

# Chest infections in the community

Sarah Marshall gives an overview of acute bronchitis and community-acquired pneumonia and how the two conditions are treated

An estimated 17 per cent of all GP consultations are for acute respiratory infections, accounting for more GP visits annually than any other condition.<sup>1</sup> They occur primarily in the autumn and winter, with pre-school children, people over 65 years of age, smokers, alcoholics and those with serious comorbidity or immunosuppression being particularly susceptible. "Chest infection" is a broad term that covers various conditions, ranging from mild and self-limiting ones to severe, potentially fatal disease. Adult chest infections treated in the community can be divided into three categories: acute bronchitis, community-acquired pneumonia (CAP) and exacerbations of chronic obstructive pulmonary disease (COPD; see Panel 1, p476).

Acute bronchitis is a transient inflammation of the trachea and major bronchi as a result of infection, which often follows a cold or influenza. In contrast, pneumonia usually involves acute inflammation further down the respiratory tract — there is intense infiltration of inflammatory cells into and around the alveoli and terminal bronchioles. The resulting inflammation and production of exudate lead to sections of the lung or even entire lobes becoming solid (a result of fluid filling the tissue, losing their usual spongy texture). Either or both of the lungs may be affected.

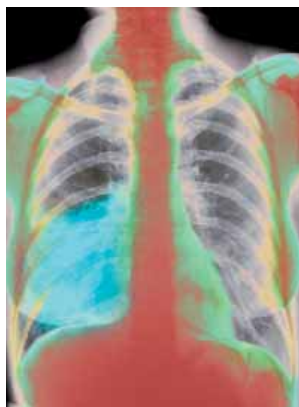
About 44 cases of acute bronchitis per 1,000 adult population occur annually in the UK.<sup>1</sup> CAP is less common, with an annual incidence of five to 11 per 1,000 adults but it is more serious, resulting in an estimated 83,000 hospital admissions each year.<sup>1</sup>

## Pathogens

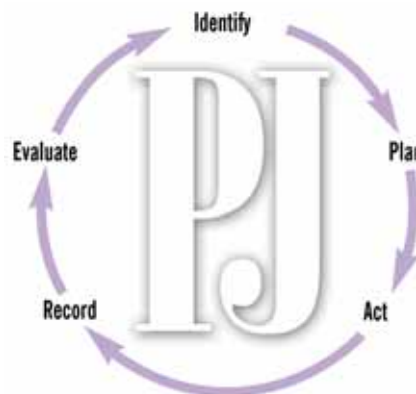
The infective agents responsible for chest infections vary, depending on factors, such as the time of year, patient characteristics, history of antibiotic exposure or influenza vaccination, and any circulating epidemic organisms (eg, mycoplasma or influenza). In many chest infections the cause may not be traceable. Patients with influenza whose condition initially improves then begins to deteriorate after one or two weeks are likely to have a secondary bacterial infection complicating their recovery.

Most cases of acute bronchitis are thought to be viral, but bacterial causes include *Streptococcus pneumoniae* (pneumococcus), *Haemophilus influenzae* and *Moraxella catarrhalis*. Atypical bacteria, such as *Chlamydia pneumoniae* and *Mycoplasma pneumoniae*, may also be involved.<sup>1</sup>

More than 100 organisms have been implicated in CAP. *S pneumoniae* is responsible for most cases but other common pathogens are *H influenzae* and viruses. Sometimes multiple micro-organisms are involved. The mortality of CAP ranges from 5–35 per cent,



In pneumonia, lung tissue fills with fluid, which replaces air and causes the lung to become solid



## Identify knowledge gaps

1. How do GPs differentiate between acute bronchitis and pneumonia?
2. What are the first-line treatments for chest infections?
3. Why should antibiotics not normally be used to treat acute bronchitis in otherwise healthy adults?

Before reading on, think about how this article may help you to do your job better. The Royal Pharmaceutical Society's areas of competence for pharmacists are listed in "Plan and record", (available at: [www.rpsgb.org/education](http://www.rpsgb.org/education)). This article relates to "common disease states" (see appendix 4 of "Plan and record").

depending on disease severity,<sup>5</sup> and the three pathogens most commonly implicated are *S pneumoniae*, legionella and influenza A virus.

Pneumonia due to legionella infection (Legionnaire's disease) is unusual and requires hospital admission because it produces such severe symptoms. The infection is more common in the young, and most patients have a recent history of travel abroad.

## Symptoms and diagnosis

In the community, chest infections are typically diagnosed on clinical grounds alone although controversy exists as to what criteria should be used. The GP will take a history of the complaint and carry out a general examination as well as a physical examination of the patient's chest, and ears, nose and throat.

The chest is usually examined using a stethoscope (auscultation). Unusual sounds that indicate infection or disease include crackles (moist crackling noises suggest the presence of fluid or exudates in the airway), wheezes (musical, whistling sounds created by air passing through narrowed airways) or pleural rub (where the normally slippery surfaces of the pleura covering the lungs and chest wall become "sticky" and rub against each other). Bronchial breathing, that can be heard on aus-

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cultation, has a harsh quality compared with normal breathing and occurs when lung tissue has become firm or solid. Breath sounds that are absent or muted in a particular area imply reduced air entry suggesting there may be inflammation or obstruction. Extended expiration suggests COPD.

The GP may also tap the chest with one finger over another, and listen for resonance (percussion). A hollow response indicates a normal cavernous air-filled space, whereas a more solid sound can be a sign of gross inflammation or fluid. The term "focal chest signs" refers to a particular zone of abnormal findings in the chest.

Laboratory investigations are not routinely used in the diagnosis of chest infections in primary care but sputum culture or blood tests, or both, may be useful in patients with persistent symptoms or who fail to respond to treatment. A chest X-ray is not normally carried out, but should be arranged for patients with recurrent or persistent chest infections and for smokers over 50 years of age, to exclude diseases such as lung cancer.<sup>1</sup>

Pulse oximeters (devices clipped onto the finger tip to measure blood oxygen saturation levels) are becoming increasingly available in the community setting, allowing GPs to assess severity of the condition and oxygen requirements for patients with CAP or exacerbations of COPD.

**Acute bronchitis** Acute bronchitis is suspected if a person presents with a cough (unproductive or productive) without focal chest signs. Other signs and symptoms, such as sputum, breathlessness, wheeze, fever, sweats and muscle pain may or may not be present. Symptoms usually develop quickly (over 24–48 hours) and most patients will feel unwell and will be unable to carry out their normal activities. The cough accompanying acute bronchitis can last several weeks. Acute bronchitis can develop into pneumonia.

**CAP** CAP is usually diagnosed if a patient with a cough presents with additional symptoms and signs, such as purulent sputum (which may be rust-coloured or blood-stained), breathlessness, wheeze and pain exacerbated by inspiration (pleuritic pain). Patients presenting with these symptoms in the pharmacy should be referred to their GP. Other symptoms can include raised temperature (over 38°C), weakness, malaise, muscle pain, sweating, shivering, nausea and vomiting, and headache. Focal chest signs can be heard and heart rate and respiratory rate may be raised.

Elderly patients may present with a different clinical picture, having few chest symptoms but general malaise, fatigue, anorexia, muscle pain and confusion.

In the UK, GPs normally differentiate between bronchitis and CAP by listening for focal chest signs, indicating fluid in the lungs, such as dullness to percussion, crackles and bronchial breathing. A chest X-ray is needed

## Panel 1: Exacerbations of COPD

Chronic obstructive pulmonary disease (COPD) is the name now used for a group of conditions, including those once referred to as chronic bronchitis and emphysema, and is usually the result of exposure to cigarette smoke. There are about 900,000 people diagnosed with COPD in the UK and 26,000 people die from it each year.<sup>2</sup>

COPD is a chronic condition that progresses slowly. When stable, it is characterised by airflow obstruction that remains at a constant level (ie, over several months). Symptoms can include difficulty breathing, chronic cough (ie, longer than eight weeks), regular sputum production and wheeze. An exacerbation of COPD is usually diagnosed if a patient has a sudden onset of worsening cough, increased breathlessness and a change in sputum colour and an increase in the volume of sputum being produced. There may be additional symptoms, such as a cold and sore throat, increased wheeze, chest tightness, reduced exercise tolerance, fluid retention, increased fatigue and acute confusion. Chest pain and fever do not usually occur and suggest a different cause.<sup>3</sup>

The precise role that infection plays in exacerbations of COPD is unclear because the sputum of sufferers may be colonised on a permanent basis. Up to 30 per cent of cases may be viral and as much as 50 per cent may be bacterial.<sup>4</sup> The most common pathogens are *Haemophilus influenzae*, *Streptococcus pneumoniae*, and *Pseudomonas aeruginosa*. However, at least a third of exacerbations may be due to a non-infective cause.<sup>2</sup>

Repeated exacerbations of COPD lead to a poor prognosis, so they should be treated as effectively and quickly as possible. In some cases, exacerbations may be managed by increasing the dose or frequency of existing short-acting bronchodilator therapy or by prescribing additional bronchodilators. If breathlessness is severe enough to interfere with daily activities, a short course of oral prednisolone should be considered. Oxygen therapy may be necessary to increase arterial oxygen saturations.

If the patient's sputum is more purulent than usual or he or she is showing signs of pneumonia, the exacerbation is also treated with antibiotics. Amoxicillin, a tetracycline or a macrolide are used as first-line treatment. If the infection fails to respond, treatment with one of the alternative first-line options or co-amoxiclav would be appropriate. The recommended duration of treatment is five to seven days. Patients with low blood pressure, low oxygen saturation or raised respiratory rate, whose condition is deteriorating or who are otherwise not coping at home should be admitted to hospital.

To allow rapid treatment of exacerbations patients with COPD may be given a course of antibiotics to be kept at home, along with instructions on when to take them. Preventive measures can reduce the likelihood of an exacerbation. Those who suffer more than two exacerbations a year may be prescribed long-acting beta<sub>2</sub>-agonists, tiotropium, or inhaled corticosteroids. Use of mucolytic agents, such as carbocysteine, is controversial but may have some value in reducing the frequency of chest infections in this group.

In addition to the general advice applicable to people with chest infections (see Panel 2), pharmacists can support patients with COPD by counselling them on the appropriate use of inhalers, spacers or nebulisers and encouraging compliance with antibiotic and oral corticosteroid therapy.

A national service framework for COPD is expected next year.

## The dose of amoxicillin used is higher than in the past

to diagnose pneumonia definitively, but is seldom carried out in the community.

Several conditions can present similarly to chest infections and must be excluded. These include asthma, COPD, whooping cough, pulmonary embolism, heart failure and underlying malignancy. Anyone with blood in the sputum, weight loss, hoarseness, finger clubbing or swollen glands in the neck (all possible signs of lung cancer) should be advised to see a GP as a matter of urgency.

### Treatment

The prescribing of antibiotics for chest infections in primary care is almost always empirical. The choice should be rational and appropriate, and dosage and duration of therapy should be optimised (ie, high enough dose and long enough duration) to avoid contributing to the development of antimicrobial resistance. Local antibiotic policies should be followed when available. Numerous guidelines covering the treatment

## Panel 2: General advice

### General

- Rest and drink plenty of fluids
- Paracetamol or ibuprofen can ease aches and fever
- Contact the GP if new symptoms develop or existing symptoms get worse

### For acute bronchitis

- Cough may persist for up to four weeks
- Cough medicines are unlikely to help (see *PJ*, 20 January, pp85–8)
- In people who are otherwise healthy, antibiotics are unlikely to help (even in bacterial bronchitis, they may not speed recovery and can cause side effects)

### For community-acquired pneumonia

- It is important to take antibiotics as prescribed
- If symptoms do not rapidly improve (the Health Protection Agency suggests within 48 hours) the patient should tell his or her GP because a different antibiotic or a stay in hospital may be required

of chest infections have been issued but their recommendations are broadly similar.

**Acute bronchitis** Prescribing antibiotics to treat acute bronchitis is controversial because the condition is thought often to be viral. Furthermore, it is usually mild and self-limiting. However, the prescribing of antibiotics is still common. In a recent Cochrane review,<sup>6</sup> antibiotics were found to decrease the duration of cough and feeling of illness by about half a day. This modest benefit has to be balanced against the risk of side effects, resistance development, cost implications and medicalisation of a self-limiting condition. Antibiotics are, therefore, not indicated for otherwise healthy people suffering from acute bronchitis.<sup>4</sup> However, they should be considered if:

- The patient has significant co-morbidity (eg, heart disease, diabetes)
- The patient is elderly<sup>1</sup>
- The patient's condition is deteriorating

First-line treatments are five-day courses of amoxicillin (500mg *tds*), a macrolide (eg, erythromycin, clarithromycin or azithromycin, for those who are allergic to penicillin) or doxycycline. If the infection does not respond, second-line treatment would be a five-day course of doxycycline (if not already tried) or co-amoxiclav.

**CAP** In CAP, appropriate antibiotic therapy is essential to reduce mortality, morbidity and the risk of complications. Antibiotics — usually a seven to 10 day course — should be started immediately. Amoxicillin or a macrolide are used first-line. The dose of amoxicillin used is higher than in the past — Clinical Knowledge Summaries recommends 1,000mg *tds* — because *S pneumoniae* strains with reduced susceptibility to penicillin are becoming more prevalent. If *Mycoplasma pneumoniae* is likely, for example, in young adults during known epidemics, doxycycline with or without amoxicillin may be prescribed first-line.

If the patient does not respond to amoxicillin treatment the prescriber may choose to

switch to or add a macrolide (ie, macrolides can be first-line or second-line) or doxycycline to the existing regimen or to send the patient to hospital.

Severe CAP usually requires hospital admission and different antibiotic regimens.

**Antibiotic rationale** If it is appropriate to prescribe an antibiotic, selection depends on various factors, such as the diagnosis, the patient's characteristics (eg, age, allergies, renal and hepatic function), the likely causative micro-organism and characteristics of the drug.

**Amoxicillin** Amoxicillin is used for empirical treatment of chest infections because it is active against most strains of *S pneumoniae* and *H influenzae*. No one antibiotic regimen appears superior to the others. In clinical trials, amoxicillin has been found to be at least as good as other broad spectrum antibiotics, such as quinolones and co-amoxiclav,<sup>7</sup> in terms of clinical improvement or cure in acute bronchitis. The British National Formulary notes, however, that as well as emerging pneumococcal resistance to penicillin, 15 per cent of *H influenzae* strains are amoxicillin-resistant, hence the 1,000mg *tds* dose in CAP.

Amoxicillin is a suitable choice in pregnancy and breastfeeding. Treatment failure with amoxicillin may be due to the infection being viral or caused by resistant strains of pneumococci or *H influenzae* or atypical pathogens.

**Macrolides** Macrolides are suitable alternatives to amoxicillin for people who are allergic to penicillin. Erythromycin is used for empirical treatment of acute bronchitis and CAP because it is particularly active against atypical bacteria, *S pneumoniae* and *M catarrhalis*. However macrolides have borderline activity against *H influenzae*.

Azithromycin and clarithromycin are useful alternatives if a patient experiences gastrointestinal side effects with erythromycin. They also have more acceptable dosage regimens (*od* or *bd*). Erythromycin can be used by pregnant or breastfeeding women. Disadvantages are that erythromycin-resistant strains of *S pneumoniae* are emerging and macrolides interact with many drugs. For example, they increase levels of theophylline and carbamazepine, and potentiate warfarin.

**Tetracyclines** Doxycycline is active against most respiratory pathogens, including *H influenzae* (although the BNF comments that tetracycline-resistant strains of *H influenzae* and pneumococci are developing). It is particularly useful for its cover against atypical micro-organisms, such as *M pneumoniae* and *C pneumoniae*. It has the advantage of a once daily regimen. Oxytetracycline and tetracycline have similar spectra but need to be taken more frequently. Tetracyclines are options for penicillin-allergic patients, but are contraindicated in pregnancy and should be avoided in



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**Acute bronchitis is suspected if a person presents with a cough without focal chest signs**

breastfeeding. Doxycycline is the preferred choice in renal impairment. Tetracyclines can cause photosensitivity reactions.

**Co-amoxiclav** Co-amoxiclav is a useful second-line agent, the inclusion of clavulanic acid with amoxicillin giving activity against most penicillinase-producing organisms, such as penicillin-resistant strains of *S pneumoniae*, *H influenzae* and *M catarrhalis*.

**Other antibiotics** Other antibiotics, such as cephalosporins and quinolones, are not at present recommended as first-line treatments for chest infections because there are concerns about emerging resistance to these antibacterials. They should only be used once pathogen sensitivity is known.

In addition to encouraging people to use antibiotics appropriately, general advice pharmacists can give to a patient with a chest infection is listed in Panel 2 (p477).

### When should people go to hospital?

Many chest infections can be treated in the community but, in some cases, admission to hospital may be necessary. Patients with acute bronchitis should be advised to return to their GP if their condition deteriorates (because this may signify the onset of pneumonia) or if their cough shows no sign of improvement after three weeks.

Admission to hospital should always be considered for patients diagnosed with CAP. GPs can use the CRB-65 scoring system as an aid to evaluating whether or not this is necessary and patients with more than one of the following features should be admitted:

- C — confusion (of recent onset)
- R — respiratory rate (30 breaths/min or more)
- B — blood pressure (systolic of 90mmHg or less or diastolic of 60mmHg or less)
- 65 — 65 years of age or more

Patients with none or just one of these criteria may, depending on circumstances, be treated at home but they should be reviewed regularly to ensure that both treatment and its setting remain appropriate. GPs should administer antibiotics, such as benzylpenicillin, to severely ill patients or if there is likely to be a delay of more than two hours in admission.<sup>4</sup>

### Prevention

Although anyone can contract a chest infection some people are more susceptible than others. Some interventions may decrease the likelihood of contracting a chest infection. For example, smokers should be encouraged to stop smoking and vulnerable patients should be vaccinated against influenza and pneumococcal disease (see BNF for at-risk groups). The benefits of influenza vaccinations for the elderly has recently been questioned (*PJ*, 29 September, p339) but this year's flu campaign still targets those over 65 years as well as other at-risk groups.

## Summary: Acute bronchitis versus CAP\*

Description	Acute bronchitis	Community-acquired pneumonia
	Inflammation of trachea and major bronchi	Inflammation of lower respiratory tract, with exudate filling lung tissue and obstructing airways
Prevalence	44 cases per 1,000 adults	5–11 cases per 1,000 adults
History	Cough with or without sputum wheeze or breathlessness	Cough with at least one other symptom of sputum, wheeze, dyspnoea or pleuritic pain
Examination	Wheeze often present, but no other focal chest signs Sweats, fever, muscle pain and raised temperature may or may not be present	Focal chest signs present At least one symptom of sweats, fever, muscle pain or raised temperature present
X-ray (rare)	Clear	Diagnostic — shadowing can be seen
Treatment	Antibiotics usually inappropriate	Antibiotic therapy necessary to reduce morbidity and mortality

\*Adapted from Clinical Knowledge Summaries

## Action: practice points

Reading is only one way to undertake CPD and the Society will expect to see various approaches in a pharmacist's CPD portfolio.

1. Find out if you have a local antibiotic policy.
2. Identify smokers with chest infections and offer smoking cessation advice.
3. Discuss strategies to increase uptake of influenza and pneumococcal vaccination programmes with your local GP practice.

## Evaluate

For your work to be presented as CPD, you need to evaluate your reading and any other activities. Answer the following questions: What have you learnt? How has it added value to your practice? (Have you applied this learning or had any feedback?) What will you do now and how will this be achieved?

The use of antiviral therapy (eg, zanamivir or oseltamivir) in people who have influenza and who are susceptible to a subsequent chest infections may lower the risk but therapy must be started within 48 hours of onset of symptoms.

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## References

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## Resources

- Patient information leaflets are available from NHS Direct ([www.cks.library.nhs.uk](http://www.cks.library.nhs.uk)), Patient UK ([www.patient.co.uk](http://www.patient.co.uk)) and the British Lung Foundation ([www.lunguk.org](http://www.lunguk.org)).
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