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PRACTICE

GUIDELINES

Diagnosis and management of community and hospital acquired pneumonia in adults: summary of NICE guidance

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This is one of a series of *BMJ* summaries of new guidelines based on the best available evidence; they highlight important recommendations for clinical practice, especially where uncertainty or controversy exists.

Community acquired pneumonia is a common condition that causes considerable morbidity and has a mortality rate of approximately 20% for patients admitted to hospital in the United Kingdom.[1] It is diagnosed in 5-12% of adults who present to general practitioners with symptoms of lower respiratory tract infection,[2 3] and 22-42% are subsequently admitted to hospital.[3 4] Adherence to previous guidelines has been poor, and this variation in practice can lead to suboptimal outcomes such as increased mortality and longer stay in hospital.[5-7] Hospital acquired pneumonia (excluding ventilator associated pneumonia) has a point prevalence of approximately 1% of hospital inpatients, is estimated to lengthen hospital admission by an average of eight days, and has a high mortality rate.[8 9] This article summarises the most recent recommendations for the management of both types of pneumonia from the National Institute for Health and Care Excellence (NICE).[10]

Recommendations

NICE recommendations are based on systematic reviews of best available evidence and explicit consideration of cost effectiveness. When minimal evidence is available, recommendations are based on the Guideline Development Group's experience and opinion of what constitutes good practice. Evidence levels for the recommendations are given in italic in square brackets.

Presentation with lower respiratory tract infection

Of people who present to general practitioners with symptoms of lower respiratory tract infection, only a small proportion have community acquired pneumonia. In those who do not have a clinical diagnosis of pneumonia, the decision whether to prescribe antibiotics can be difficult, with a tendency towards over-prescription. Performing a point of care C reactive protein test can help to identify patients with lower respiratory tract infections who will, and will not, benefit from antibiotics.

- For people presenting with symptoms of lower respiratory tract infection in primary care, consider a point of care C reactive protein test if after clinical assessment a diagnosis of pneumonia has not been made and it is not clear whether antibiotics should be prescribed. Use the results of the C reactive protein test to guide antibiotic prescribing in people without a clinical diagnosis of pneumonia as follows:

  -Do not routinely offer antibiotic therapy if the C reactive protein concentration is less than 20 mg/L

  -Consider a delayed antibiotic prescription (a prescription for use at a later date if symptoms worsen) if the C reactive protein concentration is between 20 mg/L and 100 mg/L

  -Offer antibiotic therapy if the C reactive protein concentration is greater than 100 mg/L.

  [Based on high to very low quality evidence from randomised controlled trials with a large number of patients and a cost effectiveness analysis]

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Community acquired pneumonia

Assessment of severity in community acquired pneumonia is important, as it helps to guide subsequent aspects of management such as place of care and choice of antibiotic therapy.

Severity assessment in primary care

- When a clinical diagnosis of community acquired pneumonia is made in primary care, determine whether patients are at low, intermediate, or high risk of death by using the CRB65 score (see box 1).
- Use clinical judgment in conjunction with the CRB65 score to inform decisions about whether patients need hospital assessment as follows:
  -Consider home based care for patients with a CRB65 score of 0

  -Consider hospital assessment for all other patients, particularly those with a CRB65 score of 2 or more.

  [Based on limited observational data and the experience and opinion of the GDG]

Severity assessment in hospital

- When a diagnosis of community acquired pneumonia is made at presentation to hospital, determine whether patients are at low, intermediate, or high risk of death by using the CURB65 score (see box 2).
- Use clinical judgment in conjunction with the CURB65 score to guide the management of community acquired pneumonia, as follows:
  -Consider home based care for patients with a CURB65 score of 0 or 1

  -Consider hospital based care for patients with a CURB65 score of 2 or more

  -Consider intensive care assessment for patients with a CURB65 score of 3 or more.

  [Based on prognostic cohort studies of moderate to very low quality with a large number of patients and the experience and opinion of the GDG]
- Stratify patients presenting with community acquired pneumonia into those with low, moderate, or high severity disease. The grade of severity will usually correspond to the risk of death. *[Based on the experience and opinion of the GDG]*

Microbiological tests

- Do not routinely offer microbiological tests to patients with low severity community acquired pneumonia.
- For patients with moderate or high severity community acquired pneumonia:
  -Take blood and sputum cultures *and*

  -Consider pneumococcal and legionella urinary antigen tests.

  [Based on low to very low quality evidence from randomised and non-randomised studies, an original economic analysis, and the experience and opinion of the GDG]

Timely diagnosis and treatment

Early administration of antibiotics to patients admitted with community acquired pneumonia improves outcomes, but this must be linked to swift, accurate diagnosis to avoid inappropriate, potentially harmful, administration of antibiotics to those who prove to have a different diagnosis (for example, heart failure).

- Put in place processes to allow diagnosis (including x rays) and treatment of community acquired pneumonia within four hours of presentation to hospital.
- Offer antibiotic therapy as soon as possible after diagnosis, and certainly within four hours to all patients with community acquired pneumonia who are admitted to hospital. *[Based on observational cohort studies of low to very low quality with a large number of patients]*

Antibiotic therapy

Antibiotic therapy is the cornerstone of management of community acquired pneumonia, but overuse may be harmful. Careful tailoring of antibiotic type and duration to severity of pneumonia is therefore important. The recommendation for a five day course of antibiotics in low severity community acquired pneumonia is shorter than in previous guidance, with the safety net of advising patients to seek further medical advice if they are not improving and clinicians to consider extending the course as a possible management strategy when improvement is inadequate. Routine use of longer antibiotic courses and dual antibiotic therapy should be reserved for patients with moderate or high severity community acquired pneumonia.

Low severity community acquired pneumonia:

- Offer a five day course of a single antibiotic to patients with low severity community acquired pneumonia. *[Based on moderate to very low quality evidence from randomised controlled trials, a cost analysis with limitations, and the experience and opinion of the GDG]*
- Consider amoxicillin in preference to a macrolide or a tetracycline. Consider a macrolide or a tetracycline for patients who are allergic to penicillin. *[Based on inconclusive evidence from randomised controlled trials and the experience and opinion of the GDG]*
- Consider extending the course of the antibiotic for longer than five days as a possible management strategy for patients whose symptoms do not improve as expected after three days. *[Based on the experience and opinion of the GDG]*
- Explain to patients treated in the community, and, when appropriate, to their families or carers, that they should seek further medical advice if their symptoms do not begin to improve within three days of starting the antibiotic, or earlier if their symptoms are worsening. *[Based on the experience and opinion of the GDG]*
- Do not routinely offer:
  -A fluoroquinolone

  -Dual antibiotic therapy.

  [Based on very low quality evidence from randomised controlled trials and the experience and opinion of the GDG]

Moderate and high severity community acquired pneumonia:

- Consider a seven to 10 day course of antibiotic therapy for patients with moderate or high severity community acquired

Box 1 CRB65 score for mortality risk assessment in primary care[11]

CRB65 score is calculated by giving 1 point for each of the following prognostic features:

- Confusion (abbreviated mental test score 8 or less or new disorientation in person, place, or time)*
- Raised respiratory rate (30 breaths per minute or more)
- Low blood pressure (diastolic 60 mm Hg or less, or systolic less than 90 mm Hg)
- Age 65 years or more

Patients are stratified for risk of death as follows:

- 0=low risk (less than 1% mortality risk)
- 1 or 2=intermediate risk (1 to 10% mortality risk)
- 3 or 4=high risk (more than 10% mortality risk)

*For guidance on delirium, please refer to National Institute for Health and Care Excellence. Delirium: diagnosis, prevention and management (NICE clinical guideline 103). 2010. www.nice.org.uk/guidance/cg103

Box 2 CURB65 score for mortality risk assessment in hospital[11]

CURB65 score is calculated by giving 1 point for each of the following prognostic features:

- Confusion (abbreviated mental test score 8 or less or new disorientation in person, place, or time)*
- Raised blood urea nitrogen (over 7 mmol/L)
- Raised respiratory rate (30 breaths per minute or more)
- Low blood pressure (diastolic 60 mm Hg or less, or systolic less than 90 mm Hg)
- Age 65 years or more

Patients are stratified for risk of death as follows:

- 0 or 1=low risk (less than 3% mortality risk)
- 2=intermediate risk (3 to 15% mortality risk)
- 3 to 5=high risk (more than 15% mortality risk)

*For guidance on delirium, please refer to National Institute for Health and Care Excellence. Delirium: diagnosis, prevention and management (NICE clinical guideline 103). 2010. www.nice.org.uk/guidance/cg103

pneumonia. *[Based on the experience and opinion of the GDG]*

- Consider dual antibiotic therapy with amoxicillin and a macrolide for patients with moderate severity community acquired pneumonia.
- Consider dual antibiotic therapy with a β lactamase stable β lactam and a macrolide for patients with high severity community acquired pneumonia. Available β lactamase stable β lactams include co-amoxiclav, cefotaxime, ceftaroline fosamil, ceftriaxone, cefuroxime, and piperacillin with tazobactam. *[Based on moderate to very low quality randomised controlled trials, low to very low quality evidence from observational cohort studies with a large number of patients, cost effectiveness analysis, and the experience and opinion of the GDG]*

Glucocorticosteroid treatment

- Do not routinely offer a glucocorticosteroid to patients with community acquired pneumonia unless they have other conditions for which glucocorticosteroid treatment is indicated. *[Based on moderate to very low quality evidence from randomised controlled trials and the experience and opinion of the GDG]*

Monitoring in hospital

Measuring C reactive protein concentration in patients in hospital with community acquired pneumonia can help to identify patients who are not responding to treatment and need their management to be reassessed.

- Consider measuring a baseline C reactive protein concentration in patients with community acquired pneumonia on admission to hospital and repeat the test if clinical progress is uncertain after 48 to 72 hours. *[Based on low to very low quality observational cohort studies and the experience and opinion of the GDG]*

Safe discharge from hospital

Reducing length of stay has been a common goal in an over-stretched NHS in the United Kingdom. However, discharge of patients who are not yet sufficiently stable can result in increased mortality and higher readmission rates.

- Do not routinely discharge patients with community acquired pneumonia if in the previous 24 hours they have had two or more of the following findings:
  -Temperature higher than 37.5°C
  -Respiratory rate 24 breaths per minute or more
  -Heart rate more than 100 beats per minute
  -Systolic blood pressure 90 mm Hg or less
  -Oxygen saturation less than 90% on room air
  -Abnormal mental status
  -Inability to eat without assistance.
- Consider delaying discharge if their temperature is higher than 37.5°C. *[Based on evidence from moderate to very low quality prognostic cohort studies at low risk of bias]*

Patient information

Many patients are unaware of what to expect when recovering from community acquired pneumonia. Knowing the timeline of a "normal" recovery can help to reduce anxiety, while also highlighting the need to seek further advice if they are not improving as expected.

- Explain to patients with community acquired pneumonia that after they start treatment their symptoms should steadily improve, although the rate of improvement will

vary with the severity of the pneumonia, and most people can expect that by:

-1 week—fever should have resolved

-4 weeks—chest pain and sputum production should have substantially reduced

-6 weeks—cough and breathlessness should have substantially reduced

-3 months—most symptoms should have resolved, but fatigue may still be present

-6 months—most people will feel back to normal.

- Advise patients with community acquired pneumonia to consult their healthcare professional if they feel that their condition is deteriorating or not improving as expected. *[Based on evidence from a systematic review and observational studies of moderate to very low quality]*

Hospital acquired pneumonia (excluding ventilator associated pneumonia)

Unfortunately, the evidence base for hospital acquired pneumonia was sparse. As a result, the Guideline Development Group was not able to make specific recommendations on many of the topics examined.

Antibiotic therapy

- Offer antibiotic therapy as soon as possible after diagnosis, and certainly within four hours, to patients with hospital acquired pneumonia. *[Based on the experience and opinion of the GDG]*
- Choose antibiotic therapy in accordance with local hospital policy (which should take into account knowledge of local microbial pathogens) and clinical circumstances. *[Based on evidence from low to very low quality randomised controlled trials and the experience and opinion of the GDG]*
- Consider a five to 10 day course of antibiotic therapy. *[Based on the experience and opinion of the GDG]*

Overcoming barriers

Many patients expect to receive antibiotics whenever they feel unwell with a productive cough, and two aspects of this new guidance will run contrary to these expectations. Both are important because overuse of antibiotics can be detrimental to individual patients (owing to adverse effects of drugs and complications such as *Clostridium difficile* infection) and to the population in general (by promoting increased antibiotic resistance). Consideration of the use of a point of care C reactive protein test in primary care is a new recommendation that will require some initial, and ongoing, cost outlay and education. However, incorporating the result of the test into discussions with patients should help to reassure them when antibiotics are not indicated (most cases). Many people who have received antibiotics go on to receive a second course because their symptoms have not completely resolved. The evidence on the expected natural resolution of symptoms suggests that most of these courses are probably unnecessary, and education on this point should also reduce the misplaced use of antibiotics.

Other areas of the guideline focus on the importance of early but accurate diagnosis of pneumonia and on the use of validated severity assessment to guide the prompt and appropriate use of antibiotics when these are indicated. We hope that this guideline will not only remind clinicians of the importance of antibiotic stewardship but also encourage prompt and correct use of antibiotics once it is clear that these are required.

The members of the Guideline Development Group (GDG) were Mark Woodhead (chair), Sani Aliyu, Corinne Ashton (nee Whittingham), Jeremy Brown, Sinan Eccles, Sonia Greenwood, Ahmed F Jaafar, Wei Shen Lim, Michael Moore, Susie Orme, Lesley Ann Roper, Steve Searle, and John Watkins. James Hooper and Ron Daniels were appointed as co-opted members of the GDG. The technical team at the National Clinical Guideline Centre included Sara Carrillo de Albornoz, Elisabetta Fenu, Chris Kiff, Bernard Higgins, Paul Miller, Celia Pincus, Eleanor Samarasekera, Grammati Sarri, and Giulia Zuodar.

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Further information on the guidance

Methods

The Guideline Development Group (GDG) comprised three respiratory physicians (including the chair), two general practitioners, one patient member, an emergency medicine consultant, a consultant in geriatric medicine, a pharmacist, a respiratory nurse, a microbiologist, and a junior doctor. The GDG also co-opted a consultant chemical pathologist and a consultant in intensive care and anaesthesia. The GDG followed the standard NICE methods in the development of this guideline (www.nice.org.uk/article/PMG6/chapter/1%20Introduction). The group developed clinical questions, collected and appraised clinical evidence, and evaluated the cost effectiveness of proposed interventions through literature review and original economic modelling. Quality ratings of the evidence were based on GRADE methodology (www.gradeworkinggroup.org). These relate to the quality of the available evidence for assessed outcomes rather than the quality of the clinical study.

The draft guideline went through a rigorous reviewing process, in which stakeholders' organisations were invited to comment; the group took all comments into consideration when producing the final version of the guideline.

The guideline is published on the NICE website (www.nice.org.uk/guidance/cg191) in four different versions: full guideline, NICE guideline, NICE pathway, and information for the public (www.nice.org.uk/Guidance/CG191/Informationforpublic).

NICE will conduct a review after publication to determine whether the evidence base has progressed sufficiently to alter the guideline recommendations and warrant an update.

Economic analysis

An original cost effectiveness analysis was conducted to assess the benefit of performing tests aimed at identifying the causative organism in people requiring hospital admission for pneumonia. Tests considered were sputum culture, blood culture, and measurement of pneumococcal and legionella antigens. The empirical antibiotics recommended in the guideline will cover many of the potential bacteria, so only blood and sputum culture offered a high enough gain in quality adjusted life years to be routinely cost effective.

Future research/remaining uncertainties

The production of this guideline highlighted important areas in which high quality evidence is lacking. These include the management of hospital acquired pneumonia, for which, for example, data on the microbiology of hospital acquired pneumonia to guide antibiotic therapy are limited.

The Guideline Development Group has made the following recommendations for research.

Community acquired pneumonia

- In moderate to high severity community acquired pneumonia, does using legionella and pneumococcal urinary antigen testing in addition to other routine tests improve outcomes?
- In patients admitted to hospital with moderate to high severity community acquired pneumonia, does monitoring C reactive protein in addition to clinical observation to guide antibiotic duration safely reduce the total duration of antibiotic therapy compared with a fixed empirical antibiotic course?
- What is the clinical effectiveness of continuous positive pressure ventilation compared with usual care in patients who have community acquired pneumonia and type I respiratory failure (hypoxaemia without hypercapnoea) without a history of chronic obstructive pulmonary disease?

Hospital acquired pneumonia

- Can rapid microbiological diagnosis of hospital acquired pneumonia reduce the use of extended spectrum antibiotic therapy, without adversely affecting outcomes?