza</em></td>
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<td>For these patients use: Amoxycillin + clavulanate 22.5mg/kg (Amoxycillin component) (up to maximum 500mg amoxicillin/125mg clavulanate per dose) 8-hourly for 5-7 days.</td>
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