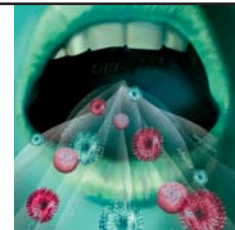




# Lower respiratory tract infections and community acquired pneumonia in adults



**BACKGROUND** Lower respiratory tract infections – acute bronchitis and community acquired pneumonia (CAP) – are important causes of morbidity in Australia. Acute bronchitis is often treated with antibiotics, although the cause is usually viral. Community acquired pneumonia may be fatal, particularly in the elderly, therefore appropriate assessment and management is essential.

**OBJECTIVE** This article describes the aetiology, clinical assessment, investigations and management of acute bronchitis and CAP in the community.

**DISCUSSION** Clinical assessment is important for acute bronchitis and CAP, with investigations such as C reactive protein, serology, and chest X-ray informing diagnosis and management of the latter. Causative organisms are usually not identified, but are presumed to be viral for acute bronchitis, and *Streptococcus pneumoniae* for CAP; although ‘atypicals’ are also important. Antibiotics should generally not be prescribed for acute bronchitis, however, there is some evidence they may provide limited benefits in patients who have chest signs, are very unwell, are older, have comorbidities, or smoke. In patients with CAP, treated outside of hospital, the combination of amoxicillin and doxycycline/roxithromycin is the treatment of choice.

Lower respiratory tract infection (LRTI), acute bronchitis (excluding acute on chronic bronchitis), chest infection, and acute cough are terms used by general practitioners around the world to describe a constellation of respiratory symptoms and signs in patients presenting with acute cough (Table 1). The severity of illness varies from a distressing dry cough with a clear chest through to an influenza-like illness with high fever, sputum and abnormal chest signs that may suggest community

acquired pneumonia (CAP).

In Australia, consultation for acute bronchitis is very common (3.5 per 100 consultations), with antibiotics being prescribed in about 75% of cases with nearly half of these having abnormal chest signs or being very unwell.<sup>1</sup> In contrast, the average GP will see approximately two cases of CAP per 1000 population per year.<sup>2</sup> This figure is similar to the United States with 267 per 100 000 population hospitalised with CAP in 1991 and an overall case fatality rate of 8.8%.<sup>3</sup>

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### Case history 1

Mrs Jones, 38 years of age, is a nonsmoking mother of two young children. Her children have been coughing for a couple of weeks and are slowly getting better, but now Mrs Jones has developed a cough. She has some chest discomfort but no fever or sputum. A cough suppressant has not helped and she wants to know if antibiotics would be useful. Clinical examination is normal. The viral cause and expected natural history, including duration of symptoms of her illness is explained. She is given an information leaflet, encouraged to return if she develops fever and shortness of breath and is reassured that her illness is not serious.

### Lessons

Acute bronchitis is usually self limiting. Patients should be given realistic expectations about how long their cough will last (on average 2–3 weeks) and given practical written advice about its management.

Table 1. Definition of acute bronchitis

Acute cough of less than 14 days duration with at least one other respiratory tract symptom

- URTI symptoms, eg. rhinitis or sore throat
- Sputum production
- Dyspnoea
- Wheeze
- Chest discomfort

There should be no other obvious cause, eg. asthma, sinusitis, COPD

## Diagnosis and investigations

### Acute bronchitis

The diagnosis of acute bronchitis is usually clinical (*Case history 1, Table 1*). However, if a patient has a high fever, sore throat and malaise associated with a cough (productive or otherwise), nasal and throat swabs for polymerase chain reaction (PCR) may be appropriate. Chest X-ray should be considered if a patient has any combination of:

- heart rate >100 minute
- respiratory rate >24 minute
- temperature >38°C
- night sweats, or
- focal chest signs.

Acute bronchitis is associated with bronchial obstruction and inflammation, so wheezy sounds can often be heard on auscultation. However, this is usually transitory and resolves after the infection clears.<sup>4</sup> If wheeze has been a recurrent problem – and a troublesome symptom, spirometry would be helpful in determining diagnosis.

General practitioners in Scandinavian countries use

### Case history 2

Mr Smith, 22 years of age, is a single man living with his parents. He presented with a flu-like illness, was examined and told to rest, use paracetamol every 4 hours and drink plenty of fluids. Because he was quite unwell, serology for influenza, full blood count and CRP were taken. He re-presented to another doctor in the same practice 2 days later, a CRP of >100 was noted and bronchial breath sounds (but only just) on the RLL. Chest X-ray that afternoon revealed pneumonia. He was commenced on augmentin and asked to return for review in 2 days. He developed severe diarrhoea, attended an emergency department and was subsequently admitted for 3 days of intravenous antibiotics and hydration. He had a subsequent uneventful recovery.

### Lessons

Chest sounds may not always be present, even if consolidation is found on chest X-ray. CRP is a useful test to heighten clinical suspicion. Augmentin is more likely to cause diarrhoea than the recommended combination of amoxicillin plus doxycycline or roxithromycin. Augmentin does not have activity against the 'atypicals'.

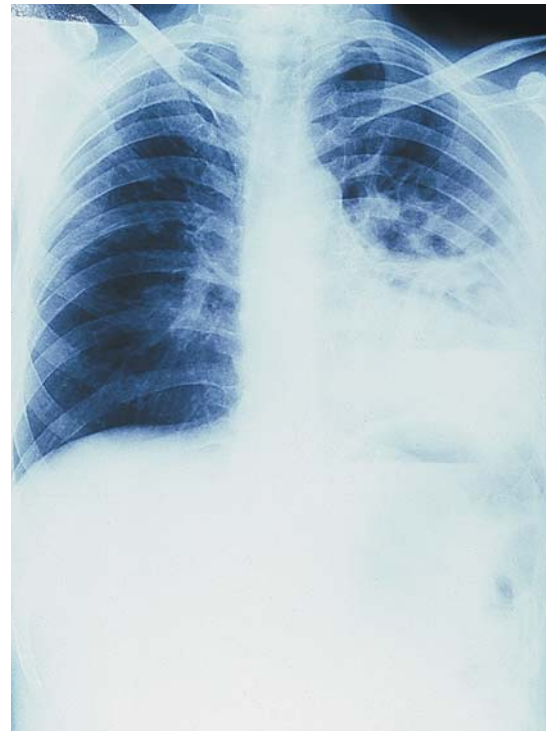


Figure 1. Left lung lower lobe consolidation

point of care C reactive protein (CRP) tests to predict which patients may benefit from antibiotic. A high and sustained CRP indicates a more severe and possibly bacterial infection. Sputum culture is of limited value in community settings because of nasopharyngeal contamination, and it is thought that outcomes are unrelated to the identified pathogen.<sup>5</sup>

## CAP

It is not easy to diagnose CAP based solely on the clinical examination (*Case history 2*) because although the clinical signs can include fever, productive cough, tachypnoea, chest pain, crackles or bronchial breath sounds on auscultation, these may also be absent. Chest X-ray should be performed in suspected cases. Unfortunately even the gold standard of chest X-ray – showing consolidation or infiltrates – may be reported 'normal' early in atypical pneumonias (*Figure 1*). A high degree of clinical suspicion is helpful in:

- the elderly
- those with comorbidities, and
- those who fail to improve over time.

In addition to chest X-ray, investigations for suspected pneumonia should include:

- full blood count (usually normal in viral infections)
- blood cultures
- paired serological tests for mycoplasma, chlamydia, legionella and viral infections if an atypical infection is suspected, and
- pertussis serology (in those with persisting cough especially if presentation occurs during an outbreak).

Aspiration pneumonia due to anaerobic organisms should be considered in patients with:

- neurological disorders (eg. myasthenia gravis)
- dysphagia or oesophageal disease
- dental sepsis
- altered consciousness, or
- terminal illness.

It should be remembered that the goal of investigations is to confirm the diagnosis, identify an organism to guide treatment, and help assess the severity of the illness throughout management. Follow up radiography in 2–3 weeks should be performed to exclude any pathology particularly in (ex)smokers.

## Management

### Acute bronchitis

Current Australian antibiotic guidelines do not recommend antibiotics for acute bronchitis as it is predominately of viral origin. Studies have found a

**Table 2. Causes of atypical pneumonia**

**Mycoplasma** – occurs in outbreaks with an incubation period 2–3 weeks. Fever headache and cough prominent. Chest signs may be minimal despite radiographic changes

**Chlamydia** – similar to mycoplasma but does not occur in epidemics

**Legionella** – spread via water droplets (potable water and cooling towers), symptoms include diarrhoea, high fever, hyponatraemia, neutrophils but no organisms in gram stain of respiratory secretions

mixed viral, bacterial and atypical picture;<sup>6</sup> the usual pathogens isolated being *M. pneumoniae*, *C. pneumoniae* and *B. pertussis*,<sup>7–9</sup> although *S. pneumoniae*, *H. influenzae* and *M. catarrhalis* have also been implicated in some individuals.<sup>9</sup> Nevertheless, systematic reviews of antibiotic treatment have demonstrated only modest benefits and these are probably offset by side effects.

In an effort to identify who may benefit, some GPs assign prognostic significance to the colour of sputum, however, there is no evidence the appearance of sputum is related to bacterial colonisation or the efficacy of antibiotics.<sup>10</sup> Chest signs are also used to determine who may receive antibiotics.<sup>11</sup> An association between the presence of focal chest signs and radiographic pneumonia has been reported,<sup>6</sup> although this does not mean that all patients with chest signs will benefit from their use. Fever may also be an important sign, but probably only in association with other factors such as age, respiratory rate, pulse and comorbidities.<sup>12</sup>

Clearly those with cough and who are systemically well, will probably not benefit from antibiotics. For these patients, GPs can suggest the use of fluids and paracetamol, along with rest and sickness certification as appropriate. The use of bronchodilators for acute bronchitis although common is not supported by recent research<sup>13</sup> and there is not enough evidence for or against the use of cough suppressants.<sup>14</sup> If antibiotics are expected or requested by the patient, simple strategies such as delayed prescribing<sup>15</sup> and patient information leaflets<sup>16</sup> can reduce antibiotic use and the frequency of re-consultation.

### Who may benefit from antibiotics?

Those with acute bronchitis and chest signs, who:

- are very unwell
- are older (>55)

**Table 3. Treatment of CAP**

Class 1 and 2 of the 'pneumonia severity index' (patients with more severe disease, classes 3–5, will require intravenous antibiotics)

Amoxycillin 1 g orally, 8 hourly for 7 days

Plus either:

Doxycycline 200 mg orally, for the first dose, 100 mg per day for a further 7 days

OR

Roxithromycin 300 mg, daily for 7 days

In patients allergic to penicillin, amoxycillin should be replaced with cefuroxime 500 mg orally, 12 hourly for 7 days

**Table 4. CAP: who should be admitted to hospital?**

If a patient has one or more of the following they should be considered for hospitalisation:

- Age >50 years
- Coexisting illness: neoplastic, cerebrovascular, renal, liver or congestive cardiac failure
- Altered mental state
- Pulse >125 minute
- Respiratory rate >30 minute
- Systolic blood pressure <90 mmHg
- Temperature <35°C or >40°C

- have comorbidities, or
- smoke

should be assessed fully as for CAP. Assuming they do not have CAP, a decision on antibiotics should be made after discussion with the patient about the potential benefits and side effects. Clinical review would be important for this group if symptoms persist or worsen.

### Community acquired pneumonia

Community acquired pneumonia is usually caused by one organism, most commonly in Australia, *Streptococcus pneumoniae*. However, other important causes include *M. pneumoniae*, *C. pneumoniae* and legionella (Table 2). Although good quality sputum specimens collected before antibiotic therapy can indicate a likely causative organism, therapy is usually empirical as outlined in Table 3. Treatment is usually continued for:

- 5–10 days for bacterial infections
- 14 days for mycoplasma and chlamydia, and
- 21 days for legionella.

While the choice of antibiotic and duration of treatment is fairly clear, judging the severity of the illness – and

who needs hospitalisation – requires much clinical experience. To help, a 'pneumonia severity index' (PSI) has been developed that groups patients with CAP into one of five classes that reflects expected mortality (ranges from a 30 day mortality of 0.1% in class one through to 27% in class five).<sup>17</sup>

Table 4 shows how to determine if a patient requires further assessment in hospital. In addition to intravenous antibiotics, hospitalised patients may require intravenous fluids, supplementary oxygen, analgesia for chest pain and physiotherapy. Although hospitalisation is important for those who are sick, the risk of nosocomial infection should be considered.

### Preventive measures

Few preventive measures are available, however, the use of influenza and pneumococcal vaccinations in at risk populations should be encouraged. The National Health Medical Research Council (NHMRC) recommend that influenza (every year) and pneumococcal (every 5 years) vaccines be used in those over 65 years of age (over 50 years of age in Aboriginal and Torres Strait Islanders) and those with chronic diseases. In addition, pneumococcal vaccine should be given to immunocompromised patients and those with asplenia.

### Conclusion

Lower respiratory tract infections – acute bronchitis and CAP – are common and important causes of morbidity in Australian general practice. Clinical assessment is important for both conditions with a limited number of investigations informing diagnosis and management. Causative organisms are usually not identified but are presumed to be viral for acute bronchitis and *Streptococcus pneumoniae* for CAP, although 'atypicals' are also important. Supportive treatment is important for both conditions. Although antibiotics are widely prescribed for acute bronchitis, they should not be used generally. (There is limited evidence they may be helpful in those with chest signs, those who are very unwell, older, have comorbidities or who smoke). In contrast, antibiotic therapy is indicated for patients with CAP. More severely unwell patients require hospitalisation and treatment with intravenous antibiotics. The combination of amoxycillin and doxycycline/roxithromycin is appropriate for patients with CAP who are treated outside of hospital.

## Summary of important points

### Acute bronchitis

- Most episodes are viral in origin.
- Cough symptoms can last for an average of 2–3 weeks.
- Bronchodilators and cough suppressants have not been shown to be effective.

### Community acquired pneumonia (CAP)

- Use the pneumonia severity index (PSI) to assess the need for hospitalisation.
- Outside of hospital, treatment is usually empirical (amoxicillin plus either doxycycline or roxithromycin).

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