Pneumonia in adults: diagnosis and management

NICE Guideline, No. 191

London: National Institute for Health and Care Excellence (NICE); 2023 Oct 31.
ISBN-13: 978-1-4731-5518-3

This guideline is partially replaced by NG237.

This guideline is the basis of QS110.

Overview

This guideline was developed before the COVID-19 pandemic. It covers diagnosing and managing pneumonia in adults who do not have COVID-19. It aims to improve accurate assessment and diagnosis of pneumonia to help guide antibiotic prescribing and ensure that people receive the right treatment.

For recommendations on managing suspected or confirmed pneumonia in adults with COVID-19, see NICE's guideline on managing COVID-19.

For recommendations on antibiotic treatment, see NICE's guidelines on pneumonia (community-acquired): antimicrobial prescribing and pneumonia (hospital-acquired): antimicrobial prescribing.

Who is it for?

- Healthcare professionals
- People who have pneumonia, their families and carers

Introduction

Pneumonia is an infection of the lung tissue. When a person has pneumonia the air sacs in their lungs become filled with microorganisms, fluid and inflammatory cells and their lungs are not able to work properly. Diagnosis of pneumonia is based on symptoms and signs of an acute lower respiratory tract infection, and can be confirmed by a chest X-ray showing new shadowing that is not due to any other cause (such as pulmonary oedema or infarction). In this guideline pneumonia is classified as community-acquired or hospital-acquired, based on different microbial causes and patient factors, which need different management strategies.

Every year between 0.5% and 1% of adults in the UK will have community-acquired pneumonia. It is diagnosed in 5–12% of adults who present to GPs with symptoms of lower respiratory tract infection, and 22–42% of these are admitted to hospital, where the mortality rate is between 5% and 14%. Between 1.2% and 10% of adults admitted to hospital with community-acquired pneumonia are managed in an intensive care unit, and for these people the risk of dying is more than 30%. More than half of pneumonia-related deaths occur in people older than 84 years.

At any time 1.5% of hospital inpatients in England have a hospital-acquired respiratory infection, more than half of which are hospital-acquired pneumonia and are not associated with intubation.

Hospital-acquired pneumonia is estimated to increase hospital stay by about 8 days and has a reported mortality rate that ranges from 30–70%. Variations in clinical management and outcome occur across the UK.

The guideline is needed because pneumonia is common and has a high mortality rate. The British Thoracic Society (2009) has published guidance on the management of community-acquired pneumonia in adults, but there is a lack of evidence-based guidance on the management of hospital-acquired pneumonia. For both types of pneumonia there is variation in care and areas of uncertainty for best practice, and these are the main focus of this guideline.

This guideline provides recommendations for the diagnosis of pneumonia, and aspects of management of community-acquired pneumonia in adults. However, it does not provide recommendations on areas of care where best practice is already established, such as diagnosis using chest X-ray. It does not cover bronchiectasis complicated by pneumonia, or people who acquire pneumonia while intubated or in an intensive care unit, who are immunocompromised, or in whom management of pneumonia is an expected part of end-of-life care. For guidance on antibiotic treatment of pneumonia, see NICE's guidelines on pneumonia (community-acquired): antimicrobial prescribing and pneumonia (hospital-acquired): antimicrobial prescribing.

Recommendations

The following guidance is based on the best available evidence. The full guideline gives details of the methods and the evidence used to develop the guidance.

People have the right to be involved in discussions and make informed decisions about their care, as described in NICE's information on making decisions about your care.

Making decisions using NICE guidelines explains how we use words to show the strength (or certainty) of our recommendations, and has information about prescribing medicines (including off-label use), professional guidelines, standards and laws (including on consent and mental capacity), and safeguarding.

1.1. Presentation with lower respiratory tract infection

1.1.1. For people presenting with lower respiratory tract infection, see NICE's guideline on suspected acute respiratory infection in over 16s. **[2014, amended 2023]**

1.2. Community-acquired pneumonia

Severity assessment outside hospital

1.2.1. If a clinical diagnosis of community-acquired pneumonia has been made, carry out a risk assessment using the CRB65 scoring system (see box 1). **[2014, amended 2023]**

Box 1 CRB65 score for mortality risk assessment in primary care

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). For guidance on delirium, see NICE's guideline on delirium.
- raised respiratory rate (30 breaths per minute or more)
- low blood pressure (diastolic 60 mmHg or less, or systolic less than 90 mmHg)

- age 65 years or more.

Lim WS, van der Eerden MM, Laing R, et al. (2003) Defining community-acquired pneumonia severity on presentation to hospital: an international derivation and validation study. Thorax 58: 377–82

People are stratified for risk of death (within 30 days) 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).

1.2.2. Use clinical judgement together with the CRB65 score (bearing in mind this can be affected by other factors, for example, comorbidities or pregnancy) to inform decisions about whether people with a clinical diagnosis of community-acquired pneumonia need hospital assessment as follows:

- consider hospital assessment for people with a CRB65 score of 2 or more
- discuss the options with people with a score of 1 and make a shared decision about the best care pathways for them, for example supported home-based care using a virtual ward or community intervention team
- consider home based care for patients with a CRB65 score of 0.

Severity assessment in hospital

1.2.3. When a diagnosis of community-acquired pneumonia is made at presentation to hospital, determine whether people are at low, intermediate or high risk of death using the CURB65 score (see box 2).

Box 2 CURB65 score for mortality risk assessment in hospital

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). For guidance on delirium, see NICE's guideline on delirium
- raised blood urea nitrogen (over 7 mmol/litre)
- raised respiratory rate (30 breaths per minute or more)
- low blood pressure (diastolic 60 mmHg or less, or systolic less than 90 mmHg)
- age 65 years or more.

People are stratified for risk of death as follows:

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

Lim WS, van der Eerden MM, Laing R, et al. (2003) Defining community-acquired pneumonia severity on presentation to hospital: an international derivation and validation

study. Thorax 58: 377–82

1.2.4. Use clinical judgement in conjunction with the CURB65 score to guide the management of community-acquired pneumonia, as follows:

- consider home-based care for people with a CURB65 score of 0 or 1
- consider hospital-based care for people with a CURB65 score of 2 or more
- consider intensive care assessment for people with a CURB65 score of 3 or more.

1.2.5. Stratify people 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.

Microbiological tests

1.2.6. Do not routinely offer microbiological tests to people with low-severity community-acquired pneumonia.

1.2.7. For people with moderate- or high-severity community-acquired pneumonia:

- take blood and sputum cultures **and**
- consider pneumococcal and legionella urinary antigen tests.

Timely diagnosis and treatment

1.2.8. Put in place processes to allow diagnosis (including X-rays) and treatment of community-acquired pneumonia within 4 hours of presentation to hospital.

Antibiotic therapy

See NICE's guideline on pneumonia (community-acquired): antimicrobial prescribing for recommendations on antibiotic therapy.

Low-severity community-acquired pneumonia

1.2.9. Deleted.

1.2.10. Deleted.

1.2.11. Deleted.

1.2.12. Deleted.

1.2.13. Deleted.

Moderate- and high-severity community-acquired pneumonia

1.2.14. Deleted.

1.2.15. Deleted.

1.2.16. Deleted.

Glucocorticoid treatment

1.2.17. Do not routinely offer a glucocorticoid to people with community-acquired pneumonia unless they have other conditions for which glucocorticoid treatment is indicated.

Monitoring in hospital

1.2.18. Consider measuring a baseline C-reactive protein concentration in people with community-acquired pneumonia on admission to hospital, and repeat the test if clinical progress is uncertain after 48 to 72 hours.

Safe discharge from hospital

1.2.19. Do not routinely discharge people with community-acquired pneumonia if in the past 24 hours they have had 2 or more of the following findings:

- temperature higher than 37.5°C
- respiratory rate 24 breaths per minute or more
- heart rate over 100 beats per minute
- systolic blood pressure 90 mmHg or less
- oxygen saturation under 90% on room air
- abnormal mental status
- inability to eat without assistance.

1.2.20. Consider delaying discharge for people with community-acquired pneumonia if their temperature is higher than 37.5°C.

Patient information

1.2.21. Explain to people with community-acquired pneumonia that after starting 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.

1.2.22. Advise people with community-acquired pneumonia to consult their healthcare professional if they feel that their condition is deteriorating or not improving as expected.

1.3. Hospital-acquired pneumonia

Antibiotic therapy

See NICE's guideline on pneumonia (hospital-acquired): antimicrobial prescribing for recommendations on antibiotic therapy for hospital-acquired pneumonia.

1.3.1. Deleted.

1.3.2. Deleted.

1.3.3. Deleted.

Terms used in this guideline

Clinical diagnosis of community-acquired pneumonia

Diagnosis based on symptoms and signs of lower respiratory tract infection in a patient who, in the opinion of the GP and in the absence of a chest X-ray, is likely to have community-acquired pneumonia. This might be because of the presence of focal chest signs, illness severity or other features.

Community-acquired pneumonia

Pneumonia that is acquired outside hospital. Pneumonia that develops in a nursing home resident is included in this definition. When managed in hospital the diagnosis is usually confirmed by chest X-ray.

Hospital-acquired pneumonia

Pneumonia that develops 48 hours or more after hospital admission and that was not incubating at hospital admission. When managed in hospital the diagnosis is usually confirmed by chest X-ray. For the purpose of this guideline, pneumonia that develops in hospital after intubation (ventilator-associated pneumonia) is excluded from this definition.

Lower respiratory tract infection

An acute illness (present for 21 days or less), usually with cough as the main symptom, and with at least 1 other lower respiratory tract symptom (such as fever, sputum production, breathlessness, wheeze or chest discomfort or pain) and no alternative explanation (such as sinusitis or asthma). Pneumonia, acute bronchitis and exacerbation of chronic obstructive airways disease are included in this definition.

Mortality risk

The percentage likelihood of death occurring in a patient in the next 30 days.

Severity assessment

A judgement by the managing clinician as to the likelihood of adverse outcomes in a patient. This is based on a combination of clinical understanding and knowledge in addition to a mortality risk score. The difference between categories of severity and mortality risk can be important. Typically the mortality risk score will match the severity assessment. However, there may be situations where the mortality score does not accurately predict mortality risk and clinical judgement is needed. An example might be a patient with a low mortality risk score who has an unusually low oxygen level, who would be considered to have a severe illness.

Recommendations for research

The Guideline Development Group has made the following recommendations for research, based on its review of evidence, to improve NICE guidance and patient care in the future.

1. Urine antigen testing

In moderate- to high-severity community-acquired pneumonia does using legionella and pneumococcal urinary antigen testing in addition to other routine tests improve outcomes?

Why this is important

Current practice and evidence suggest that giving a combination of antibiotics to people with moderate- to high-severity community-acquired pneumonia reduces mortality. However, no randomised controlled trial has looked at using urinary antigen testing to target treatment. If effective, such targeted treatment could improve antibiotic stewardship, increase compliance and potentially reduce costs.

2. C-reactive protein-guided antibiotic duration

In people hospitalised with moderate- to high-severity community-acquired pneumonia, does using C-reactive protein monitoring in addition to clinical observation to guide antibiotic duration safely reduce the total duration of antibiotic therapy compared with a fixed empirical antibiotic course?

Why this is important

The recommended duration of antibiotic therapy for adults hospitalised with moderate- to high-severity community-acquired pneumonia is based on evidence of very low quality; no relevant clinical trials were identified by NICE. The burden of community-acquired pneumonia is large, and its treatment accounts for a high proportion of antibiotic use in hospitals. Overuse of antibiotics is associated with antimicrobial resistance, which is a national and global priority.

3. Continuous positive pressure ventilation

What is the clinical effectiveness of continuous positive pressure ventilation compared with usual care in people with community-acquired pneumonia and type I respiratory failure without a history of chronic obstructive pulmonary disease?

Why this is important

Type I respiratory failure is a common feature of pneumonia. Mild type I respiratory failure is easily corrected with low levels of supplemental oxygen, whereas severe life-threatening hypoxemia needs immediate intubation and invasive ventilation. Research into whether continuous positive pressure ventilation improves gas exchange and subsequent outcomes, such as mortality, could help improve care for people with respiratory failure between these extremes.

4. Hospital-acquired pneumonia

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

Why this is important

Data are limited on the microbiology of hospital-acquired pneumonia to guide antibiotic therapy. Hospital-acquired infections can be caused by highly resistant pathogens that need treatment with extended-spectrum antibiotics (for example, extended-spectrum penicillins, third-generation cephalosporins, aminoglycosides, carbapenems, linezolid, vancomycin, or teicoplanin), as recommended by British Society of Antimicrobial Chemotherapy guidance. Because routine microbial tests lack sensitivity and take 24–48 hours to identify a causative pathogen, patient characteristics are used to guide antibiotic choice. However, this may lead to unnecessary use of extended-spectrum antibiotics in people infected with non-resistant organisms, and inappropriate use of first-line antibiotics (such as beta-lactam stable penicillins, macrolides or doxycycline) in people infected with resistant organisms.

Rapid diagnostic tests to identify causative bacterial pathogens and determine whether they are resistant to antibiotics may have a role in guiding antibiotic choice for postoperative hospital-acquired pneumonia.

To limit population variability and include high-risk people spending time in intensive care, studies should include postoperative patients from different surgical specialties.

More information and committee details

To find NICE guidance on related topics, including guidance in development, see the NICE topic page on infections.

For full details of the evidence and the guideline committee's discussions, see the full guideline. You can also find information about how the guideline was developed, including details of the committee.

NICE has produced tools and resources to help you put this guideline into practice. For general help and advice on putting our guidelines into practice, see resources to help you put NICE guidance into practice.

Update information

October 2023: We replaced recommendation 1.1.1 with a link to NICE's guideline on suspected acute respiratory infection in over 16s (ARI). We updated recommendations 1.2.1 and 1.2.2 in line with the ARI guideline.

July 2022: We reinstated this guideline, which was temporarily withdrawn in May 2020 because of the COVID-19 pandemic, and plan to update it. For more information, see the surveillance decision.

September 2019: Recommendations on community-acquired pneumonia (1.2.9 to 1.2.17) and hospital-acquired pneumonia (1.3.1 to 1.3.3) were withdrawn because they have been updated and replaced by recommendations in NICE's guidelines on pneumonia (community-acquired): antimicrobial prescribing and pneumonia (hospital-acquired): antimicrobial prescribing.

Minor changes since publication

November 2018: The term glucocorticosteroids was updated to glucocorticoids throughout after a surveillance review.

Your responsibility: The recommendations in this guideline represent the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, professionals and practitioners are expected to take this guideline fully into account, alongside the individual needs, preferences and values of their patients or the people using their service. It is not mandatory to apply the recommendations, and the guideline does not override the responsibility to make decisions appropriate to the circumstances of the individual, in consultation with them and their families and carers or guardian.

All problems (adverse events) related to a medicine or medical device used for treatment or in a procedure should be reported to the Medicines and Healthcare products Regulatory Agency using the Yellow Card Scheme.

Local commissioners and providers of healthcare have a responsibility to enable the guideline to be applied when individual professionals and people using services wish to use it. They should do so in the context of local and national priorities for funding and developing services, and in light of their duties to have due regard to the need to eliminate unlawful discrimination, to advance equality of opportunity and to reduce health inequalities. Nothing in this guideline should be interpreted in a way that would be inconsistent with complying with those duties.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

Created: December 3, 2014; Last Update: October 31, 2023.

Bookshelf ID: NBK552669 PMID: 31940163