

# Rational Use of Antibiotics in Respiratory Tract Infections



# www.bpac.org.nz

**bpac<sup>nz</sup> Development Team:** Rachael Clarke  
Sonia Ross  
Dr Trevor Walker  
David Woods

**Acknowledgement:**

bpac<sup>nz</sup> would like to thank Professor Bruce Arroll, Dr Rosemary Ikram, Professor Jim Reid, Dr David Reith and Dr Neil Whittaker for their help and guidance on the development of this resource.

Developed by bpac<sup>nz</sup>  
Level 8, 10 George Street  
PO Box 6032  
Dunedin

Phone 03 477 5418  
Fax 0800 bpac nz (0800 2722 69)  
Contact: [trevor@bpac.org.nz](mailto:trevor@bpac.org.nz)  
[www.bpac.org.nz](http://www.bpac.org.nz)  
© bpac<sup>nz</sup> August 2006

All information is intended for use by competent health care professionals and should be utilised in conjunction with pertinent clinical data.

# Contents

## Key Points **Rational use of Antibiotics in Respiratory Tract Infections**

General principles of rational antibiotic use..... 2

## Part 1 **Rational use of Antibiotics in Upper Respiratory Tract Infections**

1a. Common cold (viral rhinosinusitis)..... 3

1b. Acute Sinusitis..... 4

1c. Acute sore throat..... 5

1d. Influenza-like illness..... 7

1e. Otitis Media in children..... 9

1f. Croup and epiglottitis..... 12

1g. Pertussis..... 13

## Part 2 **Rational use of Antibiotics in Lower Respiratory Tract Infections in Adults**

2a. Acute bronchitis..... 14

2b. Community acquired pneumonia..... 15

2c. COPD..... 16

## Part 3 **Rational use of Antibiotics in Lower Respiratory Tract Infections in Children**

3a. Pneumonia..... 18

3b. Bronchiolitis..... 20

<b>Appendices</b>	Sore Throat Score.....	21
	Summary Sheet.....	22
	References.....	24

# Key Points

## Rational Use of Antibiotics in Respiratory Tract Infections

"The prevalence of antibiotic resistance in a country reflects the local consumption of antibiotics. The majority of antibiotics are prescribed in general practice and most prescriptions are attributable to treatment of respiratory tract infections." (Bjerrum, 2004).

### General principles of rational antibiotic use

- Avoid prescribing antibiotics for viral infections.
- When antibiotics are indicated, choose the appropriate dose and duration of an effective agent with the narrowest spectrum, fewest side effects and lowest cost.

Application of these principles to the treatment of respiratory tract infections would result in no prescribing of antibiotics for viral infections such as the common cold and a selection between penicillin V, amoxicillin or erythromycin as first line therapy for most bacterial respiratory infections. This would reduce the development of organisms resistant to second line agents, reduce national prescribing costs, and reduce adverse effects to antibiotics without compromising patient care.

New Zealand general practitioners have done well in moving toward more rational antibiotic use. Rational use of antibiotics reduces resistance rates for the community as a whole (Molstad, 1999, Hefferman, 2002). It also importantly reduces the likelihood of individuals developing resistant bacteria. People who take antibiotics have increased risk of developing resistant strains of bacteria, for example a resistant strain of pneumococcus in their nasopharynx (Dowell, 1998).

The situation here in New Zealand is unlike an American study, which reported that 46% of patients presenting to doctors with the common cold were prescribed antibiotics for this viral infection. Worse, 51% of the antibiotics used were broad-spectrum (Steinman, 2003). Never the less, there were three quarters of a million prescriptions for amoxicillin-clavulanate (Augmentin®) in New Zealand in 2005 (Pharmhouse data).

Even when antibiotics are indicated, the use of broad-spectrum antibiotics such as amoxicillin-clavulanate, second generation macrolides, cephalosporins and quinolones as first line therapy for respiratory tract infections encourages the development of resistant strains and substantially adds to costs.

When a person takes an antibiotic to treat an illness, the drug kills susceptible bacteria. This leaves bacteria that can resist it - resistant bacteria. With the reduced competition, resistant bacteria can increase their numbers exponentially, to become predominant. Broad-spectrum antibiotics kill a wide-range of bacteria allowing resistant strains which were previously an insignificant minority to predominate.

## Rational Use of Antibiotics in Upper Respiratory Tract Infections

An overview of Cochrane reviews on the use of antibiotics for upper respiratory infections reveals a limited role for antibiotics in acute otitis media, sore throat and streptococcal tonsillitis, common cold and acute purulent sinusitis (Arroll, 2005).

---

### 1a. Common cold

(viral rhinosinusitis)

Most children will have 3 to 8 colds per year; however 10% - 15% will have 12 or more per year. Higher incidences seem to be related to starting school or day care. The incidence is much reduced in adult life.

Common cold is usually accompanied by mild fever and some degree of sinus congestion. It frequently results in mucopurulent nasal discharge or cough and often lasts for up to 10 days.

Antibiotics have no effect on the duration or severity of any of these components of the common cold nor do they decrease the likelihood of progression to bacterial infection. Short term use of oral or topical nasal decongestants is more likely to provide symptomatic relief.

#### Principles for rational antibiotic use for the common cold

1. Antibiotics are not beneficial for the common cold.
2. Mucopurulent discharge frequently accompanies the common cold. It is not an indication for antibiotic treatment unless it persists for 10 to 14 days.

# 1b. Acute Sinusitis

## Identifying people who will benefit from antibiotic use

Sinus congestion related to viral rhinosinusitis is approximately 20 to 200 times more common than bacterial sinusitis. Rational antibiotic use requires prescribers to correctly identify patients who are more likely to have bacterial sinusitis.

These are: people with:

- Severe classical symptoms of facial pain and swelling,
- Temperature >39°C,
- Tooth pain not of dental origin, or
- Known anatomical blockage.

Or people with:

- Rhinosinusitis and cough not improving after 10 days.

## Choice and duration of antibiotic for bacterial sinusitis

Acute bacterial sinusitis is usually caused by the same bacterial pathogens that cause acute otitis media (*Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Moraxella catarrhalis*). Nasopharyngeal cultures are not useful to predict the sinus pathogen.

Amoxicillin is successful for the initial treatment of most episodes of acute bacterial sinusitis, despite beta-lactamase production by some isolates of *H. influenzae* and *M. catarrhalis*. For the few patients who get recurrent infections or do not respond to amoxicillin in 48 to 72 hours, a beta-lactamase-stable agent, such as amoxicillin-clavulanate is appropriate. Doxycycline, cotrimoxazole or cefaclor are appropriate alternatives for people allergic to penicillin.

The usual course of treatment is at least 10 days and there is no advantage in prolonging treatment more than 7 days beyond the point of substantial improvement in signs and symptoms.

## Principles of rational antibiotic use for acute sinusitis

1. Sinus congestion accompanying the common cold is the most frequent cause of a feeling of pressure in the sinuses.
2. Analgesia and short-term nasal decongestants usually provide symptomatic relief.
3. Bacterial sinusitis is diagnosed when there are specific symptoms which suggest bacterial sinusitis or when rhinosinusitis and cough are not improving after 10 days.
4. Routine radiographs are not useful in determining a bacterial aetiology of sinusitis.
5. Initial antibiotic treatment of acute bacterial sinusitis should be with the narrowest spectrum agent that is effective against the likely pathogens (amoxicillin).
6. Antibiotics are usually prescribed for at least 10 days.

### Further reading:

Acute sinusitis in adults. Institute of Clinical Systems Improvement. (2004)

Available through <http://snipurl.com/temk>

## 1c. Acute sore throat

**Clinical signs and symptoms are not reliable in differentiating viral from bacterial sore throats.**

Viral and bacterial sore throats cannot be reliably differentiated by clinical signs or symptoms, severity or duration of illness. Scoring systems can help determine the probability of a positive throat swab for Group A beta haemolytic streptococcus (GABHS) (Appendix one). GABHS pharyngitis is uncommon in children under three years.

**People with a past history of rheumatic fever or who are at high risk of rheumatic fever with positive throat swab for GABHS are likely to benefit from penicillin.**

In countries with low incidences of rheumatic fever (most developed countries) the risks of antibiotic use outweigh their benefits in preventing rheumatic fever. However in New Zealand there are higher rates of rheumatic fever especially among Pacific peoples and Māori. Professor Diana Lennon points out that Cochrane reviews often include studies predominantly performed in developed countries. In some communities in the northern North Island we continue to have a high risk third world type infectious disease profile for many things including rheumatic fever, but also suppurative complications of pharyngitis such as otitis media, mastoiditis and quinsy.

The correct strategy for dealing with this problem is not yet determined, and the New Zealand Heart Foundation is currently preparing guidelines for sore throat management within the New Zealand context.

As the prevention of rheumatic fever is not compromised by delays of up to nine days in starting antibiotic treatment, a pragmatic strategy may be to take throat swabs from people who are deemed to be at higher risk of rheumatic fever and give them back-pocket prescriptions to get filled if swab results return as positive. People at high risk include:

- Māori people
- Pacific people
- People with lower socioeconomic status living in overcrowded accommodation
- People living in communities with high prevalence of rheumatic fever.

### Principles of rational antibiotic use for acute sore throat

1. Most sore throats are viral and will not benefit from antibiotic treatment.
2. The principal indication for antibiotic treatment in acute sore throat in New Zealand is for primary and secondary prevention of rheumatic fever for those at increased risk.
3. People with severe systemic symptoms may benefit from antibiotics.
4. When antibiotics are indicated, penicillin V (phenoxymethylpenicillin) is the first choice with erythromycin for people who are allergic to this.

Pamphlets for patients about back-pocket prescriptions can be ordered or downloaded from [www.bpac.org.nz](http://www.bpac.org.nz)

**People with severe systemic symptoms or people at risk because of other medical conditions such as immunosuppression may benefit from antibiotics.**

People with severe systemic symptoms are usually excluded from clinical trials of the effectiveness of antibiotics and it is probably appropriate to offer antibiotics to these people.

**People with severe local symptoms may benefit from penicillin.**

People who have at least three of the following criteria may have their symptom duration reduced by about eight hours by treatment with penicillin.

- Fever
- Purulent tonsils
- Cervical adenopathy
- Absence of cough

**Penicillin V is first choice when antibiotics are indicated for sore throat**

Phenoxymethylpenicillin (penicillin V) is first choice because it remains effective against GABHS. It is the only antibiotic that has been shown to effectively prevent primary and secondary attacks of rheumatic fever. Two or three daily doses are as effective as four daily doses but, when the indication for treatment is to eradicate GABHS for rheumatic fever prevention, a 10-day course is required. It must be taken on an empty stomach.

Broad-spectrum antibiotics are no more effective and increase the risk of developing resistant organisms. In addition the synthetic penicillins such as amoxicillin or amoxicillin-clavulanate are likely to produce a rash if the person has glandular fever; resulting in the mistaken assumption that the person is allergic to penicillin.

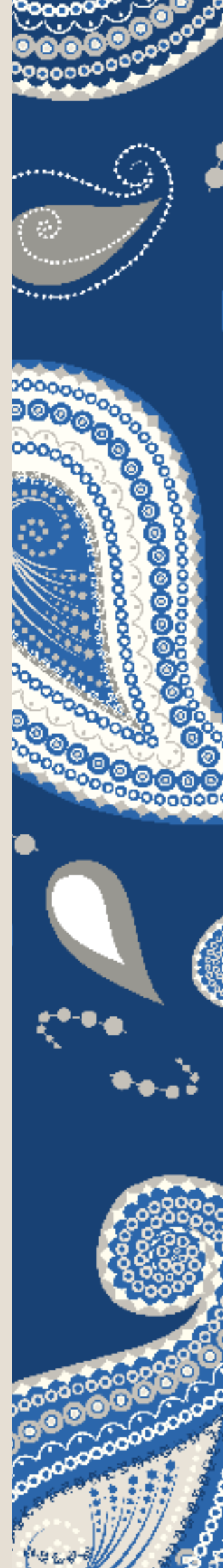
Erythromycin is suitable for people who are allergic to penicillin.

**Antibiotics do not prevent glomerulonephritis, local respiratory tract complications or progression to pneumonia.**

Antibiotics do not significantly reduce the incidence of glomerulonephritis secondary to GABHS.

The number needed to treat (NNT) to prevent progression to otitis media, sinusitis, quinsy or other suppurative complications is high. For example antibiotics need to be given to about 150 adults with sore throats to prevent one progressing to otitis media. The NNT for children is about 30 and therefore it may be worthwhile giving penicillin to children with a history of otitis media or those with a higher risk of progression to suppurative complications because of demographic factors.

Antibiotics do not prevent progression of upper respiratory tract infections to pneumonia.



## 1d. Influenza-like illness

The New Zealand case definition for an influenza-like illness is “an acute respiratory tract infection characterised by an abrupt onset of two of the following: fever, chills, headache and myalgia”. It is a significant health issue with 10 to 20% of New Zealanders affected each year. Influenza is difficult to distinguish clinically from the wide range of other viruses and bacteria that cause similar symptoms. Diagnostic testing is not usually indicated except for surveillance purposes.

### Principles of rational antibiotic use in influenza-like illness

1. Immunisation is the best protection against influenza.
2. Antibiotics are not beneficial in influenza-like illnesses when bacterial causes such as pneumonia have been clinically excluded.
3. People with influenza-like illnesses need written information about warning signs and actions to take for serious illness such as meningococcal disease.

### Immunisation is the best protection against influenza

Annual immunisation is free in New Zealand for the following groups of people:

A – All people 65 years of age and older

B – People under 65 years of age, including children with:

- cardiovascular disease (ischaemic heart disease, congestive heart failure, rheumatic heart disease, congenital heart disease, cerebrovascular disease)
- chronic respiratory disease (asthma if on regular preventive therapy; other chronic respiratory disease with impaired lung function)
- diabetes
- chronic renal disease
- any cancer, excluding basal and squamous skin cancers if not invasive
- other conditions (autoimmune disease, immune suppression, human immunodeficiency virus (HIV), transplant recipients, neuromuscular and central nervous system diseases, haemoglobinopathies, children on long term aspirin).

## Meningococcal disease may present as a flu-like illness

Meningococcal meningitis often presents with a headache but meningococcal septicaemia often does not and is much more difficult to diagnose. Meningococcal disease can affect anyone but rates among Māori and Pacific peoples are high. On average, Māori contract meningococcal disease at double the rate of Europeans; and Pacific peoples at four times the rate of Europeans. Approximately 80% of cases occur in people aged 0-19 years.

For all ethnic groups, the rate of disease is particularly high among children under five-years old. About half of all meningococcal disease cases occur in this age group. One in every 117 Māori children will get meningococcal disease by the time they reach five years. One in every 66 Pacific children and one in every 438 children of other ethnicities will get meningococcal disease by the time they turn five.

The occurrence of meningococcal disease is expected to drop following the introduction of the MeNZB vaccine programme, and the early signs look encouraging. In the meantime, people with flu-like illness, especially those under the age of 20 years should be given written information about looking for signs of meningococcal disease and what to do should they occur.

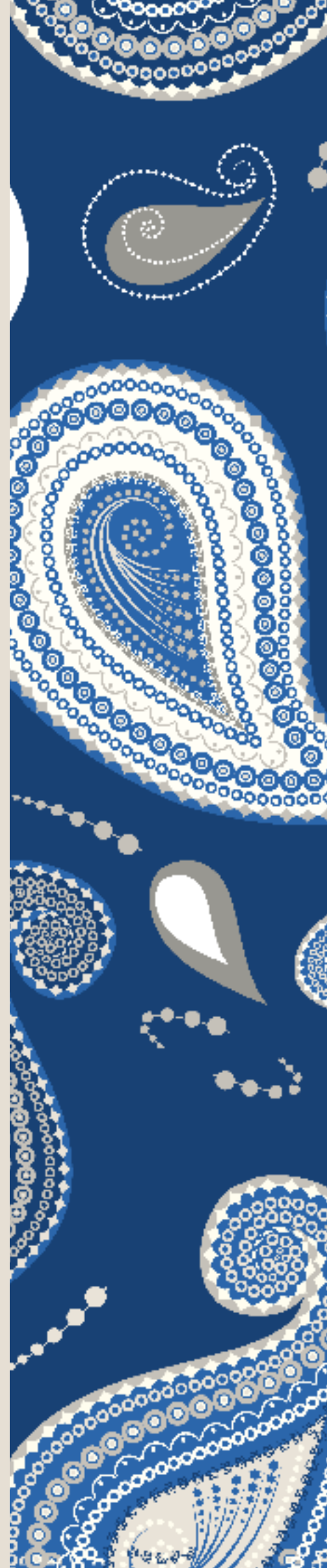
### *Order pamphlets*

You can order or download Ministry of Health pamphlets. Available through: <http://snipurl.com/sgg8>

### *Further reading:*

Meningococcal Disease. Ministry of Health. Meningococcal disease in New Zealand. Fact sheet one.

Available through: <http://snipurl.com/sgfp>



# 1e. Otitis Media in children

## Differentiating between AOM and OME

**Acute otitis media** is a purulent middle ear infection. Earache usually occurs in association with systemic upset such as irritability, restless sleep and fever.

Typical changes of the tympanic membrane include:

- Bulging with loss of normal landmarks,
- Change in colour (usually red or yellow), and
- Reduced mobility.

These symptoms and signs may have resolved because of perforation of the tympanic membrane and discharge of pus.

When acute symptoms have settled AOM frequently leaves a persistent middle ear effusion.

**Otitis media with effusion** is middle ear effusion with no signs of acute inflammation. The main symptom is hearing loss.

Examination reveals reduced mobility of the tympanic membrane on pneumo-otoscopy or tympanometry; and several of the following features on visualisation of the tympanic membrane:

- Abnormal colour such as yellow, amber, or bluish;
- Opacification other than due to scarring;
- Retraction; and
- Air bubbles or an air/fluid level.

## Principles for rational antibiotic use in otitis media

Episodes of otitis media need to be classified as acute otitis media (AOM) or otitis media with effusion (OME).

### Acute Otitis Media

- Most children with AOM can be treated with appropriate analgesia
- Antibiotic use is reserved for:
  - Children with systemic symptoms,
  - Children under three years with severe or bilateral AOM , and
  - Children under six months.
- A five-day course of high dose amoxicillin is appropriate for most children when antibiotics are indicated.

### Otitis Media with Effusion

- Persistent middle ear effusion (OME) after AOM is expected and does not require treatment.
- Antibiotic treatment is not usually recommended.

Table 1: Diagnostic features of AOM and OME

	Earache Fever Irritability	Middle ear effusion	Opaque drum	Bulging drum	Impaired drum mobility	Hearing loss
AOM	Present	Present	Present	May be present	Present	Present
OME	Usually absent	Present	May be absent	Usually absent	Present	Usually present

### **Most children with AOM do not benefit from antibiotics.**

Most episodes of AOM settle spontaneously without ongoing problems. Antibiotics have limited benefits; about 17 children with AOM need to be treated with a broad-spectrum antibiotic for one child to benefit, and their use is associated with a near doubling of the risk of vomiting, diarrhoea or rashes (Glasziou, 2002).

An appropriate strategy is to target the minority of children at higher risk of poor outcome by reserving antibiotics for:

- Children with systemic features (high temperature or vomiting) (Little, 2002),
- Children under three years with severe or bilateral AOM, and
- Children under six months (Kaleida, 1991).

Another useful strategy is to give a back pocket prescription for antibiotics, to be collected at the parents' discretion after 72 hours if the child has not improved. Most parents are comfortable with this approach and it reduces antibiotic use (Little, 2001; Arroll, 2003).

### **Five days of high dose amoxicillin is appropriate when antibiotics indicated in AOM.**

*Streptococcus pneumoniae* and *Haemophilus influenzae* are usually implicated in bacterial AOM. Amoxicillin is the drug of choice if an antibiotic is to be used. High doses are used to combat non-susceptible *S.pneumoniae*. The recommended dose is 15mg/kg (up to 500mg) TDS or 30mg/kg (up to 1000mg) BD, for five days. Cotrimoxazole and cefaclor are effective alternatives.

### **Decongestants and antihistamines are not useful in AOM.**

Given the lack of benefit and increased risk of side effects, the use of decongestant, antihistamine, or their combination is not useful for children with AOM (Flynn, 2002).

### **Paracetamol is the best option for analgesia in AOM.**

Paracetamol at a dose of 15 mg/kg four times per day is the most appropriate option for pain relief in AOM. However parents should be warned of the dangers of overdosage. Although non-steroidal anti-inflammatory drugs such as ibuprofen are effective, caution should be exercised due to the side effect profile of this class of drugs.

Two randomised controlled trials show no benefit of inserting oils in reducing pain in AOM.

### **Referral for AOM**

There are no trials of when referral is indicated for AOM. This is usually appropriate and urgent when there are serious complications, such as mastoiditis; and it may be required when a patient has several recurrences in a short time span; or a perforation is slow in healing.

## **Management of OME**

OME is a very common condition that usually resolves spontaneously and despite common belief the evidence for its impact on learning difficulties is limited.

### **Antibiotics are not usually helpful for children with OME.**

There is some short-term benefit from the use of antibiotics. However they have little influence on long-term outcomes and the incidence of side effects including diarrhoea, skin rashes, allergy development, anaphylaxis and development of resistant strains of organism is considerable.

**There is no evidence to support the routine use of antihistamines, decongestants or mucolytics in the management of OME.**

Studies considering interventions with antihistamines, decongestants or mucolytics show no convincing benefits on the clearance of middle ear effusions.

**Topical or systemic steroid therapy is not recommended in OME.**

Review of the literature concluded that the use of steroids could not be recommended for OME (Butler, 2002).

### **Referral**

For children under three years with OME and mild to moderate hearing loss (<25 dB) and no other problems, there is consistent evidence that watchful waiting is as good as early surgery (Paradise, 2000, Rovers, 2000). It should be noted that children in these trials all underwent audiometry to exclude a more serious degree of hearing loss.

Some trials, which included children over three years and those with behavioural or language problems have shown some benefit (Maw, 1999, Wilks, 2000).

#### *Further reading:*

Scottish Intercollegiate Guidelines Network. (2003) Diagnosis and management of childhood otitis media. Guideline 66. Available from: <http://www.sign.ac.uk/guidelines/fulltext/66/index.html>



# 1f. Croup and epiglottitis

Croup can be clinically diagnosed in children with typical barking cough, stridor, hoarse voice, other signs of respiratory distress and relatively mild systemic upset. It may be confused with epiglottitis, inhaled foreign body, bacterial tracheitis or retropharyngeal abscess.

## Most children with croup can be treated at home

Children with croup with the following features may be suitable for management at home:

- Minimal stridor at rest,
- No sternal retraction,
- No signs of hypoxia, and
- Not significantly distressed.

For children managed at home oral steroids started on day one may help prevent deterioration on day two or three. Prednisolone (Redipred®) at a dose of 1 to 2 mg/kg per day is given for 3 to 4 days.

There is no evidence that inhaled mist or steam is helpful but some children do improve with a change in air temperature. Review will be necessary if there are signs of deterioration such as sternal retraction, restlessness or lethargy.

## When epiglottitis is suspected parenteral antibiotics may be indicated

Epiglottitis is rare now thanks to the use of Hib immunisation. The following table from the Starship Children’s Health Clinical Guideline helps distinguish epiglottitis from severe croup.

**Table 2: Guidance to help distinguish epiglottitis from severe Croup**

	Croup	Epiglottitis
<b>Onset</b>	Days	Hours
<b>Fever</b>	++	+++
<b>Cough</b>	+++	-
<b>Drooling</b>	+	++
<b>Activity</b>	Upset	Lethargic
<b>Signs of obstruction</b>	+++	+
<b>Stridor</b>	Inspiratory, high pitched	Soft expiratory snore

## Principles of rational antibiotic use in croup and epiglottitis

1. Antibiotics are not indicated in the treatment of croup.
2. Epiglottitis is rare but may be confused with severe croup.
3. Parenteral antibiotics are indicated when epiglottitis is suspected.

### Further reading:

Croup. Starship Children’s Health Clinical Guideline. Available through: <http://snipurl.com/se8o>

Although epiglottitis is rare, practitioners, especially those in rural areas, need to be ready if they encounter it. Localities vary in the systems they have in place for dealing with this emergency and practitioners need to know what the local system is and how to initiate it.

# 1g. Pertussis

Pertussis continues to cause problems in New Zealand primarily because we do not immunise our children adequately.

Pertussis has an incubation period of 7 to 20 days. The clinical case definition in New Zealand is cough for more than 14 days with one or more of whoop, cyanosis, post-tussive vomiting or apnoea for which there is no other known cause. The peak of severity usually does not occur until the cough has been present for three weeks.

Pertussis should be suspected before the 14 days when these symptoms are present particularly if there are no signs of tachypnoea, wheeze or crackles because it is highly communicable in the early stages. The communicable period continues for three weeks in persons not treated with antibiotics, or until 5 days of a 14-day course of erythromycin.

## Diagnosis of Pertussis is usually confirmed by pernasal swab.

Confirmation of the diagnosis is usually by a pernasal swab, which is passed gently along the base of the nasal cavity to reach the posterior nares. Cultures are only positive in the catarrhal phase and the first week of paroxysmal coughing. Serology can also be done but the interpretation of the results can be problematic.

## Erythromycin is recommended for treatment and prophylaxis

Erythromycin is the recommended treatment for cases and prophylaxis for certain contacts. The initiation of erythromycin is not delayed until the results of the swab are available. The dose is 40-50 mg/kg per day (maximum 2 g per day) in divided doses for 14 days. Cotrimoxazole is an alternative but it is not as effective.

Treat all household members with a 14-day course of erythromycin if the household includes either:

- A child under one year other than the case, or
- A woman late in the third trimester.

## Reducing the spread of infection

- Exclude all pre-schoolers from pre-school if they have had pertussis and exclude children under 10-years who are not fully immunised from school, until they:
  - have had five days of a 14-day course of erythromycin, or
  - for 14 days after their last exposure to infection.
- Consider swabbing other symptomatic siblings.
- Notify cases to the Medical Officer of Health.

### Principles of rational antibiotic use for pertussis

1. The evidence of benefit for erythromycin on the course of the illness is relatively poor.
2. Erythromycin reduces the length of time that people with pertussis are culture positive.

#### Further reading:

Pertussis. Starship Children's Health Clinical Guideline.

Available through: <http://snipurl.com/se8j>

Pertussis: GP flowchart, Immunisation Advisory Centre. Available through:

<http://snipurl.com/oez4>

# Part 2

## Rational Use of Antibiotics in Lower Respiratory Tract Infections in Adults

---

### 2a. Acute bronchitis

Acute bronchitis is diagnosed clinically when a previously well person presents with cough with sputum production, dyspnoea or widespread wheeze. Localised, focal chest signs or severe systemic upset are absent. It is usually a mild, self-limiting virus infection. There is some doubt whether the condition actually exists. Most cases are in fact either the common cold, asthma, pneumonia or an exacerbation of COPD (Arroll, 2001).

Previously healthy people with acute bronchitis do not get significant benefit from antibiotic use. Patient understanding of this may be improved if the term viral bronchitis is used.

Cough may last for four weeks but duration or severity of symptoms is not significantly changed by antibiotics, beta-agonist or cough medicines. Smoke avoidance is beneficial and paracetamol and high fluid intake may be helpful if the patient has a high fever.

If a patient has a significant comorbidity, looks sick or is over 55 years empirical treatment with amoxicillin, erythromycin or doxycycline may be appropriate. Amoxicillin-clavulanate is better reserved for the few occasions where first line agents have not been effective.

#### Principles for rational antibiotic use for acute bronchitis

1. Antibiotics are not indicated for previously healthy people with acute bronchitis.
2. The presence of mucopurulent sputum is not an indication for antibiotic use.
3. Antibiotics may be useful for people over the age of 55 years who look sick.

## 2b. Community acquired pneumonia

Community acquired pneumonia can be diagnosed clinically, without the need for microbiological and radiological investigations, when a patient acquires a lower respiratory tract infection in the community and has:

- New focal chest signs,
- Systemic illness such as sweating, aches and pains or temperature  $> 38^{\circ}\text{C}$ , and
- No other explanation for the illness.

### Many adults with CAP can be treated safely at home

Adults with CAP who are less than 50 years of age and have no significant comorbidities and no psychosocial barriers to home care can be managed at home as non-severe CAP as long as they have **all** of the following features:

- No new mental confusion,
- Respiratory rate  $< 30/\text{min}$ ,
- Systolic BP  $> 90$  and diastolic  $> 60$ , and
- $\text{pO}_2$  (if available) of  $> 85$ .

People who do not meet these criteria for home care are likely to benefit from hospital assessment or admission.

### Amoxicillin remains the first line agent for CAP in the community

The preferred antibiotic for CAP treated in the community is amoxicillin 500 mg – 1.0 g three times daily. Erythromycin 500 mg four times daily is a suitable alternative for those people who are allergic to penicillin.

### Principles for antibiotic use in community acquired pneumonia (CAP)

1. Only a small range of pathogens cause CAP, the commonest is *S. pneumoniae*.
2. People with non-severe community acquired pneumonia can be given empirical antibiotic treatment at home without the need for microbiological and radiological investigations.
3. People with severe CAP need hospital admission and empirical antibiotics may be started if a delay to admission of more than two hours will occur.
4. Amoxicillin at higher doses remains the preferred agent for community managed CAP with erythromycin for those who are allergic to penicillin.
5. A combination of these two agents may be appropriate in localities with high prevalence of legionella.

These antibiotics are also appropriate for patients with severe CAP who will experience some delay in receiving hospital treatment. Patients who cannot take oral medication may be given penicillin G or erythromycin parentally.

This recommendation of the British Thoracic Society takes into account the rarity of failures of penicillin treatment even among penicillin resistant pneumococcal pneumonia, the uncommon occurrence of beta-lactamase producing strains of *H. influenzae* or *M. catarrhalis* as causes of CAP, and concerns about the safety of newer agents and the development of resistant strains to them.

When there is higher prevalence of legionella in the local community it is appropriate to combine amoxicillin and erythromycin as first line therapy.

A view that specific pathogens are associated with other comorbidities, such as COPD or influenza, is not supported by the literature.

Patients who are managed at home who no longer fit the criteria for home care or do not improve in 48 hours require hospital assessment and probable admission.

#### *Further reading*

Guidelines for the management of community acquired pneumonia in adults. British Thoracic Society. 2001 updated 2004. Available through <http://snipurl.com/sccm>

## 2c. COPD

Studies on the role of antibiotics in the management of exacerbations of COPD are difficult to interpret owing to high rates of bacterial colonisation in the sputum of people with COPD. There is increasing evidence that many exacerbations are caused by viruses and other unidentified causes. It appears that bacterial infection plays either a primary or secondary role in approximately 50% of exacerbations of COPD.

### **Principles of rational antibiotic use in COPD**

1. Prophylactic antibiotic therapy is not recommended in the management of stable COPD.
2. People with exacerbations but without more purulent sputum or signs of pneumonia do not need antibiotic therapy.
3. People with exacerbations accompanied by increase in purulent sputum production may benefit from amoxicillin or doxycycline.

## Antibiotics are only indicated in COPD exacerbations with more purulent sputum or clinical signs of infection.

Exacerbations with clinical signs of infection (increased volume and change in colour of sputum and/or fever, leucocytosis) may benefit from antibiotic therapy. The earlier this is commenced the better and patients benefit from having a home supply of antibiotics so that they can initiate treatment themselves.

When antibiotics are indicated either amoxicillin or doxycycline for 7 to 10 days is appropriate as first line therapy. A response is usually seen within three to five days. If there is not a satisfactory response by then a change to amoxicillin–clavulanate can be made.

Signs of pneumonia should be sought and if found treated appropriately.

Systemic glucocorticoids reduce the severity of and shorten recovery from acute exacerbations.

## Influenza vaccination is beneficial for people with COPD

In people with COPD annual influenza vaccination reduces the risk of exacerbations, hospitalisation and death from respiratory disease and all causes.

The vaccine usually contains three strains which are adjusted annually according to epidemiological data. The vaccine should be given in early autumn to all patients with moderate to severe COPD. A second vaccination in winter increases antibody levels and should be considered for severely immunocompromised patients.

Influenza vaccine is available fully subsidised on the Pharmaceutical schedule between 1 March and 30 June each year for patients with chronic respiratory disease.

## Pneumococcal vaccination prevents pneumococcal pneumonia

Pneumococcal vaccination is very effective in preventing invasive bacteraemic pneumococcal pneumonia, but may be less effective in elderly or immunosuppressed patients. There is no firm evidence that the vaccine is effective in preventing pneumococcal exacerbations of COPD but there are overriding benefits in preventing pneumonia in patients with already reduced respiratory reserve. Pneumococcal vaccination (polyvalent covering 23 virulent serotypes – Penumovax-23) is recommended but not currently funded for patients with chronic pulmonary disease. Vaccination should be avoided in patients with severely compromised cardiovascular or pulmonary function in whom a systemic reaction would pose a greater risk.

## No evidence that *Haemophilus influenzae* vaccination beneficial in COPD

There is no evidence that currently available vaccines for *Haemophilus influenzae* in New Zealand are effective in reducing the incidence or severity of bronchitic episodes.

### Further reading

The COPD-X Plan: Australian and New Zealand Guidelines for the management of Chronic Obstructive Pulmonary Disease, 2006. Available through:

<http://snipurl.com/sfuz>

COPD POEM. bpac<sup>nz</sup>. April 2005. Available through:

[www.bpac.org.nz](http://www.bpac.org.nz)

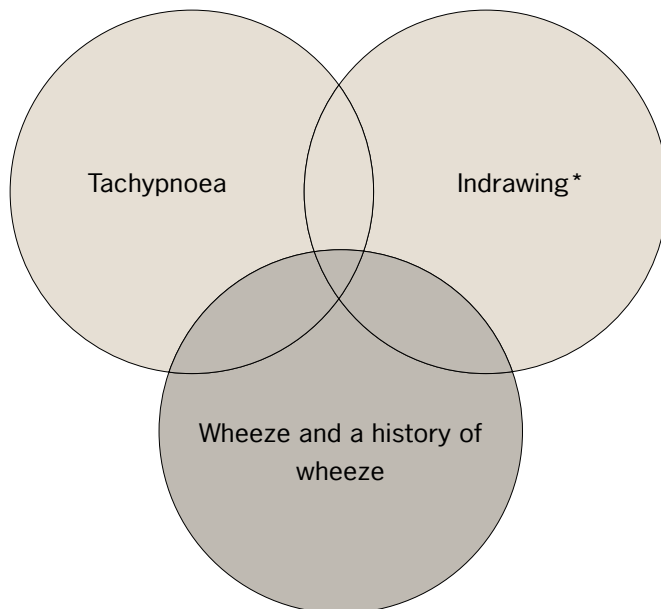
# Part 3



## Rational Use of Antibiotics in Lower Respiratory Tract Infections in children

Pneumonia, bronchiolitis and asthma are all common in children. Children with pneumonia are likely to benefit from antibiotic treatment but children with bronchiolitis or asthma are not.

### 3a. Pneumonia

**Figure 1: Child presents with cough or breathing difficulty**



-  Child does not have pneumonia
-  Child has pneumonia

#### Principles of rational antibiotic use in LRTI in children

1. The diagnosis of pneumonia needs to be considered.
2. Many children with pneumonia and no significant co-morbidities can be treated at home.
3. The principal guide to antibiotic choice for community management of pneumonia is the age of the child.
4. Antibiotics are not indicated in the management of bronchiolitis or asthma.
5. Antibiotics do not prevent pneumonia in children with upper respiratory tract infections.

\*Indrawing indicates severe pneumonia. A child with indrawing with a first episode of wheezing should be treated as if this illness is severe pneumonia even though the diagnosis may be proved incorrect in the subsequent 24-48 hours.

Adapted from WHO algorithm for diagnosing pneumonia.

## Tachypnoea, chest indrawing and absence of wheeze are the principle signs for the diagnosis of pneumonia in pre-school children

A pre-school child can be assumed to have pneumonia if they have tachypnoea or chest indrawing and do not have a current wheeze with a past history of wheeze. Nasal flaring, grunting or crepitations increase the probability of pneumonia. Atypical presentations include abdominal pain and meningismus.

The absence of tachypnoea reduces the likelihood of pneumonia. If there is no respiratory distress, tachypnoea, crackles or decreased breath sounds there is no pneumonia.

The presence or absence of fever is not a useful sign in the diagnosis of pneumonia in young children.

## Many children with pneumonia can be treated at home

Children with pneumonia and no significant co-morbidities with the following features may be suitable for treatment at home.

- Over 6 months
- Do not look toxic
- Mild respiratory symptoms
- Drinking well
- Able to take oral medication
- No skin abscesses
- Pneumonia is not a consequence of chickenpox, influenza or measles.\*

\*The presence of skin abscesses or recent chickenpox, influenza or measles may be associated with staphylococcal pneumonia which is a paediatric emergency.

**Table 3: The WHO definition of tachypnoea is age dependent**

<b>Age</b>	<b>Tachypnoea</b> Respiratory rate counted over 60 seconds
< 2 months old	> 60 breaths per minute
2-12 months	> 50 breaths per minute
12 months to 5 years	> 40 breaths per minute

## Age of the child is the best guide to antibiotic use in community management of childhood pneumonia

Sputum samples, swabs, CBC, CRP or CXR do not usually determine if pneumonia is viral or bacterial or which antibiotic would be most appropriate. Age is the best guide to the causative agent and therefore antibiotic choice.

For children with pneumonia suitable for treatment at home the following antibiotics are recommended in Table 4.

**Table 4: Age guide for antibiotic use**

Age under 5 years	Amoxicillin 50 mg/kg per day (max 500 mg per dose) in three divided doses for 7 to 10 days
Age over 5 years	Erythromycin 40 mg/kg per day (max 500 mg per dose) in four divided daily doses

## 3b. Bronchiolitis

Bronchiolitis can be diagnosed clinically when a child up to the age of 12 months does not meet the criteria for a diagnosis of pneumonia and has cough, tachypnoea or hyperinflation of the chest and examination reveals widespread crepitations and wheeze. It is often difficult to differentiate between bronchiolitis and an episode of acute asthma. The presence of atopy, previous wheeze or strong family history of atopy increases the likelihood of asthma.

### Antibiotics are not indicated for bronchiolitis

Bronchiolitis is a viral infection (usually respiratory syncytial virus) and does not respond to antibiotics. The symptoms peak at 2 to 3 days and resolve over 7 to 10 days but cough may persist for several weeks.

### Many children with bronchiolitis can be managed at home

Children with bronchiolitis who are feeding and behaving normally may be suitable for community management if they have:

- Only mild wheeze,
- No or mild chest indrawing,
- No cyanosis,
- Heart rate < 160, and
- Respiratory rate <60.

Steroids or beta-agonists are not indicated in the community management of bronchiolitis.

### Further reading:

Acute pneumonia in infants and children. Starship Children's Health Clinical Guideline. Available through: <http://snipurl.com/se3q>

Bronchiolitis. Starship Children's Health Clinical Guideline. Available through: <http://snipurl.com/scii>

# Appendices

## Appendix one

**Table 5: A clinical score to reduce unnecessary antibiotic use in patients with sore throat**

Criteria	Point	Score
Temp > 38°C	1	
No cough	1	
Tender anterior cervical adenopathy	1	
Tonsillary Swelling or exudates	1	
Age 3-14 yr	1	
Age 15-44 yr	0	
Age ≥ 45 yr	-1	
	<b>Total score =</b>	

If you score 4 then you have a high likelihood of growing GABHS on throat swab.

McIsaac WJ et al A clinical score to reduce unnecessary antibiotic use in patients with sore throat. Can Med Assoc J 1998;158:75-83.

## Upper respiratory Tract Infections

Illness	Comments	Antibiotic (if indicated)
<b>Consider delayed antibiotic prescriptions for upper respiratory tract infections</b>		
<b>Influenza</b>	<b>Annual vaccination is essential for all those at risk of influenza.</b>	
<b>Pharyngitis, sore throat &amp; tonsillitis</b>	<b>The majority of sore throats are viral; most patients do not benefit from antibiotics.</b> <b>Main indications is rheumatic fever prophylaxis to those at high risk.</b>	
	Patients with severe symptoms or children with history of otitis media may benefit from antibiotics <sup>A</sup> . Antibiotics only shorten duration of symptoms by 8 hours <sup>A+</sup> . You need to treat 30 children or 145 adults to prevent one case of otitis media. <sup>A+</sup>	
	Twice daily higher dose can be used. <sup>A</sup> QDS may be more appropriate if severe. <sup>D</sup>	1st line phenoxymethylpenicillin 500 mg BD-QDS for 10 days <i>if allergic to penicillin</i> erythromycin 500 mg BD or 250 mg QDS (less side effects) for 10 days
<b>Otitis media (child doses)</b>	<b>Many are viral. Resolves in 80% without antibiotics.<sup>A+</sup></b> Poor outcome unlikely if no vomiting or temp <38.5°C. <sup>A</sup> Use paracetamol. <sup>A</sup> for pain relief. Antibiotics indicated for children under six months, young children with severe local symptoms or children with systemic symptoms.	
	Antibiotics do not reduce pain in first 24 hours, subsequent attacks or deafness. <sup>A+</sup> Need to treat 20 children >2yrs and seven 6-24m old to get pain relief in one at 2-7 days. <sup>A+B+</sup>  Haemophilus is an extracellular pathogen, thus macrolides, which concentrate intracellularly, are less effective treatment.	1st line amoxicillin 15mg/kg (up to 500mg) TDS, or 30mg/kg (up to 1000mg) BD <i>if allergic to penicillin</i> cotrimoxazole 8/40 mg/kg/day for 5 days divided into 12 hourly doses  2nd line amoxicillin-clavulanate <b>1 - 6 yrs</b> 156 mg TDS for 5 days <b>6 - 12 yrs</b> 312 mg TDS for 5 days
<b>Rhinosinusitis acute or chronic</b>	Many are viral. Reserve antibiotic for severe <sup>B+</sup> or symptoms >10 days.  If failure to respond use another first line antibiotic	amoxicillin <sup>A+</sup> 500 mg TDS for 7 days <b>or,</b> doxycycline 200 mg stat/100 mg OD for 7 days <b>or,</b> erythromycin 250 mg QDS/500mg BD for 7 days <b>or,</b> phenoxymethylpenicillin <sup>A+</sup> 500 mg TDS for 7 days

## Lower Respiratory Tract Infections

Illness	Comments	Antibiotic (if indicated)
<b>Note: Avoid tetracyclines in pregnancy. Low doses of penicillins are more likely to select out resistance.</b>		
<b>Acute bronchitis</b>	Systematic reviews indicate antibiotics have marginal benefits in otherwise healthy adults. <sup>A+</sup> Reserve antibiotics for older people who look sick. Patient leaflets can reduce antibiotic use. <sup>B+</sup>	amoxicillin 500mg TDS for 5 days <b>or</b> , doxycycline 200 mg stat/100 mg OD for 5 days
<b>Acute exacerbation of COPD</b>	Approximately 50% bacterial. Antibiotics not indicated in absence of purulent/mucopurulent sputum. <sup>B+</sup> Most valuable if increased dyspnoea and increased purulent sputum. <sup>B+</sup> In penicillin allergy use erythromycin if tetracycline contraindicated.	amoxicillin 500 mg TDS for 5 days <b>or</b> , doxycycline 200 mg stat/100 mg OD for 5 days  erythromycin 250 - 500 mg QDS for 5 days  <i>2nd line</i> amoxicillin-clavulanate 625 mg TDS for 5 days
<b>Community-acquired pneumonia - treatment in the community</b>	Start antibiotics immediately. <sup>B</sup> If no response in 48 hours or local high prevalence of legionella consider amoxicillin plus erythromycin <sup>C</sup> In severely ill give parenteral benzylpenicillin before admission <sup>C</sup> and seek risk factors for Legionella.	amoxicillin 500 mg - 1g TDS for up to 10 days <b>or</b> , erythromycin 500 mg QDS for up to 10 days
<b>Meningitis</b>		
<b>Suspected meningococcal disease</b>	Transfer all patients to hospital immediately. Administer benzylpenicillin prior to admission, unless history of anaphylaxis, <sup>B</sup> NOT allergy. Ideally IV but IM if a vein cannot be found.	IV or IM benzylpenicillin Children < <b>1 yr</b> 300 mg Children <b>1 - 9 yr</b> 600 mg Children <b>10 yr and over</b> 1200 mg

Note: Doses are oral and for adults unless otherwise stated. Please refer to BNF for further information.

Adapted from Health Protection Agency, UK. Original table available through <http://snipurl.com/sqi4>

Letters indicate strength of evidence: A+ = systematic review; D = informal opinion

Produced 2001 - Reviewed April 2006 - Amended May 2006.

## References

Arroll, B. and Kenealy, T. (2001). Antibiotics for acute bronchitis. Four reviews and still no answers. *BMJ*, 322, 939-940.

Arroll, B. (2005). Antibiotics for upper respiratory tract infections: an overview of Cochrane reviews. *Respiratory Medicine*, 99, 255-261.

Arroll, B., Kenealy, T., and Kerse, N. (2003). Do delayed prescriptions reduce antibiotic use in respiratory tract infections? A systematic review. *British Journal of General Practice*. 53, 871-7.

Arroll, B. (2005). Antibiotics for upper respiratory tract infections: an overview of Cochrane reviews. *Respiratory Medicine*, 99, 255-261.

Bjerrum, L., Boada, A., Cots, J., Llor C., Fores Garcia D., Gahrn-Hansen, B and Munck, A. (2004). Respiratory tract infections in general practice: considerable differences in prescribing habits between general practitioners in Denmark and Spain. *Eur J Clin Pharmacol*, 60, 23-8.

Butler, C. and van der Voort, J. (2002). Oral or topical nasal steroids for hearing loss associated with otitis media with effusion in children (Cochrane Review). In: *The Cochrane Library*, Issue 2. Oxford: Update Software.

EBM Reviews - Cochrane Database of Systematic Reviews  
Accession Number 00075320-100000000-00197. Author  
Kozyrskyj, AL; Hildes-Ripstein, GE; Longstaffe, SEA; Wincott,  
JL; Sitar, DS; Klassen, TP; Moffatt, MEK. Group NameCochrane  
Acute Respiratory Infections Group. TitleShort course antibiotics  
for acute otitis media. SourceCochrane Database of Systematic  
Reviews. 1, 2006. Date of Most Recent Amendment 02-17-2005  
Date of Most Recent Substantive Amendment 02-18-2000.

Flynn, C., Griffin, G. and Tudiver, F. (2002). Decongestants and antihistamines for acute otitis media in children (Cochrane Review). In: *The Cochrane Library*, Issue 2, Oxford: Update Software.

Glasziou, P., Del Mar, C., Sanders, S. and Hayem, M. (2002). Antibiotics for acute otitis media in children (Cochrane Review). In: *The Cochrane Library*, Issue 2, Oxford: Update Software.

Hefferman, H. (2002). Annual summaries bacteriology. *Lablink* 10, 9.

Kaleida, P., Casselbrant, M., Rockette, H., Paradise, J., Bluestone, C. and Reisinger K, et al. (1991). Amoxicillin or myringotomy or both for acute otitis media: results of a randomized clinical trial. *Pediatrics*, 87, 466-74.

Little, P., Gould, C., Moore, M., Warner, G., Dunleavy, J. and Williamson, I. (2002). Predictors of poor outcome and benefits from antibiotics in children with acute otitis media: pragmatic randomised trial. *BMJ*, 325, 22.

Little, P., Gould, C., Williamson, I., Moore, M., Warner, G. and Dunleavy, J. (2001). Pragmatic randomised controlled trial of two prescribing strategies for childhood acute otitis media. *BMJ*, 322, 336-42.

Marcy, M., Takata, G., Shekelle, P., Mason, W., Wachsman, L. and Ernst, R. et al. (2001) Management of acute otitis media. Rockville (MD): Agency for Healthcare Research and Quality; Evidence Report/Technology Assessment No. 15. AHRQ Publication No. 01-E010. [cited 16 Jul 2004]. Available from url: <http://www.ncbi.nlm.nih.gov/books/bv.fcgi?call=bv.View..ShowSection&rid=hstat1.chapter.21026>

Maw, R., Wilks, J., Harvey, I., Peters, T. and Golding, J. (1999). Early surgery compared with watchful waiting for glue ear and effect on language development in preschool children: a randomised trial. *Lancet*, 353, 960-3.

Molstad, S. and Cars, O. (1999). Major changes in the use of antibiotics Following a national programme: Swedish Strategic Programme for the Rational Use of Antimicrobial agents and surveillance of resistance. *Scand J Infect Dis*, 31, 191-5.

Paradise, J., Feldman, H., Campbell, T., Dollaghan, C., Colborn, D. and Bernard, B. et al. (2000). Effect of early or delayed insertion of tympanostomy tubes for persistent otitis media on developmental outcomes at the age of three years. *N Engl J Med*, 344, 1179-87.

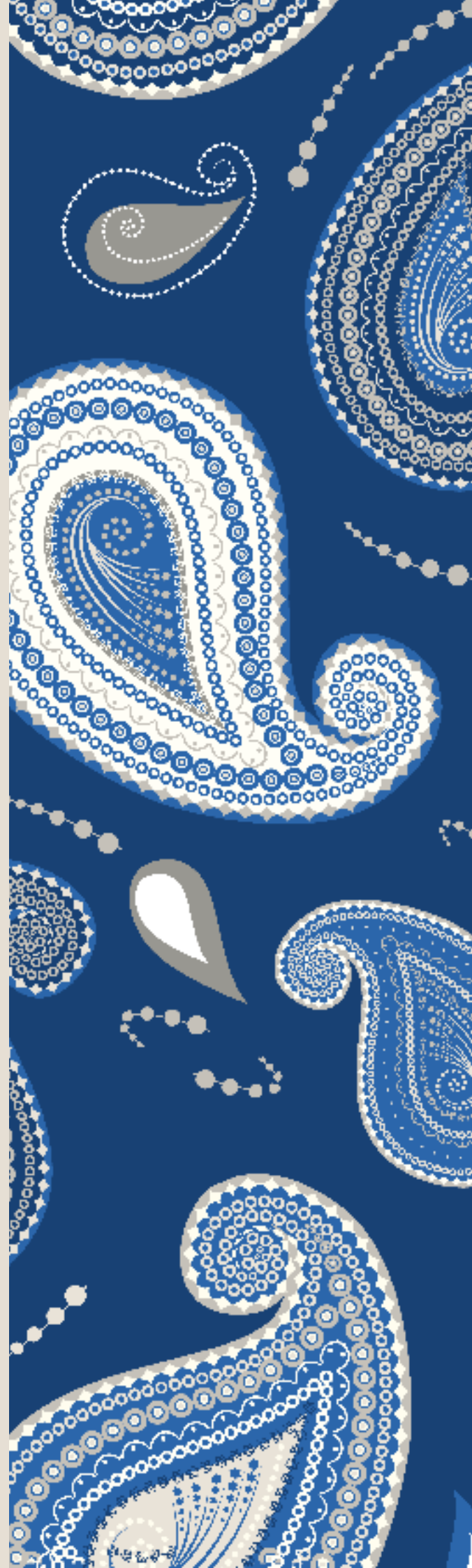
Reidpath, D., Glasziou, P., Del Mar, C. (1999). Systematic review of autoinflation for treatment of glue ear in children. *BMJ*, 318, 1177.

Rovers, M., Straatman, H., Ingels, K., van der Wilt, G., van den Broek, P. and Zielhuis, G. (2000). The effect of ventilation tubes on language development in infants with otitis media with effusion: a randomized trial. *Pediatrics*. 106, E42.

Steinman, M., Landefeld, C. and Gonzales, R. (2003). Predictors of Broad-Spectrum Antibiotic Prescribing for Acute Respiratory Tract Infections in Adult Primary Care. *JAMA*, 289, 719-725.

Scott, F., Dowell, S., MarcyDagger, M., William, P., Gerberparallel, M and Schwartz, B. (1998). Principles of Judicious Use of Antimicrobial Agents for Pediatric Upper Respiratory Tract Infections. *PEDIATRICS* Vol. 101 No. 1 Supplement, 163-165.

Wilks, J., Maw, R., Peters, T., Harvey, I. and Golding, J. (2000). Randomised controlled trial of early surgery versus watchful waiting for glue ear: the effect on behavioural problems in pre-school children. *Clin Otolaryngol*, 25, 209-14.





[www.bpac.org.nz](http://www.bpac.org.nz)