Pneumonia / LRTI guidance for antibiotic prescribing (2021)

University Hospitals of Leicester NHS
NHS Trust

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1 Introduction

1.1 This guideline informs the safe inpatient investigation, management and follow-up of adult pneumonia cases in the pandemic era.

1.2 Judicious use and timely and appropriate administration of antibiotics according to the suspected bacterial respiratory pathogen is important to preserve stocks and prevent emerging antibiotic resistance as well as C difficile infection.

1.3 Not all bacterial respiratory infections require antibiotic treatment and antibiotics have generally no role in the management of viral respiratory infections.

1.4 This guidance covers:

a. Community Acquired Pneumonia (CAP)*,
b. Lower Respiratory Tract Infection (LRTI),
c. Bacterial Pneumonia complicating COVID pneumonitis*,
d. Hospital Acquired Pneumonia (HAP),
e. Aspiration Pneumonia,
f. Ventilator Associated Pneumonia (VAP).

* Specialist Pneumonia Intervention Nurse (SPIN) team involved

1.5 The management of SARS-COV-2 pneumonitis is covered in a separate and frequently updated management guideline (PAGGS submitted).

2 Scope

2.1 The guideline applies to all medical staff, nursing staff and allied health professionals dealing with respiratory infections in UHL inpatients.

2.2 The guidance sets out principles and advice for antibiotic prescribing in admitted patients with respiratory infections where applicable.

2.3 This document sets out UHL prescribing recommendations in close alignment with published NICE guidance and needs to be seen in the context of separate guidance focussing on the management of SARS-CoV-2 pneumonitis with and without secondary bacterial infection.

3 Recommendations, Standards and Procedural Statements

3.1 Community Acquired Pneumonia (CAP)

3.1.1 Identification of consolidation on a **CXR** is of diagnostic relevance for patients admitted with respiratory tract infection. The CXR should be undertaken and reviewed within 4 hours of arrival in the hospital to aid distinction of CAP from LRTI

3.1.2 All CAP admissions should be CURB65 scored on admission.

3.1.3 **CURB65:** New or increased confusion, urea more than 7 mmol/litre, respiratory rate 30/minute or more, blood pressure (systolic less than 90 mmHg or diastolic 60 mmHg or less), age 65 or more.

3.1.4 **Risk of death** is stratified as follows:

1. CURB65 0 or 1: low risk (< 3% mortality risk
2. CURB65 2: intermediate risk (3%-15% mortality risk)
3. CURB65 3-5: high risk (more than 15 % mortality risk)

3.1.5 Prescribing principles:

3.1.6 Antibiotic prescribing should be aligned to CURB65 severity criteria on admission (see table 1).

3.1.7 Oral Amoxicillin has excellent activity against Streptococcus pneumoniae and is the preferred antibiotic for low severity CAP.

3.1.8 Dual therapy should be considered in CURB65 2 CAP and higher unless atypical infection is felt to be unlikely. Asymmetrical Lobar CXR consolidation favours typical pneumococcal pneumonia.

3.1.9 Initial intravenous therapy should be prescribed for severe CAP (CURB65 3-5) and where oral absorption/intake is unreliable. Intravenous therapy should be converted to oral where available after 48 hours or earlier where feasible.

3.1.10 Clinical judgment and discretion should be used where clinical concerns indicate that deviation from the guideline would be in the patient's best interest. Reasons for deviation from this guidance when prescribing antibiotics should always be documented for audit purposes.

Table 1:

	First line	**Second line**	**Third line** (Allergy to first- and second-line agents)
CURB65 =0-1 Low severity CAP	Amoxicillin enterally 500mg TDS for 5 days	Doxycycline enterally 200mg on first day then 100mg OD for 4 days (total 5 days)	Clarithromycin enterally 500mg BD for 5 days
CURB65 =2 Moderate severity CAP Patient able to take medication enterally	Amoxicillin enterally 500mg TDS Unless atypical pathogen unlikely add Doxycycline enterally 200mg on first day then 100mg OD for 4 days (total 5 days)	Doxycycline enterally 200mg on first day then 100mg OD for 4 days (total 5 days)	Clarithromycin enterally 500mg BD for 5 days
CURB65 =2 Moderate severity CAP Patient unable to take enterally. Switch to enteral treatment as soon as enteral route is available	Amoxicillin IV 500mg TDS Unless atypical pathogen unlikely add Clarithromycin IV 500mg BD for 5 days	Clarithromycin IV 500mg BD for 5 days	Levofloxacin IV 500mg BD for 5 days (Avoid with concomitant steroids, note risk of aortic aneurysm and

	First line	Second line	Third line (Allergy to first- and second-line agents)
			tendon damage, caution above age 60)
CURB65 = 3-5 Severe CAP	Co-amoxiclav IV 1.2g TDS and Clarithromycin enterally 500mg BD for 5 days	Levofloxacin IV/PO 500mg BD for 5 days (Avoid with concomitant steroids, note risk of aortic aneurysm and tendon damage, caution above age 60)	Meropenem* 1g TDS and Clarithromycin enterally 500mg BD for 5 days
	If patient unable to take medication orally, consider administration by nasogastric route. If this is not possible or patient is not absorbing, substitute enteral clarithromycin with IV clarithromycin or enteral levofloxacin with IV levofloxacin until enteral route available. Doxycycline enterally 200mg od on first day then 100mg is an alternative to clarithromycin; in case of allergy or significant intolerance to clarithromycin, doxycycline and levofloxacin refer to microbiology for advice. Review IV antibiotics at 48 hours and consider switching to enteral if possible. *Contact microbiology for advice if *anaphylactic* Penicillin allergy		

3.1.11 Microbiological investigation

3.1.12 Microbiological tests should be performed on all patients with moderate or severe CAP.

3.1.13 It is good practice to collect blood cultures before intravenous antibiotic therapy is administered.

3.1.14 For moderate to severe pneumonia, send urine for pneumococcal/legionella antigen

3.1.15 Testing may include routine sputum cultures or mycobacterial cultures in cases suspicious for typical or atypical mycobacterial infection. Sputum cultures should be obtained in cases failing to respond to empirical treatment.

3.1.16 Empirical treatment should be reviewed and changed where needed in light of further microbiological results.

3.1.17 During outbreaks (e.g, Legionnaires' disease) or epidemic mycoplasma years, or when there is a particular clinical or clinical or epidemiological reason urine antigen investigations, PCR of upper (nose and throat swabs) or lower (sputum) respiratory tract samples for viruses or serological investigations may be considered following discussion with microbiology.

3.1.18 An atypical pneumonia screen should not be obtained routinely.

3.2 Lower Respiratory Tract Infection (LRTI) - no CXR consolidation

3.2.1 Do not routinely offer antibiotic treatment for symptoms of upper respiratory tract infection or to those with LRTI who are not systemically unwell.

3.2.2 Consider viral causes where cough is non-productive

3.2.3 Productive cough in the presence of systemic symptoms or underlying disease / risk factors (COPD, heart failure, bronchiectasis, diabetes mellitus, steroid medication, admission in the past year) requires a chest x-ray to exclude pneumonia.

3.2.4 Choice of antibiotics for LRTI (without CXR consolidation):

Table 2:

LRTI	First line	Second line (Penicillin allergy)	Total duration
Non-productive cough /not unwell	No antibiotics		N/A
Productive cough	Amoxicillin enterally 500mg TDS	Doxycycline enterally 200mg on first day then 100mg OD for 4 days	5 days
Productive cough with underlying disease or risk factors	Treat underlying disease Amoxicillin enterally 500mg TDS	Treat underlying disease Doxycycline enterally 200mg on first day then 100mg OD for 4 days	5 days
Productive cough with underlying severe disease or risk factors	Treat underlying disease Co-amoxiclav enterally 625mg TDS OrCo-amoxiclav IV 600mg TDS (when oral not possible)	Treat underlying disease Doxycycline enterally 200mg on first day then 100mg OD for 4 days Or Clarithromycin IV 500mg BD (when oral not possible)	5 days

3.3 Secondary bacterial Pneumonia complicating COVID pneumonitis

3.3.1 Antibiotics should not be used for preventing or treating COVID-19 unless there is clinical suspicion of additional bacterial co-infection.

3.3.2 COVID-19 is thought to be complicated by bacterial co-infection in up to 10% of cases.

3.3.3 Secondary bacterial pneumonia in SARS-CoV-2 cases becomes more likely in the presence of dense asymmetrical lobar consolidation, after prolonged hospital stay and following immunosuppression.

3.3.4 Where in exceptional cases the clinical picture supports classical CAP, treat as such even in the presence of SARS-CoV-2 positivity (follow section 3.1 above)

3.3.5 To inform decision making about antibiotic prescribing in the context of SARS-CoV-2 infection consider the following tests:

- FBC (? Neutrophilia)
- C-reactive protein (low CRP makes bacterial infection less likely)

- Chest imaging (X-ray, CT or ultrasound)
- Respiratory and blood samples (for example, sputum or a tracheal aspirate sample, blood culture)
- Urine samples for legionella and pneumococcal antigen testing
- Throat samples for respiratory viral polymerase chain reaction testing.

3.3.6 Do not use C-reactive protein to assess whether a person has a secondary bacterial infection if they have been having immunosuppressant treatment.

3.3.7 In select cases procalcitonin measurement may be helpful. If less than 0.5ng/ml, this suggests bacterial respiratory tract infection is not a complicating factor and supports a decision not to start antibiotics (limited evidence). Note – in patients where dexamethasone and tocilizumab have recently been co-administered PCT may be supressed in bacterial infection.

3.3.8 Start antibiotics within 4 hours of diagnosing *secondary bacterial infection* or within 1 hour of diagnosing *sepsis.*

3.3.9 Use oral antibiotics wherever possible

3.4 Hospital Acquired Pneumonia (HAP)

3.4.1 Definition

3.4.2 Onset of infection 48 hours or more after hospital admission
or
Infection was present on admission but patient within 10 days of previous inpatient stay.

3.4.3 Clinical features
- Fever
- Purulent sputum or trachea secretions
- Leucocytosis and new infiltrate on chest x-ray

3.4.4 Severe hospital-acquired pneumonia is defined as having one or more of the following features:

Table 3:

General	Admission to ITU New mental confusion
CXR	Bilateral or multi-lobar opacification or rapidly progressive lung infiltrates
Respiratory Failure	Respiratory Rate > 30 Hypoxia (PaO2<8kPa or SaO2 <92% on any FiO2) Need for >35% oxygen to maintain arterial oxygen saturation >90% Need for ventilatory support
Severe Sepsis	Shock (systolic BP <90mmHg or diastolic BP <60mmHg)

3.4.5 **Hospital-Acquired Pneumonia**

3.4.6 Antibiotic treatment

3.4.7 **Mild to moderate HAP**

3.4.8 **First line**: Co-amoxiclav 625mg TDS for 5 days

3.4.9 **Second line**: Doxycycline 200mg stat then 100mg od for 4 days

3.4.10 **Severe HAP**

3.4.11 **First line**: Co-amoxiclav IV 1.2g TDS for 5 days

3.4.12 **Second line** (non-anaphylactic Penicillin allergy): Meropenem IV 1g for 5 days

3.4.13 Contact microbiology for advice if anaphylactic Penicillin allergy.

3.4.14 Regularly review treatment in light of further microbiological results.

3.5 **Aspiration Pneumonia**

3.5.1 Principles

3.5.2 Do not treat aspiration without evidence for pneumonia.

3.5.3 Routine antibiotic treatment not indicated except in small bowel obstruction where colonised gastric content is aspirated.

3.5.4 If persistence of chest signs after 48 hours treat as below:

Table 4:

Aspiration Pneumonia	**First line**	**Second line** (non-anaphylactic Penicillin allergy)	**Total Duration**
Mild/Moderate Patient able to take medication enterally	Co-amoxiclav enterally 625mg TDS	Ciprofloxacin enterally 500mg BD plus Metronidazole enterally 400mg BD	5 days
Mild/Moderate Patient unable to take enterally. Switch to enteral treatment as soon as enteral route is available	Co-amoxiclav IV 1.2g TDS	Ciprofloxacin IV 400mg BD plus Metronidazole IV 400mg TDS	5 days
Severe	Co-amoxiclav IV 1.2g TDS	Meropenem IV 1g TDS days	5 days

3.5.6 Contact microbiology for advice if anaphylactic penicillin allergy

3.6 **Ventilator Associated pneumonia (VAP)**

3.6.1 Definition of Hospital Acquired VAP:

3.6.2 Pneumonia developing after at least 48 hours of mechanical ventilation

3.6.3 Sampling of the airways

- Tracheal aspirate / BAL with urgent gram stain
- Blood culture sample
- Sputum or throat swab for viral PCR

3.6.4 Antibiotic treatment

3.6.5 **First line**: Piperacillin-tazobactam IV 4.5g TDS for 5 days

3.6.6 **Second line** (non-anaphylactic Penicillin allergy): Meropenem IV 1g TDS for 5 days

3.6.7 Contact microbiology for advice if anaphylactic penicillin allergy.

3.7 Additional Considerations

3.7.1 **IV to oral switch:** Where a patient has been prescribed IV antibiotics for the purpose of enabling administration while the patient is unable to take medications orally, the antibiotics should be switch to oral as soon as possible.

3.7.2 **Renal Impairment:** Dose reductions are required for the following antibiotics in patients with renal impairment: Co-amoxiclav, Clarithromycin, Levofloxacin and Meropenem. Refer to the renal dosing section on the antimicrobial website on INsite for dosing information or speak to your ward pharmacist for advice.

3.7.3 **Liver Impairment**: No dose adjustment of antibiotics dosages recommended in these guidelines are routinely required in patients with liver impairment.

3.7.4 For information on contraindications, cautions, drug interactions and adverse effects refer to the British National Formulary (www.bnf.nice.org.uk) or the Medicines Compendium (www.medicines.org.uk).

3.8 SPIN team – aims and roles (separate SOP)

3.8.1 The *Specialist Pneumonia Intervention Nurse (SPIN)* team is based at Glenfield Hospital but covers both acute sites 7 days a week.

3.8.2 SPIN provides holistic support to patients admitted with CAP.

3.8.3 The team aims to assure prompt diagnosis and evidence-based management of CAP in accordance with BTS/NICE guidance and UHL prescribing policy.

3.8.4 SPIN actively screens chest x-rays in UHL admission areas for presence of consolidation and responds to clinical team referrals received.

3.8.5 SPIN interrogates Nervecentre records and electronic prescribing to determine *CAP severity* and corresponding treatment and liaises with clinical teams / MDTs.

3.8.6 SPIN provides telephone follow-up for selected patients. SPIN provides CXR follow-up for selected patients identified by the clinical team

in accordance with BTS/NICE guidance. SPIN will inform the treating medical team of follow-up results if further actions are required.

3.8.7 SPIN does not cover HAP, aspiration pneumonia or VAP.

4 Education and Training

4.1 The guideline adherence will be promoted and supported by stickers for the notes, wall charts and SPIN team teaching.

5 Monitoring and Audit Criteria

5.1. The SPIN team monitors all aspects of CAP management including severity scoring, treatment and follow-up. Local and national audits on management and outcome take place at regular intervals in the respiratory department and as part of trust-wide mortality review.

6 Supporting Documents and Key References

a. Clinical management of patients with COVID-19 UHL guideline
b. https://www.nice.org.uk/guidance/ng138
c. https://www.nice.org.uk/guidance/ng15
d. https://www.nice.org.uk/guidance/ng191
e. https://www.nice.org.uk/guidance/ng139
f. https://www.nice.org.uk/guidance/qs110
g. Free RC, Richardson M, Pillay C, et al; Specialist pneumonia intervention nurse service improves pneumonia care and outcome; BMJ Open Respiratory Research 2021;8:e000863.

7 Replaces the following documents

- Pneumonia During the COVID-19 Pandemic UHL Guideline (B22/2020)
- B9/2009
- B4/2017

8 Key Words

Pneumonia, CAP, LRTI, HAP, VAP, Aspiration, COVID-19

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