NICE National Institute for Health and Care Excellence

NICE guideline

COVID-19 rapid guideline: antibiotics for pneumonia in adults in hospital

NICE guideline
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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.

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.

Contents

This guideline replaces CG191.

Overview

The purpose of this guideline is to ensure the best antibiotic management of suspected or confirmed bacterial pneumonia in adults in hospital during the COVID-19 pandemic. This includes people presenting to hospital with moderate to severe community-acquired pneumonia and people who develop pneumonia while in hospital. It will enable services to make the best use of NHS resources.

Where the new recommendations cover existing recommendations in the NICE guidelines on pneumonia (community-acquired): antimicrobial prescribing and pneumonia (hospital-acquired): antimicrobial prescribing follow the recommendations in the rapid guideline during the pandemic.

This guideline focuses on what you need to stop or start doing during the pandemic. Follow the usual professional guidelines, standards and laws (including those on equalities, safeguarding, communication and mental capacity), as described in making decisions using NICE guidelines.

This guideline is for:

- health and care practitioners
- health and care staff involved in planning and delivering services
- commissioners.

The recommendations bring together:

- existing national and international guidance and policies
- advice from specialists working in the NHS from across the UK. These include people with expertise and experience of treating patients for the specific health conditions covered by the guidance during the current COVID-19 pandemic.

NICE has developed these recommendations in direct response to the rapidly evolving situation and so could not follow the standard process for guidance development. The guideline has been developed using the interim process and methods for developing rapid guidelines on COVID-19.

The recommendations are based on evidence and expert opinion and have been verified as far as possible. We will review and update the recommendations as the knowledge base and expert experience develops.

1 Communicating with patients including on treatment and care planning

1.1 When possible, discuss the risks, benefits and likely outcomes of treatment options with patients with COVID-19, their families and carers, including to help them:

- make informed decisions about their treatment goals and wishes, including treatment escalation plans when appropriate
- understand that COVID-19 pneumonia is caused by a virus, so antibiotics are ineffective unless there is a bacterial co-infection.

1.2 Find out if patients have advance care plans or advance decisions to refuse treatment, including 'do not attempt cardiopulmonary resuscitation' decisions.

1.3 Use decision support tools (when available). Bear in mind that these discussions may need to take place remotely. Document discussions and decisions clearly, and take account of these in planning care.

1.4 Provide patients, their families and carers with information that meets their communication needs (see NHS England's Accessible Information Standard).

1.5 Discuss with patients, their families and carers about the options for enrolling in a COVID-19 clinical trial.

2 Tests to guide decisions about using antibiotics

2.1 Consider the following tests to help inform decision making about using antibiotics:

- microbiological samples for routine culture and sensitivities (for example, sputum or tracheal aspirate sample, blood culture)
- SARS-CoV2 polymerase chain reaction assay (nasopharyngeal aspirate, nose and throat swabs, or a lower respiratory tract sample if obtainable); see Public Health England's guidance on COVID-19: which samples should be taken)
- chest imaging (X-ray, CT or ultrasound)
- full blood count
- legionella and pneumococcal antigen tests (urine sample).

2.2 There is insufficient evidence to recommend routine procalcitonin testing to guide decisions about antibiotics. Centres already using procalcitonin tests are encouraged to participate in research and data collection (see section 6).

Procalcitonin tests could be useful in identifying whether there is a bacterial infection. However, it is not clear whether they add benefit beyond what is suggested in recommendation 2.1 to guide decisions about antibiotics. The most appropriate threshold for procalcitonin is also uncertain.

2.3 Be aware that high C-reactive protein levels do not necessarily indicate that the pneumonia is due to bacteria rather than COVID-19.

Published data and clinical opinion suggest that many patients with COVID-19 have raised C-reactive protein levels, meaning that this does not necessarily indicate that there is a bacterial infection.

3 Initial approach to antibiotic treatment choices

3.1 Be aware that:

- When a patient first presents with suspected pneumonia, it is difficult to differentiate between COVID-19 pneumonia and bacterial pneumonia on clinical features alone (see recommendations 4.2 and 4.3).
- During the COVID-19 pandemic to date most pneumonia has been viral. Evidence so far suggests that bacterial co-infection occurs in less than about 10% of patients with COVID-19. But patients in critical care have an increased likelihood of bacterial infection compared with patients in other hospital wards or settings.
- Because COVID-19 pneumonia is caused by a virus, antibiotics are ineffective unless there is a bacterial co-infection.
- Inappropriate antibiotic use may reduce their availability, and indiscriminate use may lead to *Clostridioides difficile* infection and antimicrobial resistance.

When to start antibiotics

3.2 If there is confidence that the clinical features are typical for COVID-19, it is reasonable not to start empirical antibiotics.

3.3 Empirical antibiotics should be started if there is clinical suspicion of bacterial infection, including characteristic symptoms and localised chest findings. A neutrophil count outside the normal range or lobar consolidation on chest imaging may suggest a bacterial infection but their absence does not exclude it. When a decision to start antibiotics has been made:

- Start empirical antibiotic treatment as soon as possible after establishing a diagnosis of pneumonia, and certainly within 4 hours.
- Do not wait for microbiological test results.
- Start treatment within 1 hour if the patient has suspected sepsis and meets any of the high-risk criteria for this outlined in the NICE guideline on sepsis.

Antibiotic choice

3.4 To guide decision making about antibiotics, use:

- antibiotic prescribing table 1 for patients with suspected community-acquired pneumonia (that is, pneumonia that has developed before or within 48 hours of admission)
- antibiotic prescribing table 2 for patients with suspected hospital acquired pneumonia (that is, pneumonia that develops 48 hours or more after admission and that was not incubating at admission).

3.5 When choosing antibiotics, take account of:

- local antimicrobial resistance data and
- other factors such as their availability.

3.6 For patients who are already taking an antibiotic that was started in the community for suspected pneumonia:

- review the antibiotic choice and
- change the antibiotic in line with antibiotic prescribing table 1, if appropriate.

3.7 Give oral antibiotics if the patient can take oral medicines and their condition is not severe enough to need intravenous antibiotics.

3.8 Seek specialist advice on antibiotic treatment for patients who:

- are immunocompromised
- have a history of infection with resistant organisms
- have a history of repeated infective exacerbations of lung disease
- are pregnant
- are in critical care.

Prescribing tables to guide decision making about antibiotic choice

A 2-page summary version of these prescribing tables is also available to download.

Table 1 Antibiotics for people 18 and older with suspected community-acquired pneumonia

Empirical treatment	**Antibiotics and dosage** (oral doses are for immediate-release medicines)
Oral antibiotics for moderate or severe pneumonia	**Options include:** **Doxycycline:** 200 mg on first day, then 100 mg once a day **Co-amoxiclav:** 500 mg/125 mg three times a day **with** **Clarithromycin:** 500 mg twice a day **In severe pneumonia, and if the other options are unsuitable:** **Levofloxacin:** 500 mg once or twice a day (consider the safety issues with fluoroquinolones)
Intravenous antibiotics for moderate or severe pneumonia	**Options include:** **Co-amoxiclav:** 1.2 g three times a day **with** **Clarithromycin:** 500 mg twice a day **Cefuroxime:** 750 mg three or four times a day (increased to 1.5 g three times a day if infection is severe) **with** **Clarithromycin:** 500 mg twice a day **In severe pneumonia and if the other options are unsuitable:** **Levofloxacin:** 500 mg once or twice a day (consider the safety issues with fluoroquinolones)

See the BNF for appropriate use and dosing in specific populations, for example, for hepatic impairment, renal impairment, pregnancy and breast-feeding, and when administering intravenous antibiotics.

There are no validated tools to assess the severity of community-acquired pneumonia in the context of the COVID-19 pandemic; severity should be based on clinical judgement.

Consult a local microbiologist for alternative options, including for pregnant women.

If there is a penicillin allergy, avoid using co-amoxiclav and use cefuroxime with caution.

For safety issues with fluoroquinolones, see the Medicines and Healthcare products Regulatory Agency advice. This covers restrictions and precautions for using fluoroquinolone antibiotics because of very rare reports of disabling and potentially long-lasting or irreversible side effects affecting musculoskeletal and nervous systems. Warnings include: stopping treatment at the first signs of a serious adverse reaction (such as tendonitis), prescribing with special caution for people over 60 years and avoiding coadministration with a corticosteroid (March 2019).

Table 2 Antibiotics for people 18 and older with suspected hospital-acquired pneumonia

Empirical treatment	**Antibiotics and dosage** (oral doses are for immediate-release medicines)
Oral antibiotics for non-severe pneumonia when there is not a higher risk of resistance	**Options include:** **Doxycycline:** 200 mg on first day, then 100 mg once a day **Co-amoxiclav:** 500 mg/125 mg three times a day **Co-trimoxazole:** 960 mg twice a day (see the BNF for information on monitoring of patient parameters) **If the other options are unsuitable:** **Levofloxacin:** 500 mg once or twice a day (consider the safety issues with fluoroquinolones)
Intravenous antibiotics for severe pneumonia (for example, symptoms or signs of sepsis or ventilator-associated pneumonia) or when there is a higher risk of resistance	**Options include:** **Piperacillin with tazobactam:** 4.5 g three times a day, increased to 4.5 g four times a day if infection is severe **Ceftazidime:** 2 g three times a day **If the other options are unsuitable:** **Levofloxacin:**500 mg once or twice a day(use a higher dosage if infection is severe; consider the safety issues with fluoroquinolones)

Antibiotic to be added if meticillin-resistant Staphylococcus aureus infection is suspected or confirmed (dual therapy with an intravenous antibiotic listed above)	**Vancomycin:** 15 mg/kg to 20 mg/kg two or three times a day intravenously, adjusted according to serum vancomycin concentration. Maximum 2 g per dose (see the BNF for information on patient parameter and therapeutic drug monitoring) **Teicoplanin:** Initially 6 mg/kg every 12 hours for 3 doses intravenously, then 6 mg/kg once a day (see the BNF for information on patient parameter and therapeutic drug monitoring) **Linezolid:** 600 mg twice a day orally or intravenously (with specialist advice only; see the BNF for information on monitoring of patient parameters)

See the BNF for appropriate use and dosing in specific populations, for example, for hepatic impairment, renal impairment, pregnancy and breast-feeding, and when administering intravenous antibiotics.

There are no validated tools to assess the severity of hospital-acquired pneumonia in the context of the COVID-19 pandemic; severity should be based on clinical judgement.

Consult a local microbiologist for alternative options, including for pregnant women.

If there is a penicillin allergy, avoid using co-amoxiclav and piperacillin with tazobactam, and use cefuroxime and ceftazidime with caution.

Higher risk of resistance includes symptoms or signs starting more than 5 days after hospital admission, relevant comorbidity such as severe lung disease or immunosuppression, recent use of broad-spectrum antibiotics, colonisation with multidrug-resistant bacteria, and recent contact with a health or social care setting before current admission.

For antibiotics not licensed for hospital-acquired pneumonia (co-trimoxazole, levofloxacin), use would be off-label. See NICE's prescribing medicines for more information.

For safety issues with fluoroquinolones, see the Medicines and Healthcare products Regulatory Agency advice. This covers restrictions and precautions for using fluoroquinolone antibiotics because of very rare reports of disabling and potentially long-lasting or irreversible side effects affecting musculoskeletal and nervous systems. Warnings include: stopping treatment at the first signs of a serious adverse reaction (such as tendonitis), prescribing with special caution for people

over 60 years and avoiding coadministration with a corticosteroid (March 2019).

4 Assessing the ongoing need for antibiotics

4.1 Review all antibiotics at 24 to 48 hours or as soon as test results are available.

When to stop antibiotics

4.2 Use the following signs, symptoms and test results to help inform the overall clinical assessment and decision about when to safely stop antibiotics:

- no evidence of bacterial infection in blood, urine or sputum samples
- a positive SARS-CoV2 polymerase chain reaction (PCR) assay
- fever resolved or resolving
- symptoms and blood test results (particularly lymphopenia) consistent with COVID-19 pneumonia
- chest imaging (plain X-ray, CT scan or lung ultrasound) consistent with COVID-19 pneumonia (see recommendation 4.3).

4.3 Be aware that the 3 patterns on CT-chest imaging consistent with COVID-19 pneumonia according to stage of illness (from symptom onset) are:

- early (0 to 2 days): normal or rounded ground-glass opacities
- intermediate (5 to 10 days): crazy-paving opacities
- late (more than 10 days): consolidation.

  Chest imaging changes are bilateral in most patients (more than 60%), with the lung periphery and lower lobes being most involved. Early ground-glass appearances may not be visible on plain chest X-rays (follow NHS England's guide on management of persons admitted to hospital with suspected COVID-19 infection).

Continuing antibiotics

4.4 Continue antibiotics if there is clinical or microbiological evidence of bacterial infection, regardless of SARS-CoV2 PCR test results.

4.5 Think about continuing antibiotics if the SARS-CoV2 PCR test is positive but clinical features are not typical for COVID-19 pneumonia.

4.6 If antibiotics are continued:

- review antibiotic choice based on microbiological test results and switch to a narrower spectrum antibiotic when appropriate.
- give them for a total of 5 days, and then stop them unless there is a clear indication to continue (see recommendation 5.2)
- review intravenous antibiotic use within 48 hours and think about switching to oral antibiotics (in line with prescribing table 1 and table 2).

5 Reassessment and specialist advice

5.1 Reassess patients if their symptoms do not improve as expected, or worsen rapidly or significantly.

5.2 Seek specialist advice if:

- there is a suspicion that the patient has an infection with multidrug-resistant bacteria and may need a different antibiotic, or
- there is clinical or microbiological evidence of infection and the patient's condition does not improve as expected after 48 to 72 hours of antibiotic treatment.

6 Research recommendations

6.1 Further research is recommended to:

- help improve understanding about the value added by procalcitonin testing when used with clinical judgement
- guide decisions about stopping antibiotics for people admitted to hospital with pneumonia in the context of the COVID-19 pandemic.

Suggested PICO (Population, Intervention, Comparator, Outcome)
P: Adults admitted to hospital with suspected COVID-19 pneumonia
I: Procalcitonin-guided antibiotic therapy
C: Antibiotic regimen according to the NICE rapid guideline on COVID-19: antibiotics for pneumonia in adults in hospital (without the use of procalcitonin)
O: Antibiotic use or 28-day mortality or admission to critical care

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