

The management of acute lower respiratory tract infection in adults in primary care

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ABSTRACT

Lower respiratory tract infection (LRTI) is common, usually causing self-limiting episodes of ill health, but occasionally resulting in serious illness and mortality – particularly in the elderly and those with chronic illnesses. Antibiotics are frequently prescribed, possibly inappropriately in many cases, and there is a high level of patient expectation for antibiotic prescription. General practitioners (GPs) have been criticised for over-prescribing antibiotics, and there is concern over the emergence of antimicrobial resistance in common pathogens. The precise benefits and risks to the individual and to the community are poorly defined due to an inadequate and conflicting evidence base. Careful clinical examination can identify those most seriously ill. The therapeutic decision-making process is complex and straddles the interface between doctor and patient, GP and specialist, clinician and microbiologist.

INTRODUCTION

Acute respiratory tract infection is the most common cause for consultation in primary care, and, in England and Wales, GPs prescribe over 30 million courses of antibiotics each year for its treatment.¹ The consultation rate for RTI is rising, and three-quarters of patients presenting with lower respiratory tract symptoms in the UK receive antibiotics from their GP.² There is concern about the emergence of antimicrobial resistance³ and GPs have been criticised for excessive and inappropriate use of antibiotics.⁴ Lower respiratory tract infection (LRTI) is generally self-limiting, but may cause significant morbidity and result in economic costs to the individual and society.⁵ LRTI may result in acute exacerbations of chronic bronchitis (AECB) in patients with underlying pulmonary disease, and at the severe end of the spectrum may result in community-acquired pneumonia (CAP), a condition that carries significant morbidity and mortality.⁶

GPs are currently under pressure from all sides; they are urged to use resources appropriately and to avoid unnecessary antibiotics, yet also to treat potentially serious illnesses aggressively. There may also be pressure from patients who believe their illness will respond to antibiotics.⁷ This review aims to examine the current management of adult patients presenting with symptoms of LRTI, particularly focusing on the use of antibiotics.

TERMINOLOGY

The major symptoms of LRTI are cough, sputum production, dyspnoea, wheeze, fever, chest pain and prostration. Unfortunately there is no standard terminology, and terms such as ‘cough’, ‘lower respiratory tract infection’, ‘chest infection’, ‘acute bronchitis’ and ‘pneumonia’ are often used ambiguously. The symptomatology and severity of illness resulting from infections at different levels of

the respiratory tract may merge into a continuum, without hard and fast diagnostic and prognostic factors to distinguish discrete clinical entities. Indeed, it has been suggested that GPs may choose diagnostic labels to justify prescribing antibiotics.⁸ Macfarlane and co-workers have demonstrated the uncertainty GPs experience in classifying patients presenting with acute respiratory symptoms,⁹ a process heavily influencing the decision to prescribe antibiotics. They have suggested the term ‘lower respiratory tract illness’ (LRTi)¹⁰ to reduce pressure on antimicrobial prescribing, defining LRTi as new cough and at least one other lower respiratory tract symptom, including sputum production, dyspnoea, wheeze or chest pain, for which there is no other obvious explanation.⁷ CAP may be defined as acute LRTI including cough and at least one other LRT symptom (dyspnoea, wheeze, chest pain), plus at least one systemic feature, and focal chest signs on examination.¹¹

EPIDEMIOLOGY

Acute cough is a very common reason for consulting a GP; a large UK morbidity database reported a consultation rate for ‘acute bronchitis and bronchiolitis’ as 71.9 per 1000 persons at risk.¹² In a prospective UK study, adults with LRTi presented to their GPs with an incidence of 44 per 1000 population per year.¹ The incidence was 2–4 times higher in those aged 60 or over than those aged less than 50, and there was a seasonal variation with 40% of cases occurring between January and March. It is more common in those with pre-existing chronic respiratory disease.

There is evidence that only a quarter of people with LRTi present to their GP.¹³ The reasons why patients with a cough choose to consult involve complex psychosocial factors;¹⁴ consulters are more worried about their symptoms, and more likely to feel that they are abnormally severe and are interfering with their social activities.¹⁵ Symptoms may have been present for a week or more prior to consultation,⁹ and up to 30% will be re-attending.¹⁶

High proportions of adults presenting with LRTI in the UK receive antibiotics.⁷ Similarly high levels of antibiotic usage were found in a multinational European study, in which 83% of patients with LRTI were prescribed antibiotics, with wide variations in the choice of agent.¹⁷

CAP is a serious condition usually associated with bacterial pathogens.⁶ There is general agreement of the need for prompt antibiotic management.¹¹ The reported mortality in adults ranges from 7–24%.^{18,19} Although it may affect healthy adults, it is more common and carries a worse prognosis in the elderly and those with pre-existing disease.²⁰ It is estimated in the UK that 5% of patients treated for LRTi will have radiological evidence of pneumonia, of whom 20% will require hospital admission and 1–2% will

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die.²¹ A large European survey found higher proportions (18%) of LRTI patients classified by their GP as having CAP, with radiological abnormalities present in 69% chest radiographs performed.¹⁷

AETIOLOGY

Although it has been claimed that the majority of community-acquired LRTI is initiated by viral infection,²² detailed microbiological and virological analysis is rarely performed on patients with acute respiratory symptoms. A prospective study of patients presenting to UK GPs with LRTi found bacterial isolates in 44% of cases, viral isolates in 8% and atypical pathogens in only 1%, with no pathogens identified in over half of all cases.¹ The commonest bacterial organisms isolated were *Streptococcus pneumoniae* (62/92 bacterial isolates) and *Haemophilus influenzae* (16/92 bacterial isolates) with small proportions of *Mycoplasma pneumoniae* (1/92) and *Coxiella burnetii* (1/92). Pneumococcal infection was more common in those over 60 years and in those with pre-existing chronic lung disease. The commonest viral pathogens isolated were influenza A and B and respiratory syncytial virus, although due to the time course of LRTI and to technical difficulties in identifying other common viruses (such as rhinovirus and parainfluenza virus), viral infection may have been underestimated.

M pneumoniae infection occurs in four-yearly epidemics (the last UK epidemic ending in 1999) and may then be a significant cause of LRTI in the community.²³ A large multinational surveillance study of sputum samples received by laboratories in Europe and the USA from patients with LRTI has shown similar bacterial isolate profiles, with wide variations in antimicrobial resistance patterns.²⁴

The spectrum of microbial causes for CAP is similar, with *S pneumoniae* accounting for up to 75% of isolates.¹⁸ Less common causes include *M pneumoniae*, *Chlamydia pneumoniae* and *Legionella*.

The role of bacterial pathogens in AECB is less well defined, but a similar spectrum of pathogens is found, including *S pneumoniae*, *H influenzae* and *Moraxella catarrhalis*.

CLINICAL ASSESSMENT

Empirical therapy is generally commenced without investigations in primary care. In a large European survey,²⁵ 71% of all cases of LRTI had no laboratory or radiological investigations performed, with an even higher figure (88%) for the UK patients surveyed. A chest radiograph (CXR) was performed in 22% (13% of UK patients), a blood count in 15% (8% of UK patients) and sputum analysis in 7% (6% of UK patients). Investigations were performed most commonly on patients who re-presented following initial treatment. The presence of focal signs on clinical examination of the chest is diagnostic of CAP and predictive of abnormalities on a CXR.¹ Although radiological confirmation may be performed to confirm diagnosis and exclude underlying problems, careful clinical examination will usually provide an accurate diagnosis of CAP, and most cases will be successfully managed in the community. Clinical factors associated with poor outcomes include age

over 50, co-existing chronic disease, tachypnoea, hypotension, confusion, tachycardia and a high fever,^{1,26} and most GPs would consider urgent admission in at risk patients.

ANTIBIOTIC TREATMENT

Antibiotics continue to be widely prescribed for patients presenting with LRTI. Recommendations have been published^{27–29} advising against their use on the basis of increasing antimicrobial resistance in respiratory pathogens and lack of proven efficacy. A critical analysis of the published evidence for effectiveness of antibiotics reveals however a surprising paucity of data. For such a common, important and controversial area the studies informing evidence-based decision making are few, disparate and underpowered. There have been two separate systematic reviews of randomised controlled trials comparing antibiotics to placebo for the treatment of acute cough in adults, which have reached different conclusions. Fahey *et al*³⁰ identified eight trials for inclusion and looked at efficacy of treatment as measured by resolution of cough and clinical improvement at days 7–11. The first analysis was made on 700 patients and the second on 515 patients randomised to antibiotic or placebo, so low numbers of suitable cases were identified. Trends favouring improved outcomes were seen for these measures of efficacy, but statistical significance was not reached. A non-significant trend towards side effects was seen in the treatment group. The authors concluded that antibiotics were unlikely to alter the course of illness in most adult patients. The conclusions and the methodology of the study were subsequently criticised in a lively debate in the correspondence section of the *British Medical Journal*.³¹ The wide confidence limits for the outcome measures chosen and the small numbers of cases that could be analysed point to the need for further data. However, this study has been widely quoted by those advocating reduced antibiotic usage in general practice.

The same studies were analysed by Becker *et al* for the Cochrane database³² using different methodology and outcome parameters. This group found that patients receiving antibiotics had slightly better outcomes than those receiving placebo. They were significantly less likely to report feeling unwell at a follow up visit (odds ratio 0.42, 95% confidence interval 0.22 to 0.82), to show no improvement on physician assessment (odds ratio 0.43; 0.23 to 0.79), or to have abnormal lung findings (odds ratio 0.33, 95% confidence interval 0.13 to 0.86), and had a more rapid return to work or usual activities (weighted mean difference 0.7 days earlier, 95% confidence interval 0.2 to 1.3). The antibiotic treated group were

Box 1: Key points

- Respiratory tract infection is the commonest cause of consultation with GPs
- Of adults presenting with LRTI symptoms, 75% receive antibiotics
- Antibiotic resistance to common respiratory pathogens is increasing
- There is conflicting evidence for antibiotic effectiveness in uncomplicated LRTI
- Community-acquired pneumonia is serious but may be detected clinically

Box 2: Poor prognostic factors indicating need for admission

- Hypotension
- Co-morbidity (such as chronic respiratory or cardiovascular disease)
- Tachypnoea
- Confusion
- Age > 50 years
- Hypoxia/cyanosis
- Involvement of > 1 lung lobe
- Raised blood urea

significantly more likely to have side effects, such as nausea, headache or rash. No clear sub-group analysis was possible, although there were suggestions that older patients and those who felt ill at presentation had better outcomes with active treatment.

The studies analysed used different antibiotics (doxycycline, erythromycin, trimethoprim-sulphamethoxazole and placebo) and were felt to be of variable quality. Unfortunately, our current evidence base does not allow definitive statements on which groups of patients, if any, will improve, and by how much, with antibiotic treatment. The benefits of active treatment compared to placebo are likely to be modest, but remain to be quantified and analysed by sub-group.

A detailed discussion of the management of AECB is beyond the scope of this review, but current British Thoracic Society (BTS) guidelines suggest that antibiotics are not routinely indicated.³³

THE CHOICE OF ANTIBIOTIC

Although the use of antibiotics in uncomplicated LRTI is controversial, there is agreement that they are indicated at the severe end of the spectrum. There is an extensive literature and detailed guidelines for the hospital management of CAP.¹¹ The majority of mild to moderate CAP is however treated in the community, and is incompletely covered in current guidelines (although will be addressed in the forthcoming revised BTS guidelines). High dose oral amoxicillin (1.5–3 g/day) remains the preferred empirical treatment, with erythromycin recommended as an alternative. Pneumococcal resistance to β -lactam penicillins is an increasing problem in many parts of the world, accounting for 33% of isolates in the USA, although levels are lower in the UK, estimated at 3.8%.³⁴ There is evidence that this *in vitro* resistance may not necessarily result in treatment failure, and that infections caused by resistant organisms may be successfully treated by traditional agents.³⁵

In elderly people, *C pneumoniae* may be implicated in up to 26% of cases, and the addition of erythromycin may be considered.³⁶ In mycoplasma epidemics, erythromycin, tetracycline or fluoroquinolones may be considered as empiric therapy in suspected cases. Other pathogens (e.g. *Legionella*, *Staphylococcus aureus* and *Chlamydia psittaci*) will generally result in a more severe illness necessitating hospital admission and investigation, but British guidelines still recommend amoxicillin plus erythromycin for initial empiric treatment of hospitalised patients in all but the most severe cases.¹¹ There is increasing interest in the use of the newer fluoroquinolones,^{11,37} but they are expensive and there seems little justification for deviating from guidelines in LRTI treated in the community without specific complicating factors.

Reconsultation is common, and is often interpreted by patient and GP as treatment failure, resulting in prescriptions for second-line antibiotics. There is however evidence that reconsultation reflects the long natural history of LRTI, is unrelated to antibiotic prescription and may be associated with prior consultation patterns and co-morbidity.¹⁶

OTHER MANAGEMENT STRATEGIES

The ecology of the emergence and spread of antibiotic resistance is complex and poorly understood. However, there is strong circumstantial evidence³⁸ and early direct observational evidence of a correlation between antibiotic resistance and prescribing by GPs,³⁹ increasing the imperative to use antibiotics sparingly. Symptomatic patients often believe that antibiotics will cure LRTI, and GPs frequently prescribe antibiotics even when they do not believe that they will be effective.⁷ Educational initiatives have attempted to change the threshold for antibiotic prescribing; a simple patient leaflet outlining the prolonged natural history of LRTI has been shown to reduce reconsultation rates,² and a combination of patient and clinician educational initiatives has been shown to reduce antibiotic treatment in the USA.²⁸ Antitussives have been widely used for symptomatic relief of cough, and there has been some interest in bronchodilators as an effective symptomatic strategy,^{40,41} although this has not entered mainstream practice. The use of antiviral agents in LRTI awaits elucidation.

CONCLUSIONS

LRTI usually causes minor illness, but may result in significant morbidity and mortality. Better lay and professional awareness of the often prolonged course of LRTI may improve understanding and appropriate use of antibiotics. Studies are needed to clarify the risks and benefits and to identify sub-groups who may benefit from antibiotic treatment. ■

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