Scottish Intercollegiate Guidelines Network

59 Community Management of Lower Respiratory Tract Infection in Adults

A national clinical guideline

June 2002

KEY TO EVIDENCE STATEMENTS AND GRADES OF RECOMMENDATIONS

LEVELS OF EVIDENCE

1^{++}	High quality meta-analyses, systematic reviews of randomised controlled trials (RCTs), or RCTs with a very low risk of bias
1^{+}	Well-conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias
1^{-}	Meta-analyses, systematic reviews of RCTs, or RCTs with a high risk of bias
2^{++}	High quality systematic reviews of case control or cohort studies High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
2^{+}	Well-conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
2^{-}	Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
3	Non-analytic studies, e.g. case reports, case series
4	Expert opinion

GRADES OF RECOMMENDATION

A	At least one meta-analysis, systematic review of RCTs, or RCT rated as 1^{++} and directly applicable to the target population*; or* A body of evidence consisting principally of studies rated as 1^{+}, directly applicable to the target population, and demonstrating overall consistency of results
B	A body of evidence including studies rated as 2^{++}, directly applicable to the target population, and demonstrating overall consistency of results*; or* Extrapolated evidence from studies rated as 1^{++} or 1^{+}
C	A body of evidence including studies rated as 2^{+}, directly applicable to the target population and demonstrating overall consistency of results*; or* Extrapolated evidence from studies rated as 2^{++}
D	Evidence level 3 or 4*; or* Extrapolated evidence from studies rated as 2^{+}

GOOD PRACTICE POINTS

☑	Recommended best practice based on the clinical experience of the guideline development group

ISBN 1 899893 08 3

First published 2002

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1 Introduction

1.1 WHAT IS LOWER RESPIRATORY TRACT INFECTION?

Lower respiratory tract infection (LRTI) describes a range of symptoms and signs, varying in severity from non-pneumonic LRTI in the young healthy adult through to pneumonia or life-threatening exacerbation in a patient with severe disabling chronic obstructive pulmonary disease (COPD). The most common symptom is cough, which is new or changed in character. Other symptoms include sputum production, breathlessness, wheeze, chest pain, fever, sore throat and coryza. However, there is no unique set of symptoms that relate to LRTI.[1]

LRTI can be difficult to distinguish from upper respiratory tract infection,[2] and not all lower respiratory tract symptoms are due to an infection that can be identified. Distinguishing pneumonia from non-pneumonic lower respiratory tract infection in the community is also difficult, particularly without diagnostic radiology. Evidence suggests that no combination of symptoms or clinical findings (i.e. pulse, respiratory rate, temperature, and chest examination) can reliably confirm the diagnosis of pneumonia.[3]

1.2 THE NEED FOR A GUIDELINE

LRTI accounts for more general practitioner (GP) consultations per year than any other illness. The vast majority of cases are self-limiting and can be managed at home.[4-6] Data on the management of LRTI throughout Europe found that only 4.5% of patients seen in primary care were admitted to hospital, rising to 9% for the UK population.[6]

Although numerous studies demonstrate that antibiotic prescriptions are of no benefit in uncomplicated non-pneumonic LRTI, many such patients (66% of adults in one study[7]) do receive antibiotics. Practitioners may prescribe unnecessary antibiotics for clinical reasons that have no evidence base, such as colour of nasal discharge,[8] or for non-clinical reasons such as the desire to reduce re-attendance, or belief that the patient expects an antibiotic.

There is no doubt that unnecessary antibiotic prescribing is harmful to the patient (side effects are a common cause of repeat visit to the GP) and causes selection of resistant bacteria, making subsequent infection more difficult to treat.[9-11] It is also harmful to the community as a whole, due to increased prescription costs and spread of resistant organisms within the community.[9]

This guideline focuses on the following key questions in the management of LRTI:

- When should antibiotics be prescribed ?
- How can rates of reconsultation be reduced ?
- When should patients be referred to secondary care ?

1.3 POPULATION COVERED BY THE GUIDELINE

This guideline covers adults (>16 years of age) presenting to primary healthcare services or Accident and Emergency departments with acute lower respiratory symptoms and/or signs which may be due to infection. This includes non-pneumonic LRTI, acute exacerbations of COPD, and pneumonia.

The guideline does not apply to patients with asthma (*updated guidelines from the British Thoracic Society and SIGN will be published in 2002*), known lung cancer (see the SIGN guideline,[12] under review 2002-3), cystic fibrosis, bronchiectasis, tuberculosis, human immunodeficiency virus infection or other forms of significant immunocompromise.

1.4 PROFESSIONAL GROUPS TO WHICH THE GUIDELINE APPLIES

This guideline will be of interest to general practitioners, practice nurses, health visitors, community and hospital pharmacists, staff in Accident & Emergency departments, respiratory physicians and nurse specialists, infectious disease specialists, microbiologists and public health practitioners.

2 Epidemiology of LRTI in Scotland

2.1 DEFINING LOWER RESPIRATORY TRACT INFECTION

The common unifying symptom in patients with LRTI is cough, whether as a new symptom or change in chronic symptoms. However even using cough as the central symptom risks excluding a small proportion of patients in the community who present with pneumonia or pleurisy who do not complain of cough.

For the purposes of this guideline a pragmatic definition of LRTI has been used based on the following four questions, the answers to which, will allow appropriate management planning:

1 **Has the patient been previously well or is there underlying chronic respiratory or other disease?**

2 **Has there been the development or deterioration in either of the following symptoms?**

- dyspnoea
(difficulty in breathing)

- sputum purulence
(macroscopic yellow or green colour due to the presence of pus cells in mucus)

3 **Are there any new signs audible in the chest to suggest pneumonia?**

4 **Are any features of severity present?**
- (raised respiratory rate, low blood pressure, confusion of recent onset: *see Box 1 on page 5*)

This guideline distinguishes three different populations within LRTI:

- Patients with no new signs in the chest, and who have underlying chronic respiratory disease and have an increase in dyspnoea and sputum purulence - e.g. acute exacerbation of COPD with purulent sputum (*see section 4*).
- Patients with new focal signs in the chest (crackles or altered breath sounds) - suspected community acquired pneumonia (*see section 5*).
- Patients with no signs in the chest, and who have been previously well and do not have other features of severity - non-pneumonic LRTI (*see section 6*).

The presence of significant comorbidity in the first two groups may influence disease management decisions. Similarly, patients without chest signs who have co-morbidity (e.g. chronic cardiac, renal, hepatic or neurological disease or have diabetes mellitus) or are elderly, require more careful management when they acquire an LRTI. In the absence of direct evidence, the consensus is that such patients should be considered for a sputum culture. Appropriate antibiotic prescription can then be made. However, optimal management of comorbidity is outside the scope of this guideline.

2.2 INCIDENCE OF LRTI

Approximately 1.7 million people aged between 16 and 79 years were treated for LRTI in England and Wales in 1991, representing an incidence of 46/1,000 population.[13] UK studies documenting the frequency of LRTI in the adult population in general practice suggest an overall incidence of 44-84 cases per 1,000 population per year.[13,14] Extrapolation of these figures suggests that in Scotland there are 150,000 -350,000 cases of LRTI in adults each year.

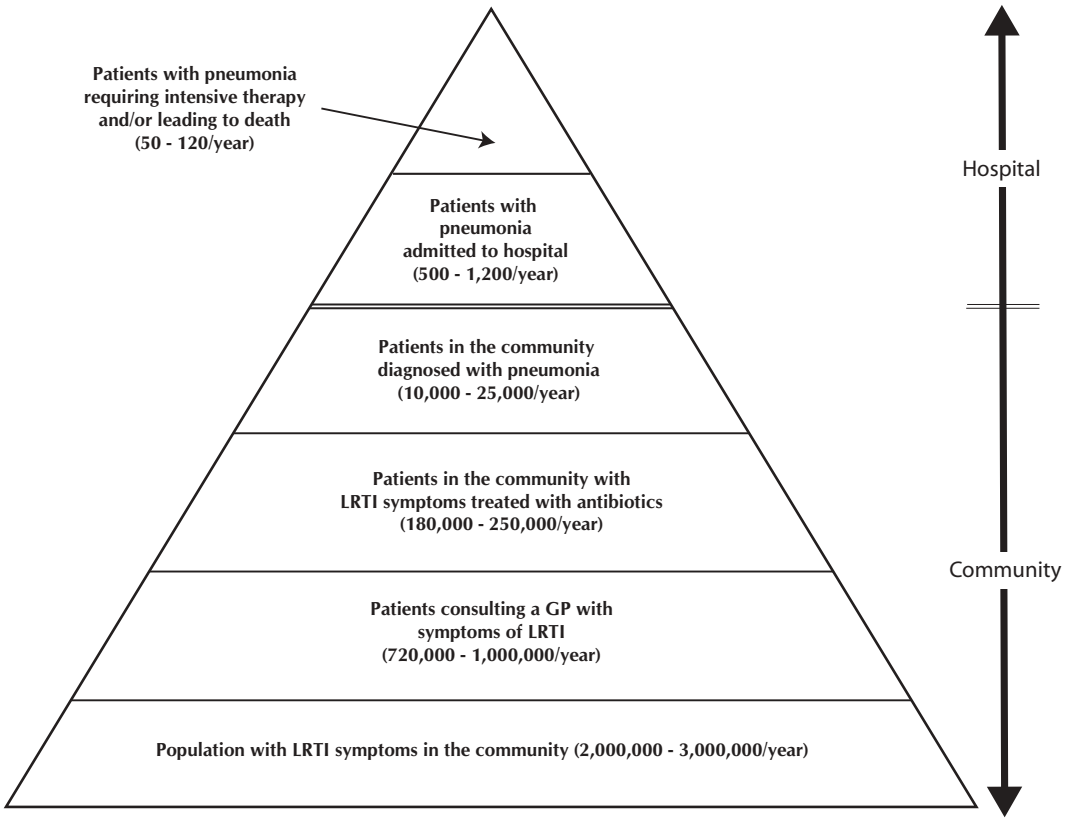
LRTI is a particularly common and serious illness in the elderly. In a population-based retrospective cohort study in Rochester, Minnesota, USA, approximately one in 18 residents older than 65 years experienced one or more episodes of bronchitis or pneumonia over one year, with an overall 30-day mortality of 10.7%.[15] A UK prevalence-based burden of illness analysis estimated the direct health care cost to be £1,364 million annually at 1992/93 prices.[16] Over 60% of these costs occur in hospital, although inpatient care accounted for only 1.4% of all LRTI episodes. A total of 13% of these admissions were discharged within 24 hours and further calculation suggests that managing

80% of these admissions in the community could reduce NHS costs by between £10 million and £49 million annually.

Figure 1 represents the estimated incidence of LRTI in both hospital and community in Scotland. These figures were derived from studies in general practice in Nottinghamshire and extrapolated to a Scottish population of 4.2 million adults. The diagram emphasises the fact that most individuals with LRTI do not consult their GP and very few require admission to hospital. These figures are likely to be underestimates of the actual incidence.

Figure 1: ***The LRTI pyramid***

Incidence of LRTI and pneumonia in adults in the community and in hospital in Scotland (adapted with permission from Macfarlane[17]).



2.2.1 THE SPECTRUM OF LRTI IN GENERAL PRACTICE IN SCOTLAND

In a UK general practice study of LRTI, 100% of 206 patients presented with cough and/or sputum production, 71% with breathlessness or wheeze, 68% with chest pains or aches, 66% with sweats, and 64% with sore throat. On examination, 49% had an inflamed throat, 25% focal chest signs, and 7% cold sores.[13]

Continuous Morbidity Recording (CMR) data for LRTI in a subset of 51 practices in Scotland in 1999 show that the incidences are similar between the sexes (*Figure 2*). Incidence rates are increased in pre-school children (110-140/1,000 population), lowest for 5-64 year olds (<70/1,000 population), increased in those aged 65-74 (110-130/1,000 population) and highest in those aged 75 years and over (140-180/1,000 population). There is a strong seasonal variation with a peak incidence in December and January (*Figure 3*). Deprivation, based on postcode, also influences the incidence of LRTI, with females living in the most deprived areas having the highest incidence (*Figure 4*). The CMR data also confirm the prevalence of asthma and COPD in patients consulting with LRTI (*Figure 5*).

Figure 2

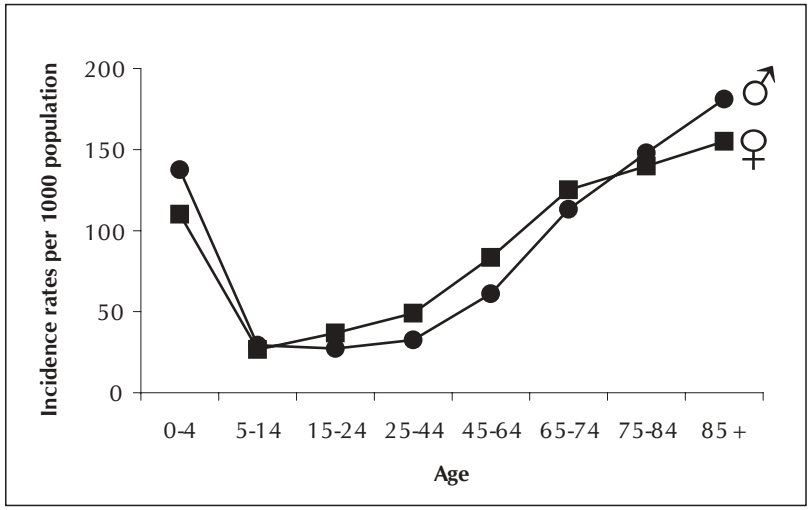


Figure 3

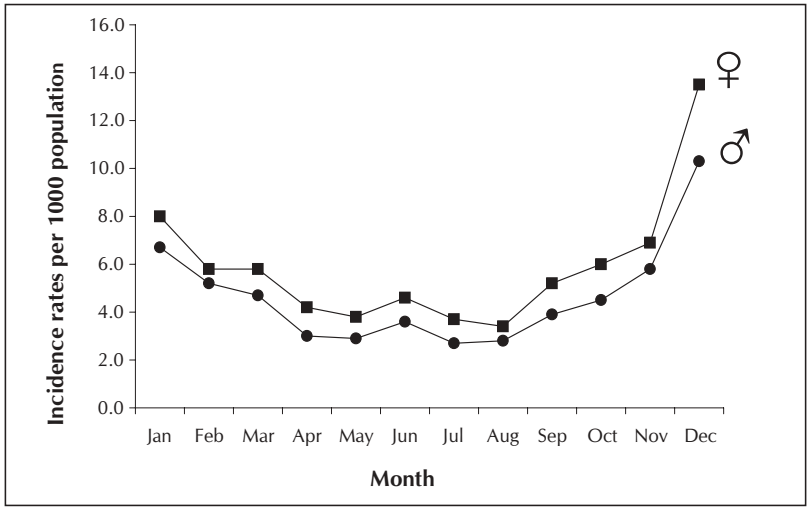


Figure 4

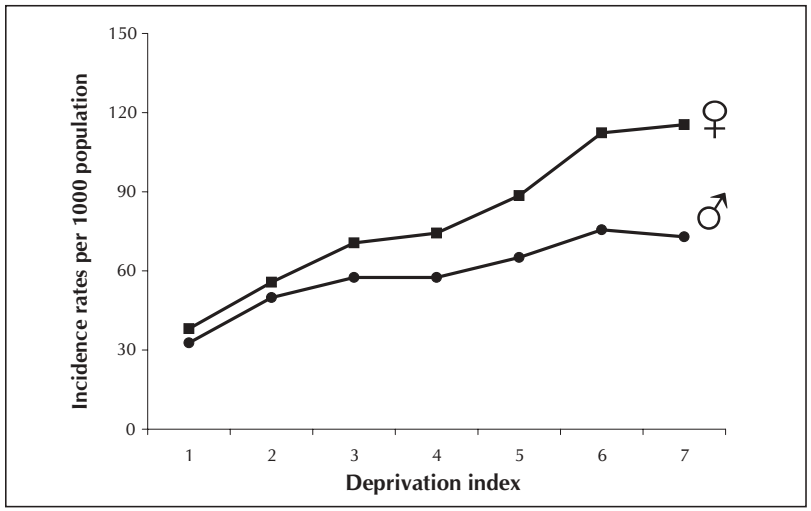
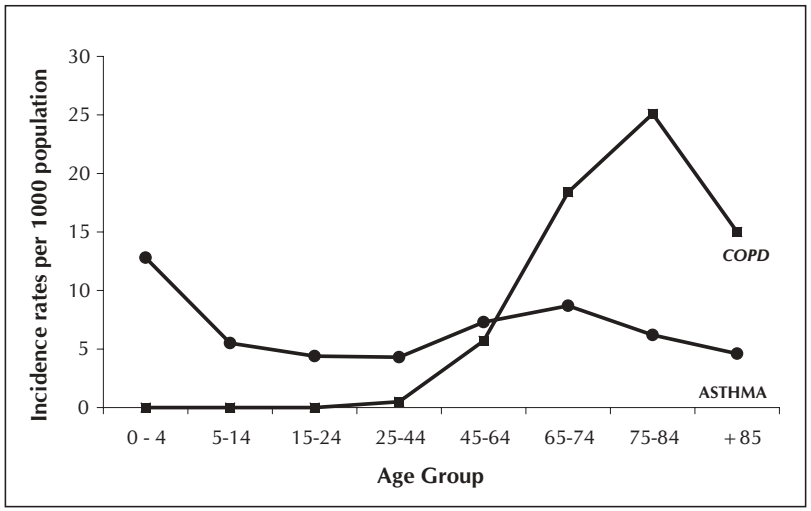


Figure 5



CMR data kindly provided by Michelle Logan and David Murphy, Information & Statistics Division, NHS Scotland, Trinity Park House, South Trinity Road, Edinburgh EH5 3SQ

3 Assessment of severity

History taking and clinical examination can provide an accurate assessment of severity of illness and social support available in the community. Although most patients with LRTI are managed in the community without investigations,[18] some clinical assessment may help predict the need for hospitalisation. It is good clinical practice to examine the chest and make basic observations.

Occasionally, patients will present with a severe form of LRTI, i.e. pneumonia. No combination of symptoms or clinical findings reliably confirms the diagnosis of pneumonia. If focal chest signs are present, 35-46% of patients may have pneumonia.[19] In the elderly, clinical features are less reliable, and up to 50% of pneumonia cases cannot be diagnosed from clinical symptoms.

Studies suggest that between 70 and 99% of community acquired pneumonia is managed at home.[20,21] Severity assessment tools have been developed to aid the primary care or A&E physician to safely predict those patients who can be managed at home; and decreased admission rates, without increased mortality, have been demonstrated when such admission decision protocols are used.[22] 3

Evidence from the USA has shown that patients with radiological evidence of pneumonia who do not exhibit any of the features shown in Box 1 have a negligible mortality and can normally be managed in the community.[23] 2+

Box 1: ***Features of severity in LRTI*** *(items in bold are the most important)*

- **Raised respiratory rate**
  (>30/min)
- **Low blood pressure**
  (systolic <90 mmHg +/- diastolic <60 mmHg)
- **Confusion of recent onset**
- Age >50 years
- Coexisting disease present
  (e.g. cardiac failure, cerebrovascular, neoplastic, renal, or liver disease)
- High or low temperature (<35°C or ≥40°C)
- Tachycardia (>125/min)

Clinical judgement will also need to be taken into account. There will for instance, be patients over the age of 50 who could be managed safely at home, and indeed other workers have proposed similar criteria but with age >65.[24] It also needs to be borne in mind that what applies in North American healthcare does not necessarily apply to a Scottish population. Therefore such criteria may guide the physician in the prognostic factors to look for, but cannot be interpreted rigidly, the decision being dependent on a more holistic overview of the patient. 3

The decision for hospitalisation should also consider **social factors.** Even a relatively "well" patient who is socially disadvantaged or geographically isolated may require hospital rather than community care.[25] Similarly, domiciliary treatment may not be appropriate for a frail isolated elderly patient with co-morbidity, or where compliance is unpredictable, for example in patients who have severe psychiatric disorder or who have an alcohol problem. Hospital admission may be needed if there is lack of social support, inability to take medicine (e.g. vomiting), or where illness is assessed as severe.

C **Manage patients with LRTI routinely in the community, using assessment protocols based on the features of severity to identify those requiring hospital admission.**

Consider the individual patient's needs and the availability of support at home.

4 Exacerbations of COPD

There is currently no general agreement on the definition of an exacerbation in COPD. Definitions of exacerbations in COPD are based on increasing symptoms and/or increased health care utilisation.[26] In some studies exacerbations have been defined in operative terms according to the type and number of symptoms. A commonly used definition is based on an increase in symptoms of dyspnoea, sputum volume and sputum purulence with or without symptoms of upper respiratory infection.[27]

Bacteria are isolated from between 40-60% of acute exacerbations of COPD. Three bacterial species account for most isolates: *Haemophilus influenzae, Streptococcus pneumoniae* and *Moraxella cattarhalis*. *Haemophilus parainfluenzae, Pseudomonas aeruginosa, Staphylococcus aureus* and *Enterobacteriaciae* are encountered less frequently. *Haemophilus influenzae* is present in about 50% of culture positive sputa in most clinical trials. Variation in incidence between trials may be accounted for by patient selection criteria, previous antibiotic exposure and sputum culture techniques.[3,28-41]

4.1 INVESTIGATION

4.1.1 SPUTUM EXAMINATION

Sputum analysis is controversial and possibly for this reason has not featured prominently in studies of LRTI. In selected cases however, it has a role in the management of patients with exacerbations in COPD.[42]

A questionnaire survey of GPs submitting sputum samples for analysis found that the most common reason for submitting a sample was failure of antibiotic treatment.[43] In 25% of the samples in which a pathogen was identified, this did influence antibiotic prescribing. Paradoxically, interpretation of a positive sputum culture is difficult and potentially less useful once antibiotics have already been prescribed. A significant number of GPs feel that the culture results are not available rapidly enough to influence prescribing. Where same day laboratory access is possible, the preliminary overnight analysis can be used to reduce the number of antibiotic scripts by 60% and lead to a reduced repeat visit rate in patients compared to those given empirical antibiotics.[44] 2+

A British study of COPD exacerbations in primary care has demonstrated that green (purulent) sputum is a good indicator of a high bacterial load and that patients with lack of purulence will improve without antibiotic therapy.[45]

☑
- Visualise sputum in patients with an exacerbation of COPD.
- Where sputum purulence is present and antibiotic treatment is intended, obtain sputum culture if overnight analysis is available.
- Base antibiotic choice on the result of the sputum culture.
- If overnight analysis is not available, proceed with empirical therapy, if appropriate.

4.1.2 CHEST X-RAY

Chest x-ray is not normally useful for patients presenting with acute symptoms but should be considered in the convalescent period in those who smoke or if patients do not make satisfactory progress.

☑ Chest x-ray should not be used routinely for patients presenting with acute symptoms of exacerbations of chronic obstructive pulmonary disease (COPD).

☑ Consider chest x-ray in the convalescent period in COPD patients who smoke or if patients do not make satisfactory progress.

4.1.3 PULMONARY FUNCTION TESTS

Two studies [46,47] have shown a correlation between the forced expiratory volume in one second (FEV_1) and sputum cultures. A severe impairment of FEV_1 may be associated with the presence of organisms which are more likely to be resistant to normal antibiotic therapy, such as Pseudomonas during an exacerbation of COPD. Thus knowledge of baseline FEV_1 may be useful when deciding on empirical antibiotic therapy. In contrast, peak flow measurements do not influence management of LRTI symptoms in patients without asthma. Spirometry (FEV_1 and forced vital capacity) is of importance in confirming airways obstruction and is essential in the diagnosis of COPD. 3

☑ Measure FEV_1 in smokers who may have early COPD.

4.1.4 PULSE OXIMETRY

Pulse oximetry, where available, may provide useful additional data for patient management. A study has looked at the impact of pulse oximetry on the management of 14,059 patients admitted to an emergency room with a wide range of conditions.[48] They looked at the management of the patient before and after the physician was made aware of the pulse oximetry reading. A total of 22% of the 1,220 with a saturated oxygen (SaO_2) of $<95\%$ had investigations or treatment changed compared to 2.2% of patients with an SaO_2 of $>95\%$. Management changes were less common in patients with an SaO_2 of $<89\%$, perhaps suggesting that physicians can detect severe hypoxia clinically but find it difficult to detect mild degrees of hypoxia. The value of pulse oximeters in general practice in the UK has not been evaluated.

4.2 TREATMENT

There have been a number of randomised placebo controlled trials of antibiotic therapy (usually aminopenicillin or tetracycline) in patients with exacerbation of COPD. A systematic review of these trials has shown a small benefit for those patients receiving antibiotic rather than placebo, although a small number of patients was used in each of the original study groups.[49] 1^-

In one study the sub-group of patients showing most benefit from antibiotics were those with two or all of the following symptoms: increasing breathlessness, sputum volume and sputum purulence.[27] Patients in this study had significant baseline obstruction with a mean FEV_1 of 33% of predicted. In patients with COPD, sputum purulence is a good guide to the presence and number of bacteria and whether antibiotic treatment is likely to be beneficial.[40,50] 1^+

B **Patients with significant airway obstruction who have an increase in breathlessness and sputum purulence should be treated with an antibiotic.**

☑ The antibiotic of choice should be an aminopenicillin, a macrolide or a tetracycline.

Quinolones have performed equally well in clinical trials, but no clinical superiority over other antibiotics has yet been shown.[51]

For further information on choice of antibiotic, see Annex 1 to this guideline on the SIGN website.

5 Community acquired pneumonia

In the absence of a chest x-ray, the British Thoracic Society defines pneumonia as symptoms of an acute lower respiratory tract infection, including a cough and at least one other lower respiratory tract symptom, together with at least one systemic symptom, and new focal signs on chest examination.[52] In most reported series of patients with community acquired pneumonia, no pathogen is identified in 50% or more of cases. The role of viruses will become clear with increased use of modern molecular diagnostic techniques (*see Annex 2 to this guideline on the SIGN website*). A wide array of organisms may cause acute pneumonia and published reports vary in the organisms isolated due to differences in patient groups, presence of epidemic organisms and diligence of the investigation:[53,54]

- *Streptococcus pneumoniae* is the most frequently identified pathogen in community GP samples. Other organisms commonly reported include *Mycoplasma pneumoniae, Staphylococcus aureus, Haemophilus influenzae* and influenza viruses. A raised incidence of *Staphylococcus aureus* is found during influenza epidemics.[14]
- Organisms such as *Mycoplasma pneumoniae* show seasonal variation with peak incidence at four yearly intervals.
- *Legionella spp.* were initially reported in large scale outbreaks but this organism is now known to occur sporadically particularly in patients with comorbidity such as congestive cardiac failure, diabetes and chronic obstructive pulmonary disease.[54,55] Approximately three-quarters of Legionnaires' disease cases have a history of recent travel abroad.[56]
- *Chlamydia pneumoniae* has recently been identified as a human pathogen, the extent to which this organism causes respiratory disease is as yet undetermined. Infection by *Chlamydia psittaci* should be considered when there is exposure to birds.
- Patients with a history of recent foreign travel may have pneumonia caused by a wide variety of organisms rarely found in Scotland. Additionally, common pathogens such as *Streptococcus pneumoniae* which are acquired abroad may exhibit more resistance to common antibiotics than is currently seen in Scotland.[57-60]
- Anaerobic infection due to aspiration into the lower respiratory tract is found in patients with an alcohol problem, and in other conditions predisposing to aspiration into the respiratory tract.

5.1 INVESTIGATION

5.1.1 SPUTUM CULTURE

If sputum is available and the patient has not had prior antibiotic treatment then a Gram stain is a good indicator of the causative organisms.[54,61] Overnight culture will provide confirmation and the chance to perform susceptibility studies, allowing modification of empirical therapy. Culture is also helpful in establishing the pathogenicity of any isolates.[62-67] 2+

5.1.2 BLOOD TESTS FOR C-REACTIVE PROTEIN (CRP)

In a study of adults with respiratory tract infection in general practice,[68] CRP was the best test discriminating between pneumonia and non-pneumonic LRTI. In a further larger study of 402 adults, this finding was confirmed and it was found that, in the first week of the illness, viral LRTI could also produce high CRP values; with the likelihood ratio for pneumonia in the presence of a high CRP increasing after the first week of illness.[69] In this study, although those with radiological evidence of pneumonia had a higher mean white blood cell count (WBC), a WBC of ≥10.4 was not helpful in predicting radiologically defined pneumonia unless symptoms had been present for seven days or more. Another study showed that in a hospital population with community acquired pneumonia, failure of the CRP to fall was a useful indicator of treatment failure.[70] 2+ 3

An assessment of whether the availability of CRP tests to GPs can reduce antibiotic prescribing for respiratory tract infections in the community looked at prescribing for both upper and lower respiratory tract infections in two groups of patients: those in whom the CRP value was available 1+ 3

and those in whom the decision was based on clinical grounds alone.[71] This RCT found no difference in prescribing between the two groups. In previously well patients, presenting with LRTI, a CRP level >50 mg/dl was seen more frequently in patients with indirect indications and microbiological evidence of infection but the sensitivity and specificity of the test were insufficient for it to be of value for routine management in primary care.[72]

B **CRP levels are of limited use as a diagnostic tool for community acquired pneumonia and should not be performed routinely.**

5.1.3 PULMONARY FUNCTION TESTS

One study has followed up a group of 95 patients presenting to their GP with an episode of cough associated with diffuse wheeze or crackles.[73] Three years after their initial presentation, the patients completed a questionnaire and performed spirometry and methacholine challenge testing. A total of 34% of this group had findings consistent with a diagnosis of asthma or COPD. Thus a presentation with a cough associated with diffuse wheeze or crackles may raise the suspicion of an underlying airway problem. 3

D **Consider spirometry in the convalescent period to diagnose asthma or COPD in patients with community acquired pneumonia presenting with a cough associated with diffuse wheeze or crackles.**

5.1.4 CHEST X-RAY

Chest x-ray evidence of pneumonia is reported in around 40% of patients thought by their GPs to have an acute lower respiratory tract infection associated with new focal chest signs.[14,19] The absence of any signs of abnormality (i.e. pulse, respiratory rate, temperature, and chest examination) makes the diagnosis of radiologically-defined pneumonia unlikely.

In a study of 402 consecutive adults presenting to general practice in Sweden with symptoms of respiratory tract infection, 5% were shown to have pneumonia on chest x-ray.[15] However, in this study, lung crackles and other abnormal chest findings were interpreted too frequently as features of pneumonia. Similarly in a study of 153 adult patients with LRTI, only one of nine with pneumococcal pneumonia, and two of seven with mycoplasma infection, had radiographic evidence of pneumonia.[74] 2+ 3

There has also been debate regarding the value of follow-up chest x-rays in those found to have pneumonia. A retrospective review of case notes of 1,011 patients admitted to hospital with pneumonia found 13 patients with bronchial carcinoma.[75] In eight cases this diagnosis was apparent on the initial chest x-ray. Bronchial carcinoma was thus found on convalescent chest x-ray in just 0.58% of patients. The authors therefore recommended a clinical review one-two months after diagnosis, and x-raying only those with ongoing symptoms. In a separate prospective study, a convalescent chest x-ray was recommended in those patients who make a good recovery because they found that six out of 36 smokers over the age of 60 with pneumonia, had an underlying bronchial carcinoma.[14]

C **Chest x-ray should not be used routinely for patients with acute symptoms of community acquired pneumonia.**

C **Consider chest x-ray in the convalescent period in community acquired pneumonia patients who smoke, or if patients do not make satisfactory progress.**

5.2 TREATMENT

Although there is no direct evidence due to trials not having been conducted and due to the fact that it is no longer ethical to conduct such trials, the longstanding consensus is that antibiotic treatment is essential for pneumonia.[52] 4

D **Early administration of antibiotics in patients with pneumonia is essential.**

The antibiotic chosen should be effective against *Streptococcus pneumoniae*. Treatment with an aminopenicillin or a macrolide is appropriate.

In younger patients (aged <50 years) *Mycoplasma pneumoniae* should be considered, particularly if it is an epidemic year and any of the following clinical features are present:

- upper respiratory tract symptoms
- headache
- symptom duration >1 week.

In these cases, and in those with a diagnosis of chlamydial pneumonia, treatment with a macrolide or tetracycline is appropriate since aminopenicillins are ineffective.

☑ For patients with indices of severity who might normally be referred to hospital, but for various reasons are managed in the community, aminopenicillin and macrolide combination treatment and close follow-up is recommended.

☑ Patients with features of pneumonia should be reviewed after 48 hours, or earlier if clinically indicated, when severity should be reassessed.

6 Non-pneumonic LRTI

Non-pneumonic LRTI is defined here as lower respiratory tract symptoms in a previously well patient with no chest signs and is associated with infection by all of the major respiratory viral groups. A proportion of cases are caused by *Mycoplasma pneumoniae*, *Bordetella pertussis* and *Chlamydia pneumoniae (for further information, see Annex 2 to this guideline, available on the SIGN website*). At the present time, the exact role of atypical pathogens in this disease is not clear. *Haemophilus influenzae* and *Streptococcus pneumoniae* may be associated with secondary infection though their presence in nasopharyngeal commensal flora makes this difficult to determine.[50]

6.1 INVESTIGATION

The evidence suggests that chest x-ray and blood tests for C-reactive protein are not helpful in the community management of non-pneumonic LRTI. Sputum purulence or a positive sputum culture are generally not helpful *(see section 5 for details of the evidence base*). | 2+

B **Sputum culture, chest x-ray and blood tests for CRP should not be carried out routinely in non-pneumonic LRTI.**

6.2 TREATMENT

Several randomised controlled trials and a number of meta-analyses and systematic reviews have investigated the treatment of non-pneumonic LRTI in the community[76-79] and have shown that antibiotic treatment of non-pneumonic LRTI leads to no or minimal advantage.[78,80] | 1++

Specific antibiotic therapy against mycoplasma or chlamydia is not helpful.[81] Any advantages are outweighed by the disadvantages of drug side effects and potential resistance development. | 4

A **Antibiotics should not normally be prescribed for previously well patients who do not have signs in the chest or features of severity** *(see Box 1 on page 5)*.

A **Sputum purulence alone is not an indication for antibiotics in a previously well patient with no chest signs.**

GPs should give non-pneumonic LRTI patients written information to help explain the illness, to explain the decision not to prescribe an antibiotic and to reduce reconsultation rates *(see section 10*).

There is a significant reconsultation rate in non-pneumonic LRTI patients. Guidance on reducing this reconsultation rate is provided in sections 7-9.

7 Good practice in antibiotic use

7.1 EXACERBATIONS OF COPD

Antibiotics are only likely to be of benefit in purulent exacerbations of COPD if increased purulent sputum and dyspnoea are present. In pneumonia, urgent treatment is indicated, with appropriate adjustment on receipt of (laboratory) investigation results. If sputum is available for culture it should be obtained prior to commencing antibiotic. If antibiotic susceptibilities are available then an appropriate agent can be chosen from the laboratory report based on toxicity, mode of administration, allergy, likelihood of resistance developing, cost, dosing schedule, compliance, co-morbidity and severity of disease. Several groups of antibiotic are appropriate for use in purulent exacerbations of COPD. Traditionally, in the UK, penicillin and macrolides have been used although they are less successful against *Haemophilus influenzae*. Tetracyclines are an alternative.

7.2 NON-PNEUMONIC LRTI

In non-pneumonic LRTI, the probability of obtaining benefit from antibiotics may be similar to the probability of being harmed by them.[82] A cough and discoloured sputum do not require antibiotics in the absence of focal signs in the chest. Cough persisting for two to three weeks after presentation, is unlikely to resolve or improve more quickly as a result of antibiotic therapy.[83] Audits have shown poor quality antibiotic prescribing both in hospitals and the community.[84-87] The National Audit Commission has criticised GPs for their unnecessary use of antibiotics. Approximately 60% of GPs' antibiotic use is for respiratory tract symptoms, so it is to be hoped that this guideline will contribute to improved prescribing quality, in particular reduction in antibiotic use where benefits of antibiotics will not or are unlikely to be obtained. As well as making judgements about individual prescriptions, clinicians also need to consider the societal aspect of antibiotic prescription given the current pandemic of resistance in the community.[88-90]

7.3 IMPORTANT ISSUES TO CONSIDER

Recent evidence correlates increasing macrolide resistance with high use of macrolides, with increased resistance arising within a very short time period. There is some evidence that long half-life macrolides are more likely to cause resistance problems although only high-level resistance may be of clinical significance.[91]

Optimal dosing of antibiotic (*see Annex 1 to this guideline on the SIGN website)* is encouraged to hasten bacteriological (and clinical) cure, reduce relapses and shorten length of treatment. Inappropriate treatment, e.g. long term or low dose is associated with selection of resistance leading to treatment failure.[92]

If susceptibility tests suggest resistance or disease severity indicates it, then a quinolone can be an appropriate choice. Quinolones should be used with caution because of potential toxicity and the development of resistance.[93,94]

In the absence of detailed susceptibility data, data from a 2000 National Survey (*see Annex 3 on the website*) of resistance in respiratory tract pathogens or data from a local laboratory may be useful. Scottish data from Alert organism surveillance suggests reduced penicillin susceptibility in pneumococci is relatively rare and macrolides resistance is <10%. Although Scotland appears to have relatively low levels of resistance, this should be an added stimulus to reducing inappropriate use and preventing the development of resistant organisms.[95]

No evidence exists to guide on the optimum length of prescribing. Persistant sputum purulence suggests either a resistant organism or non-bacterial aetiology and other investigations may be appropriate.[45]

Recent treatment or travel abroad is associated with carriage and or infection with antibiotic resistant organisms. High antibiotic consumption in a practice is associated with high resistance rates both in individual patients and in the practice as a whole, often resulting in reduced antibiotic susceptibility in *Streptococcus pneumoniae* or β-lactamase producing *Haemophilus influenzae*.[10,96-99]

Reconsultation is due as often to side effects of antibiotics as it is to treatment failure.[11]

8 General management of LRTI

8.1 GENERAL ADVICE

☑ Patients in all groups should be advised to rest and drink plenty of fluids.

☑ Paracetamol or aspirin should be advised as an antipyretic and analgesic.

☑ Patients should also be advised to contact their general practice in the event of deterioration. An advice leaflet *(see section 10)* can assist in this.

8.2 COUGH MIXTURES

Cough is a useful defence mechanism for clearing sputum in lower respiratory tract infection therefore its suppression in this circumstance may not be appropriate. Cough suppression in LRTI may be justified for a non-productive irritating cough.

There are a number of experimental studies where the severity of pharmacologically induced cough is reduced by dextromethorphan and codeine (but these tend to be small studies of around 20 patients) and there is conflicting evidence for the therapeutic effect of dextromethorphan and codeine and pholcodine in patients with chronic cough.[100-103] 1⁻

Two studies have addressed the efficacy of codeine in the treatment of cough associated with acute lower respiratory tract infection.[104,105] Neither of these placebo controlled studies have shown a benefit for codeine. The place of cough suppressants in non-productive cough due to LRTI remains unclear with the larger RCTs suggesting they are not of benefit. A recent meta-analysis concurs with this opinion.[106] 1⁺⁺ 1⁺

A Cochrane review did not identify any evidence of a beneficial effect of β_2-agonists on cough in LRTI.[107]

It is also generally accepted that expectorants and demulcent cough preparations are ineffective.[108] 4

8.3 SMOKING CESSATION

The presentation of smokers with LRTI is an ideal opportunity to introduce smoking cessation measures. There are published UK guidelines on smoking cessation which have been endorsed by most of the key professional groups in this area.[109]

A US public health service report lists the principal steps for developing smoking cessation:[110]

- Recognition that effective treatments for smoking cessation exist.
- The principle that all health care workers should promote smoking cessation at every contact the smoker makes with the health service.
- Tobacco dependence counselling is effective and the degree of effectiveness relates to the intensity of counselling.
- Nicotine replacement therapy will reliably increase long term smoking abstinence rates. (This is currently the subject of a Cochrane review).[111]

Limited evidence suggests that prescription of bupropion leads to an increased rate of smoking cessation in patients who are involved in structured cessation programmes.[112,113] The effect of bupropion is independent of past history of depression or alcoholism.[114]

9 Immunisation

The complications of influenza infection include both viral and bacterial pneumonia and are associated with a high rate of morbidity and mortality in vulnerable groups, often overwhelming hospital services during the winter months. The most common cause of bacterial pneumonia is the pneumococcus, which causes the majority of community acquired pneumonia. Pneumococcal bacteraemia is a serious invasive disease with a high mortality that is frequently associated with pneumococcal pneumonia. Therefore, both *Streptococcus pneumoniae* and the influenza A and B viruses are important pathogens commonly affecting the 65 years and over age group and others with high risk conditions.

9.1 INFLUENZA VACCINATION

Influenza vaccine is prepared each year using viruses similar to those considered most likely to be circulating in the forthcoming winter. The UK Departments of Health[115] recommend that the influenza vaccine is given to all people aged 65 years or older and to people of any age

- with chronic respiratory disease including asthma
- with chronic heart disease
- with chronic renal disease
- with immunosuppression due to disease or treatment
- with diabetes mellitus
- in long stay residential care
- health and social care workers of all ages who have regular direct contact with high risk patients or clients.

4

Studies of the safety of influenza vaccine have concluded that the incidence of systemic reactions is low (<5%) and that systemic side effects are equally common in the vaccine and placebo groups.[116-118]

1+

Several large, well designed case-control studies have shown that influenza vaccination reduces admissions for pneumonia and influenza in the elderly and/or reduces mortality from respiratory and all causes.[116,119-125] Vaccination was also shown to be associated with fewer hospitalisations for pneumonia and influenza and fewer outpatient visits for all respiratory conditions in the elderly with chronic lung disease.[126]

2++

A meta-analysis of 20 cohort studies in patients over 65 years, described pooled estimates of vaccine efficacy of 56% for preventing respiratory illness, 53% for preventing pneumonia, 50% for preventing hospitalisation and 68% for preventing death.[127]

While studies in "high risk" groups (including those with chronic lung, heart, renal and liver disease, diabetes mellitus, immunosuppression due to disease or treatment and those aged over 65 years) have shown benefit from influenza vaccination, it remains less clear whether "low risk" occupational groups (including all health and social care workers who have direct patient contact or contact with vulnerable clients) should be offered immunisation. One study has reported that influenza vaccination of health-care workers is associated with a substantial decrease in mortality among elderly people in long-term care. However, virological surveillance showed no associated decrease in non-fatal influenza infection.[128]

One RCT revealed that hospital employees show no significant reduction in influenza-like illness, severity of illness or sickness absenteeism.[129] A more recent study, showed 25% fewer episodes of upper respiratory illness, 43% fewer days of sick leave and 44% fewer visits to physicians' offices for upper respiratory tract illness in those receiving active vaccine.[130] Another RCT has shown that influenza vaccination of healthy working adults reduces the rates of influenza-like illness, lost workdays and physician visits during the year when the vaccine and circulating viruses are similar. However, during a season when the vaccine is poorly matched, vaccination does not reduce influenza-like illness, physician visits or lost workdays. During both seasons, no overall economic benefits can be demonstrated.[131]

1+

B **Influenza vaccination is recommended for those aged ≥65 years and for people of any age with underlying chronic disease or living in long-stay residential care, and for health and social care workers.**

C **Influenza vaccine is contraindicated for those with hypersensitivity to hen's eggs.**

9.2 PNEUMOCOCCAL VACCINATION

The current 23-valent pneumococcal polysaccharide vaccine (PPV) covers more than 95% of invasive disease serotypes in Scotland.[132]

Four large early RCTs confirmed the high efficacy of PPV against both pneumococcal pneumonia and invasive pneumococcal disease in immunocompetent adults who are at risk because of their occupational or social circumstances.[133-136] As a result the vaccine was licensed in 1977, before large RCTs could be conducted amongst higher risk groups including the elderly, those with underlying medical conditions and those specifically immunocompromised by HIV, haematological disorders/malignancies and splenic dysfunction. The high efficacy in immunocompetent younger adults was used to under-estimate required sample sizes for the trials in higher risk groups where efficacy was bound to be lower and the actual sample sizes required even higher. As a result, the published RCTs in the elderly and those with underlying medical conditions have not consistently shown a benefit in terms of reduced pneumococcal pneumonia [137,138] although at least three have demonstrated a non-statistically significant reduced risk of pneumococcal bacteraemia.[132,139,140] Other RCTs for specific high risk groups, including the severely immunocompromised and those with advanced malignancy, were inadequate in sample size and were primarily designed to assess immunogenicity and safety.[141-143] One exception is the large study of black Ugandans with HIV which showed no benefit in this high risk group.[144] 1+ 1-

Systematic reviews or meta-analyses of these small and flawed RCTs have been published.[145-147] The verdict regarding the efficacy amongst elderly and other higher risk patients differ amongst the three publications with only one [146] concluding that the vaccine was equally efficacious for the elderly, institutionalised people or those with chronic disease. 1-

However, there is now an extensive literature calling into question the validity of meta-analyses that group together inadequately sized and otherwise flawed studies using different outcome measures [148-152] and the advantages of observational studies in this situation.[153,154] As a result, the most valid conclusion of the review of RCTs is that they fail to provide estimates of efficacy against pneumococcal pneumonia in the elderly, those with underlying medical conditions and the severely immunocompromised, which therefore remain unknown. It can reasonably be assumed that the efficacy of PPV in these higher risk groups is less than that estimated in the original studies, decreasing with increasing degree of immunocompromised state.

The more numerous observational studies have consistently shown a benefit. Four out of five case control studies,[155-159] a prospective cohort study,[160] and an indirect cohort study[161-163] have all demonstrated clear protective effects with the use of the vaccine against invasive pneumococcal infection, a clear and unambiguous endpoint. In addition, the vaccine was associated with fewer hospitalisations for pneumonia, fewer deaths and direct medical care cost savings in patients with chronic lung disease.[164,165] As a result, the current international consensus is that the vaccine can be considered to be 50-80% effective against invasive pneumococcal disease.[166-168] 2++ 4

Two recent studies of cost-effectiveness, one based in America [169] and the other in five European countries [170] suggest that, based on the reduction of pneumococcal bacteraemia, the vaccine is cost-effective. Compared with preventing bacteraemic pneumococcal pneumonia alone (the bulk of invasive pneumococcal disease), the cost-effectiveness of pneumococcal vaccination increases substantially when only a small proportion of additional cases of non-bacteraemic pneumococcal pneumonia are prevented.[171]

Although some of the evidence is conflicting, it seems reasonable to conclude that at least in immunocompetent patients, the current vaccine is clinically highly effective for preventing pneumococcal pneumonia and associated bacteraemia. The evidence of benefit in terms of preventing invasive pneumococcal disease in the elderly and those with underlying medical

conditions remains persuasive. Efficacy against pneumococcal pneumonia in these higher risk groups is unknown because it has yet to be properly studied. Nevertheless, the possibility that PPV prevents some pneumococcal pneumonia in the elderly and those with underlying medical conditions remains likely even though the efficacy is expected to be lower in these groups and even lower in immunocompromised patients.

Given the need to prevent this infection in the increasing numbers of elderly and in the face of increasing antimicrobial resistance to *S. pneumoniae*, it seems reasonable to specifically advocate its use in the 65+ age group, particularly given the recent reduction in the age-related indication for influenza vaccine and the evidence that the protective effects of simultaneous pneumococcal and influenza vaccination (at different sites) are additive and that their concurrent administration is safe.[172] 1++

B **Pneumococcal polysaccharide vaccine (PPV) should be given to all those aged two years or older in whom pneumococcal infection is likely to be more common or more serious in terms of increased morbidity and mortality (those with chronic lung disease, underlying medical conditions or severely immunocompromised).**

B **PPV should be given to all people over the age of 65 years, on a one-off basis, to be administered when patients receive their routine annual influenza vaccine.**

B **Pneumococcal and influenza vaccines can safely be given concurrently at different sites.**

Current UK Department of Health Joint Committee on Vaccination and Immunisation guidelines[173] recommend that PPV should not be given during acute infection and is not recommended during pregnancy. Revaccination with PPV within three years is contraindicated but revaccination after five years should be considered in those at increased risk including asplenic, hyposplenic and nephrotic patients.

10 Key messages for patients

10.1 LIFESTYLE

The reasons for prescription of antibiotics in respiratory illness are complex.[174] Many patients with non-pneumonic LRTI believe that their symptoms are due to an infection which can be cured by antibiotics and such beliefs can significantly influence a general practitioner's prescribing. A primary care study showed a correlation between a patient's expectations of receiving an antibiotic and a physician prescribing it. Physicians prescribed antibiotics 77% of the time when they believed that the patients wanted antibiotics, but only 29% of the time when they believed the patients did not want antibiotics; however, in only 47% of patients was the physician's perception correct. Patient satisfaction in this study was most strongly associated with the physician spending enough time explaining the illness and the choice of treatment.[175] 3

D **GPs can reduce a patient's expectations of being prescribed an antibiotic and reduce unnecessary reconsultations by addressing four issues at consultation:**

- **The natural course of the illness**
- **The lack of effectiveness of antibiotics**
- **The problems of antibiotic resistance**
- **The side effects of antibiotics.**

Time constraints are often a difficulty in general practice, and this may influence prescribing habits. However, it has been shown that a decrease in antibiotic prescribing need not lead to an increase in the reconsultation rate,[176] that the reconsultation rate in a single illness episode seems independent of antibiotic prescribing,[177] and furthermore that antibiotic prescriptions may increase the likelihood of future consultations if the patient perceived that the drug had helped in the past.[178] Previous consultation habit, underlying chronic disease and dyspnoea were positively associated with reconsultation. 2+

Attempts to solve this problem are likely to be largely behavioural, multifactorial and multidisciplinary in nature, requiring education of both patients and medical staff. No single intervention is likely to produce a high degree of change. Nevertheless, intervention strategies adopting a multidimensional approach (educational patient mailings, clinician education in communication and disease management, and surgery based literature) have shown a reduction in antibiotic prescribing of up to 40%.[176] 2+

The provision of patient education alone has been successful in recent studies.[179-181] These studies have shown that the use of an information leaflet for patients (similar to that in section 10) significantly reduces reconsultation rates. In addition, using terms such as "chest cold" with patients, rather than "bronchitis" or "chest infection", may reduce their expectations for an antibiotic. 1+ 3

B **GPs should give non-pneumonic LRTI patients written information to help explain the illness, to explain the decision not to prescribe an antibiotic and to reduce reconsultation rates.**

The example patient information leaflet shown below may be copied freely and adapted for use locally. A sample copy of a patient leaflet is also available from the BMJ website: http://bmj.com/cgi/content/full/324/7329/91.

Example information leaflet for patients with a cough

Dear Patient,

We hope you find this information sheet will help you understand why your cough is troublesome and what you can expect to happen.

What does a cough mean?

A cough is not a "bad" thing: it is there for a reason. It helps defend your lungs by making sure that any secretions are coughed up, rather than settling in the lower lungs where they would cause trouble. Similarly, "phlegm" or "sputum" is there to act as a barrier to catch the dust and germs that we breathe in. Because your cough is part of your body's defence mechanisms, it is likely to be the last symptom of your current illness to go back to normal.

Do I have a chest infection?

No microbes (the organisms that cause infection) can be detected in around half of the patients with a cough. When patients do have an infection, it is caused by either virus germs or bacteria germs.

Should I be treated with antibiotics?

Antibiotics are only effective against bacteria and do not kill viruses. Antibiotics are not needed in most people who normally have healthy chests. They do not usually speed up recovery and can cause unpleasant side effects, such as feeling or being sick, and lead to resistance in future infections. In some cases, however, an antibiotic may be useful. For example, for people who have had previous chest problems or are vulnerable to severe chest infections for other reasons. If you are prescribed antibiotics, you must ensure that you complete the full course.

What will help relieve my symptoms?

Paracetamol or aspirin, taken regularly, will help with fever and mild chest pains and it is advisable to stop smoking. Remember to drink plenty of fluids. There is no good evidence that cough mixtures work.

Is there anything I should look out for?

Should you find that you develop any new or worsening symptoms, or if you start to cough up any blood or feel breathless, it is important to telephone the surgery and make an appointment for a further check. The process of recovery, even with any treatment that your doctor may have prescribed is likely to take up to two to three weeks to complete. Assuming you are otherwise feeling well, you need not worry if your cough and phlegm take time to settle, especially if you are getting gradually better every day.

Further information:

This surgery telephone number is _____
when closed _____

You can also contact NHS 24 for telephone advice at any time on:

A lot of the information is also available on the NHS Direct web site: www.nhsdirect.nhs.uk or visit the British Lung Foundation web site: www.lunguk.org

10.2 SOURCES OF FURTHER INFORMATION

NHS 24
www.nhs24.com

NHS Direct
www.nhsdirect.nhs.uk

The British Lung Foundation Scotland
The Royal College of Physicians and Surgeons
234-242 St Vincent Street Glasgow G2 5PA
Tel: 0141 204 4110
Email:redballoon@blfscotland.org.uk
www.lunguk.org

Chest, Heart & Stroke Scotland
65 North Castle Street Edinburgh EH2 3LT
Advice Line: 0845 077 6000
Tel: 0131 225 6963
Fax: 0131 220 6313
E-mail:admin@chss.org.uk
www.chss.org.uk

11 Implementation and audit

11.1 STATEMENT OF INTENT

This guideline is not intended to be construed or to serve as a standard of medical care. Standards of care are determined on the basis of all clinical data available for an individual case and are subject to change as scientific knowledge and technology advance and patterns of care evolve. These parameters of practice should be considered guidelines only. Adherence to them will not ensure a successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgement regarding a particular clinical procedure or treatment plan must be made in light of the clinical data presented by the patient and the diagnostic and treatment options available. However, it is advised that significant departures from the national guideline or any local guidelines derived from it should be fully documented in the patient's case notes at the time the relevant decision is taken.

11.2 LOCAL IMPLEMENTATION

Implementation of national clinical guidelines is the responsibility of each NHS Trust and Health Board and is an essential part of clinical governance. It is acknowledged that every Trust cannot implement every guideline immediately on publication, but mechanisms should be in place to ensure that the care provided is reviewed against the guideline recommendations and the reasons for any differences assessed and, where appropriate, addressed. These discussions should involve both clinical staff and management. Local arrangements may then be made to implement the national guideline in individual hospitals, units and practices, and to monitor compliance. This may be done by a variety of means including patient-specific reminders, continuing education and training, and clinical audit.

11.3 COST SAVINGS FOR NHSSCOTLAND

A preliminary economic analysis conducted by the Research Assistant to the SIGN Economic Advisor has estimated that substantial cost savings can ensue if the recommendations in this guideline are followed. Based on this analysis the number of antibacterial prescriptions for LRTI annually in Scotland is around 640 800, each costing between £3.19 and £5.18. A 40% reduction in the largely unnecessary antibiotic prescribing for LRTI is a reasonable target to aim for.[176] Achieving this target by implementing this guideline would save between £1-1.33 million annually for NHSScotland. These conservative estimates do not take into account further savings from reduced consultations with GPs due to antibiotic side effects or requests for repeat prescriptions.

11.4 KEY POINTS FOR AUDIT

- Proportion of previously well patients with LRTI without focal chest signs receiving antibiotic treatment.
- Proportion of previously well patients with LRTI without focal chest signs receiving an information leaflet.
- Any increase in deaths among patients with community acquired pneumonia.
- Proportion of patients with COPD and an increase in purulent sputum having sputum cultured.
- Proportion of smokers with LRTI receiving smoking cessation advice.
- Proportion of patients presenting with LRTI fitting into recommended groups for influenza and pneumococcal vaccination who receive such vaccination.
- Proportion of patients previously well presenting with LRTI who have spirometry performed.
- Proportion of patients with LRTI referred for secondary care, investigation and advice.
- Number of LRTI consultations in the two years before establishment of a diagnosis of chronic lung disease.
- Monetary savings obtained as a result of reduced antibiotic prescribing.

11.5 RECOMMENDATIONS FOR RESEARCH

- Identification of the aetiology of LRTI "in the community".
- Development of a better understanding of reasons for consultation and reconsultation of those with LRTI.
- Development of a workable definition and nomenclature of LRTI.
- Assessment of the role of nurse led clinics and NHS Direct / NHS 24 in dealing with LRTI.
- Assessing the value of sputum culture in patients with underlying lung disease in the community.
- Assessing the value of pulse oximetry in patients presenting with LRTI in the community.
- Assessing the value of education and other modalities to effect behavioural change in the reduction of antibiotic prescribing and reconsultation.
- Identifying the value of spirometry in patients presenting with LRTI.
- Identifying the cause of breathlessness in patients presenting with LRTI.
- Assessing the need for antibiotic treatment in patients with non respiratory co-morbidity and no focal signs in the chest who present with LRTI.
- Assessing the effect of delayed prescribing and/or awaiting sputum culture results on the rates of antibiotic prescribing and reconsultation.
- Assessing the efficacy of pharmacological agents for the treatment of cough.

12 Development of the guideline

12.1 INTRODUCTION

SIGN is a collaborative network of clinicians, other health care professionals, and patient organisations funded by the Clinical Resource and Audit Group (CRAG) of the Scottish Executive Health Department. SIGN guidelines are developed by multidisciplinary groups using a standard methodology, based on a systematic review of the evidence. Further details about SIGN and the guideline development methodology are contained in SIGN 50: A guideline developer's handbook, available at **www.sign.ac.uk.**

12.2 THE GUIDELINE DEVELOPMENT GROUP

Dr John Winter (Chairman)	*Respiratory Physician, Kings Cross Hospital, Dundee*
Ms Francesca Chappell	*Information Officer, SIGN*
Dr Graham Douglas	*Consultant Physician, Aberdeen Royal Infirmary*
Dr Ali El-Ghorr	*Programme Manager, SIGN*
Dr Iain Farmer	*General Practitioner, Cill Chuimein Medical Centre, Fort Augustus*
Dr Iain Gould	*Consultant Microbiologist, Aberdeen Royal Infirmary*
Dr Alison Grove	*Consultant Physician, Royal Hampshire County Hospital, Winchester*
Mrs Pauline Hamilton	*Lecturer in Nursing, Glasgow Caledonian University*
Dr Helene Irvine	*Public Health Consultant, Greater Glasgow Health Board*
Dr Gavin Lindsay	*Consultant Bacteriologist, Southern General Hospital, Glasgow*
Dr Carol McKinnon	*General Practitioner, Castlemilk Health Centre, Glasgow*
Dr Kathleen Onori	*General Practitioner, The Richmond Practice, Bo'ness*
Dr Gavin Petrie	*Consultant Physician, Victoria Hospital, Kirkcaldy*
Dr Nigel Pexton	*General Practitioner, Williamwood Medical Centre, Glasgow*
Mr Ken Schofield	*Grampian Health Contact, Lossiemouth*
Dr Philip Welsby	*Consultant in Infectious Diseases, Western General Hospital, Edinburgh*

The membership of the guideline development group was confirmed in consultation with the member organisations of SIGN. Declarations of interests were made by all members of the guideline development group. Further details are available on request. Guideline development and literature review expertise, support, and facilitation were provided by the SIGN Executive.

12.3 SYSTEMATIC LITERATURE REVIEW

A thorough literature search was undertaken in Medline, Embase, and Healthstar to obtain material from 1985 to 1999 inclusive. The results of an Internet search on key websites were passed on to the Chairman of the group. All material was assessed and evidence synthesised in accordance with SIGN methodology. Material not deemed to be of sufficient quality was discarded.

This guideline was issued in 2002 and will be considered for review in 2005, or sooner if new evidence becomes available. Any updates to the guideline will be noted on the SIGN website: **www.sign.ac.uk.**

12.4 CONSULTATION AND PEER REVIEW

12.4.1 NATIONAL OPEN MEETING

A national open meeting is the main consultative phase of SIGN guideline development, at which the guideline development group present their draft recommendations for the first time. The national open meeting for this guideline was held on 9 February 2001 and was attended by 150 representatives of all the key specialties relevant to the guideline. The draft guideline was also available on the SIGN web site for a limited period at this stage to allow those unable to attend the meeting to contribute to the development of the guideline.

12.4.2 SPECIALIST PEER REVIEW

The guideline was also reviewed in draft form by a panel of independent expert referees, who were asked to comment primarily on the comprehensiveness and accuracy of interpretation of the evidence base supporting the recommendations in the guideline. SIGN is very grateful to all of these experts for their contribution to this guideline.

Dr Jim Beattie	*General Practitioner, Inverurie*
Dr Alan Begg	*General Practitioner, Montrose*
Dr Peter Christie	*Consultant Epidemiologist, Scottish Centre for Infection & Environmental Health*
Dr Hamish Greig	*Chairman, Scottish Association of Community Hospitals*
Dr Steven Haigh	*Chairman, Antibiotic Working Group, Lothian Joint Formulary and General Practitioner, West Calder*
Dr Catherine Higgott	*General Practitioner, Isle of Skye*
Professor Sean Hilton	*Department of General Practice, St George's Hospital Medical School, London*
Dr Bill Holmes	*Group Medical Director, Nestor Healthcare Group, Nottingham*
Dr John Macfarlane	*Respiratory Physician, Nottingham City Hospital*
Dr Allan Merry	*General Practitioner, Ayrshire*
Professor David Price	*Professor of Primary Care Respiratory Medicine, University of Aberdeen*
Ms Nicola Ring	*Nurse Co-ordinator, Clinical Effectiveness Programme (Primary Care)*
Professor Lewis Ritchie	*Department of General Practice & Primary Care, University of Aberdeen*
Professor Robert Stockley	*Professor of Medicine, Queen Elizabeth Hospital, Birmingham*
Dr Mark Woodhead	*Respiratory Physician, Manchester Royal Infirmary*

12.4.3 SIGN EDITORIAL GROUP

As a final quality control check, the guideline was reviewed by an Editorial Group comprising the relevant specialty representatives on SIGN Council:

Dr David Alexander	*British Medical Association Scottish General Practice Committee*
Professor Gordon Lowe	*Chairman of SIGN*
Dr Lesley MacDonald	*Faculty of Public Health Medicine*
Ms Juliet Miller	*Director of SIGN*
Dr Margaret Roberts	*Royal College of Physicians and Surgeons of Glasgow*

12.5 ACKNOWLEDGEMENTS

SIGN is grateful to the following former members of the group and others who have contributed to the development of this guideline:

Dr Bill Carman	*Director, Regional Virus Laboratory, Glasgow*
Ms Ann Kerr	*Programme Manager, Health Education Board for Scotland*
Dr Charles Langan	*General Practitioner, Glasgow*
Dr David Hawson	*General Practitioner, Aberdeen*
Mrs Margaret MacDonald	*Specialist Respiratory Nurse, Stobhill Hospital, Glasgow (deceased)*
Dr Safia Qureshi	*Senior Programme Manager, SIGN*
Dr Olivia Wu	*Research Associate, Department of Public Health, University of Glasgow*

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NON-PNEUMONIC LRTI IN PREVIOUSLY WELL PATIENTS

B **Sputum culture, chest x-ray and blood tests for C - reactive protein (CRP) should not be carried out routinely in non-pneumonic LRTI.**

A **Antibiotics should not normally be prescribed for previously well patients who do not have signs in the chest or features of severity.**

A **Sputum purulence alone is not an indication for antibiotics in a previously well patient with no chest signs.**

EXACERBATIONS OF COPD

☑
- Visualise sputum in patients with an exacerbation of chronic obstructive pulmonary disease (COPD).
- Where sputum purulence is present and antibiotic treatment is intended, obtain sputum culture if overnight analysis is available.
- Base antibiotic choice on the result of the sputum culture.
- If overnight analysis is not available, proceed with empirical therapy, if appropriate.

☑ Chest x-ray:
- should not be used routinely for patients presenting with acute symptoms of exacerbations of COPD.
- should be considered in the convalescent period in COPD patients who smoke, or if patients do not make satisfactory progress.

B **Patients with significant airways obstruction who have an increase in breathlessness and sputum purulence should be treated with an antibiotic.**

☑ The antibiotic of choice should be an aminopenicillin, a macrolide or a tetracycline.

Further information is available from:

NHS Direct
www.nhsdirect.nhs.uk
The British Lung Foundation Scotland
www.lunguk.org
Chest, Heart & Stroke Scotland
www.chss.org.uk

Features of severity in LRTI

(items in bold are the most important)

- **Raised respiratory rate** (>30/min)
- **Low blood pressure** (systolic <90 mmHg +/- diastolic <60 mmHg)
- **Confusion of recent onset**
- Age >50 years
- Coexisting disease present (e.g. cardiac failure, cerebrovascular, neoplastic, renal, or liver disease)
- High or low temperature (<35°C or ≥40°C)
- Tachycardia (>125/min)

COMMUNITY ACQUIRED PNEUMONIA

B **CRP levels are of limited use as a diagnostic tool for community acquired pneumonia (CAP) and should not be performed routinely.**

D **Consider spirometry in the convalescent period to diagnose asthma or COPD in patients with community acquired pneumonia presenting with a cough associated with diffuse wheeze or crackles.**

C **Chest x-ray:**
- **should not be used routinely for patients with acute symptoms of community acquired pneumonia**
- **should be considered in the convalescent period in community acquired pneumonia patients who smoke, or if patients do not make satisfactory progress.**

D **Early administration of antibiotics in patients with pneumonia is essential.**

☑ For patients with indices of severity who might normally be referred to hospital, but for various reasons are managed in the community, aminopenicillin and macrolide combination treatment and close follow-up is recommended.

☑ Patients with features of pneumonia should be reviewed after 48 hours, or earlier if clinically indicated, when severity should be reassessed.

IMMUNISATION

B **Influenza vaccination is recommended for those aged ≥65 years and for people of any age with underlying chronic disease or living in long-stay residential care, and for health and social care workers.**

B **Pneumococcal polysaccharide vaccine (PPV) should be given to all those aged two years or older in whom pneumococcal infection is likely to be more common or more serious in terms of increased morbidity and mortality** (those with chronic lung disease, underlying medical conditions or severely immunocompromised).

B **PPV should be given to all people over the age of 65 years, on a one-off basis, to be administered when patients receive their routine annual influenza vaccine.**

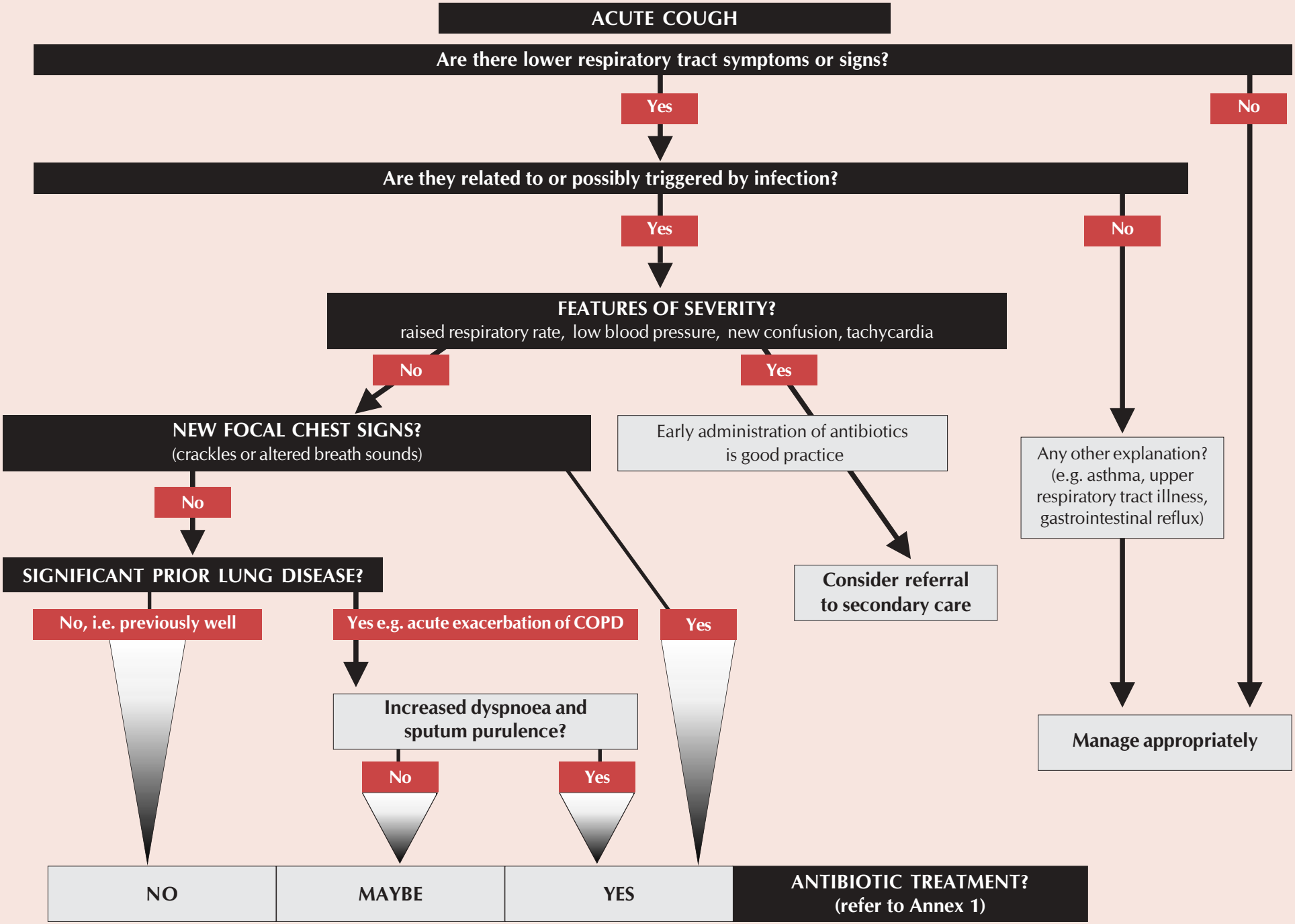
OTHER MANAGEMENT MEASURES

D **GPs can reduce a patient's expectations of being prescribed an antibiotic and reduce unnecessary reconsultations by addressing four issues at consultation:**
- **The natural course of the illness**
- **The lack of effectiveness of antibiotics**
- **The problems of antibiotic resistance**
- **The side effects of antibiotics.**

B **GPs should give non-pneumonic LRTI patients a leaflet to help explain the illness, to explain the decision not to prescribe an antibiotic and to reduce reconsultation rates.**

☑
- Patients in all groups should be advised to rest and drink plenty of fluids.
- Paracetamol should be advised as an antipyretic and analgesic.
- There is no good evidence that cough mixtures work.
- Patients should also be advised to contact their general practice in the event of deterioration.

ADULTS IN THE COMMUNITY WITH SYMPTOMS OF LOWER RESPIRATORY TRACT INFECTIONS



In all cases, give symptomatic treatment with fluids and paracetamol, and if appropriate provide educational material regarding lower respiratory tract infections, assess for unknown co-morbidity, advise smoking cessation and check vaccination status against influenza & pneumococcus. When a decision to give antibiotic has been made, a sputum culture is good practice wherever possible.