

POLICY FOR TREATMENT OF LOWER RESPIRATORY TRACT INFECTIONS

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*This document is part of antibiotic formulary guidance
Formulary guidance holds the same status as Trust policy*

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1) Community acquired pneumonia (CAP)

Definition

Acute respiratory tract illness associated with a CXR showing a new infiltrate, occurring prior to or within first two days of admission to hospital (i.e. acquired outside hospital), **including pneumonia that develops in a nursing home resident.**

CAP should be confirmed by CXR before commencement of antibiotics in the majority of patients. Selected patients with life-threatening disease should be treated based on a presumptive clinical diagnosis of CAP. Sometimes an initial CXR can be normal, so consider repeating after 24 hours if high index of suspicion. If repeat CXR is normal, consider other diagnoses.

Common causative organisms	Microbiological Investigations
<i>Streptococcus pneumoniae</i> <i>Haemophilus influenzae</i> Respiratory viruses particularly in children Mycoplasma <i>Chlamydophila pneumoniae</i> <i>Legionella pneumophila</i> <i>Staphylococcus aureus</i> especially following influenza virus infection	Sputum cultures Blood culture (moderate/severe) Legionella urine antigen (in suspected atypical pneumonia) or if CURB ≥ 3 Mycoplasma serology (in suspected atypical pneumonia) Nasopharyngeal swabs for viral PCR (if indicated)

Assess CURB-65 score (one point for each):

- **C**onfusion (new onset)
- **U**rea >7mmol/l
- **R**esp rate >30/min
- **B**lood pressure (SBP <90mmHg or DBP <60mmHg)
- Age >65 years.

Treatment

CURB65 score	1 st line	Penicillin allergy	If <u>MRSA</u> colonised in nose, throat or sputum:	Duration	Comments
0-1	Amoxicillin 500mg TDS PO	1 st line: Doxycycline 200mg stat, then 100mg OD PO OR 2 nd line: Clarithromycin 500mg BD PO (Erythromycin 500mg QDS po if pregnant)	Add in: 1 st line: Doxycycline PO OR 2 nd line: Clarithromycin IV/PO (dose as in table below) OR 3 rd line: *Linezolid 600mg BD IV/PO	5 days	* may need dose adjustment in renal impairment. Discuss with Pharmacist if unsure.
2	Amoxicillin 500mg-1g TDS PO AND Clarithromycin 500mg BD PO (Erythromycin 500mg QDS po if pregnant) OR (if unable to take orally) Benzylpenicillin 1.2g QDS IV AND Clarithromycin 500mg BD IV (Erythromycin 500mg QDS po/iv if pregnant)	Doxycycline 200mg stat, then 100mg OD PO (If allergic/intolerant to doxycycline, contact Microbiologist)	Unless regime already contains one of these agents, in which case no additional treatment necessary	Some organisms may require longer duration: Legionella: 14 days Mycoplasma: 7-14 days Staph aureus (inc MRSA): 14-21 days	
3-5 Send Legionella urine antigen	*Co-amoxiclav 1.2g TDS IV AND Clarithromycin 500mg BD IV (Erythromycin 500mg QDS po/iv if pregnant) (Please switch to narrow spectrum therapy as soon as Microbiology results suggest so)	Penicillin allergy (non life threatening) *Cefuroxime 1.5g TDS IV AND Clarithromycin 500mg BD IV/PO (Erythromycin 500mg QDS po/iv if pregnant) OR Penicillin allergy (anaphylaxis): *Levofloxacin 500mg BD IV/PO		If no improvement after 48-72 hours seek advice from microbiology	Consider Critical Care review

Notes:

- Antibiotics should be administered within 4 hours of presentation.
- For High Risk Sepsis refer to the Trust sepsis IPOC
- **Switch to:**
 - A specific narrow spectrum therapy based on Microbiology results should be considered e.g. benzylpenicillin alone for Pneumococcus.
 - Oral therapy after clinical improvement has occurred (usually after 24-48hr of IV therapy), unless sensitivity results indicate that the switch cannot be made.
- **Panton-Valentine Leucocidin (PVL) positive *Staphylococcus aureus* :**
 - Causes necrotising pneumonia, frequently following influenza infection and can occur in young fit patients. Please discuss with microbiologist for advice on management if this is suspected.

2) Hospital acquired pneumonia (HAP)

Definition

Pneumonia (see definition above) that occurs ≥ 2 days after admission and did not seem to have been incubating on admission, with new or progressive consolidation on CXR.

This **does not include** patients with a recent admission to hospital, unless they were **discharged within the previous 48 hours**. **All other patients should be treated as per CAP guidelines above.**

Ventilator associated pneumonia (VAP) is a type of pneumonia that occurs more than 48hrs after endotracheal intubation.

Common causative organisms	Microbiological Investigations
<i>Pseudomonas aeruginosa</i> <i>Staphylococcus aureus</i> <i>Haemophilus influenzae</i> <i>Streptococcus pneumoniae</i> <i>Streptococcus sp</i> Enterobacteriaceae (eg <i>E.coli</i> , <i>Klebsiella</i> , <i>Enterobacter</i>)	Blood culture Sputum BAL (if indicated) Viral PCR (if indicated)

Treatment notes:

- Switch to oral treatment as soon as clinical improvement occurs.
- For patients with **previous history of confirmed toxigenic *C.difficile* infection** please discuss with microbiologist.
- ***Higher risk of resistance:** symptoms and signs > 5 days after admission, co-morbidities (e.g. lung disease, immunosuppression), colonisation with multi-drug resistance organism, recent contact with health or social care setting before current admission.

Treatment

Hospital acquired pneumonia		If <u>MRSA</u> colonised in nose, throat or sputum:	Duration	Comments	
Low risk of resistance (*see notes above)	<p>*Co-amoxiclav 1.2g TDS IV (if not taking orally)</p> <p>OR</p> <p>Co-amoxiclav PO 625mg TDS</p>	<p>Add in: 1st line: Doxycycline PO</p> <p>OR</p> <p>2nd line: Clarithromycin IV/PO (dose as in table below)</p> <p>OR</p> <p>1st line: *Linezolid 600mg BD IV/PO</p>	<p>5 days</p> <p>If no improvement after 48-72 hours seek advice from microbiology</p>	<p>* may need dose adjustment in renal impairment. Discuss with Pharmacist if unsure.</p>	
<p>Penicillin allergy (non life threatening)</p> <p>*Cefuroxime 1.5g TDS IV</p> <p>OR</p> <p>Cefaclor MR 375mg PO BD</p>	<p>If no response after 48hrs to above OR</p> <p>High risk of resistance (*see notes above)</p> <p>OR</p> <p>Age >65 AND ≥ 5 days treatment with co-amoxiclav or cephalosporin (for any indication) that has finished within the last 2 weeks.</p>			<p>* Piperacillin + tazobactam 4.5g TDS IV</p> <p>OR</p> <p>Penicillin allergy</p> <p>Levofloxacin 500mg BD IV/PO</p> <p>Oral switch if NOT on Levofloxacin:</p> <p>Discuss with the Microbiologist.</p>	<p>If patient has had treatment with > 5 days of co-amoxiclav followed by piperacillin + tazobactam with symptoms unresolved, contact microbiology.</p>
<p>Penicillin anaphylaxis</p>					

3) Aspiration Pneumonia

Definition

Pneumonia, usually of insidious onset, resulting from 'macroaspiration' of oropharyngeal or gastric contents colonised with bacteria. Usually the aspiration is not witnessed; therefore aspiration pneumonia commonly applies to pneumonia in a patient with risk factors for aspiration. These risk factors include altered consciousness, abnormal gag and swallowing reflexes, stroke and gastric disorders such as gastro-oesophageal reflux. It should be distinguished from aspiration pneumonitis, an acute chemical lung injury after the inhalation of regurgitated sterile gastric contents in which aspiration is commonly witnessed.

Common causative organisms	Microbiological Investigations
Anaerobes <i>Staphylococcus aureus</i> Gram negative bacilli (including <i>Pseudomonas</i>) <i>Streptococcus pneumoniae</i> <i>Haemophilus influenzae</i>	Blood cultures Sputum cultures

Treatment

Aspiration pneumonia		Oral switch	If <u>MRSA</u> colonised in nose, throat or sputum:	Duration	Comments
1st line	<p>No treatment. Many patients with a chemical aspiration pneumonitis do <u>NOT</u> require antibiotic treatment (unless the patient is severely ill). Antibiotics are only recommended if:</p> <ul style="list-style-type: none"> there is no resolution after 48hrs, associated with pulmonary infiltrates on CXR. the features are those of a bacterial pneumonia of the more insidious form. 				
2nd line treatment	Unless meet criteria for piperacillin + tazobactam below	*Co-amoxiclav 1.2g TDS IV	Co-amoxiclav 625mg TDS	<p>Add in:</p> <p>1st line: Doxycycline PO</p> <p>OR</p> <p>2nd line: Clarithromycin IV/PO (dose as in table below)</p> <p>OR</p> <p>1st line: *Linezolid 600mg BD IV/PO</p>	<p>* may need dose adjustment in renal impairment. Discuss with Pharmacist if unsure.</p>
Penicillin allergy (non life threatening)		*Cefuroxime 1.5g TDS IV AND Metronidazole 500mg TDS IV	Cefaclor MR 375mg BD AND Metronidazole 400mg TDS		
Life threatening penicillin allergy (anaphylaxis)		*Levofloxacin 500mg BD IV/PO AND Metronidazole 500mg TDS IV	*Levofloxacin 500mg BD PO AND Metronidazole 400mg TDS		
<p><u>Criteria for Piperacillin + tazobactam:</u></p> <p>Age >65 years</p> <p>AND</p> <p>≥ 5 days treatment with co-amoxiclav or cephalosporin (for any indication) that has finished within the last 2 weeks.</p>		*Piperacillin + tazobactam 4.5g TDS IV	Discuss with microbiology	<p>Unless regime already contains one of these agents, in which case no additional treatment necessary</p>	<p>If patient has had treatment with > 5 days of co-amoxiclav followed by piperacillin + tazobactam with symptoms unresolved, contact microbiology.</p>
		<p>Penicillin allergy:</p> <p>Levofloxacin 500mg BD IV/PO AND Metronidazole 500mg TDS IV</p>	<p>(unless already on Levofloxacin and Metronidazole)</p>		

4) COPD/Non-CF Bronchiectasis

Definition

COPD is a chronic, slowly progressive disorder characterised by airflow limitation that is not fully reversible, associated with an abnormal inflammatory response of the lungs to noxious particles or gases.

Bronchiectasis is a chronic disease causing chronic daily cough with viscid sputum production following irreversible dilatation of the bronchi due to bronchial wall damage caused by infection or inflammation.

Exacerbations of COPD/bronchiectasis are defined as a sustained change in the patient's dyspnoea, cough and/or sputum production (colour or volume) beyond day- to-day variability sufficient to warrant a change in management. They may be due to infective or non-infective (e.g. air pollution) causes.

Common causative organisms	Microbiological Investigations
<i>Haemophilus influenzae</i> <i>Moraxella catarrhalis</i> <i>Streptococcus pneumoniae</i> <i>Pseudomonas aeruginosa</i>	Sputum Blood culture (if systemically unwell)

Treatment

Infective exacerbation of COPD/Bronchiectasis	If <u>MRSA</u> colonised in nose, throat or sputum:	Duration	Comments
1 st line	Doxycycline 200mg stat, then 100mg OD PO OR Amoxicillin 500mg-1000mg TDS PO or IV OR Clarithromycin 500mg BD PO or IV		
If <u>no previous <i>Pseudomonas</i></u> in sputum AND documented resistance to 1 st line agents OR no response to 1 st line agent after 48hrs.	*Co-amoxiclav 1.2g TDS IV OR 625mg TDS PO <u>Penicillin allergy (non-life threatening)</u> *Cefuroxime 1.5g TDS IV OR Cefaclor MR 375mg BD PO <u>Penicillin allergy (anaphylaxis)</u> *Levofloxacin 500mg BD IV/PO	Add in: 1 st line: Doxycycline PO 200mg stat, then 100mg OD PO OR 2 nd line: Clarithromycin 500mg BD IV/PO OR 3 rd line: *Linezolid 600mg BD IV/PO	Only use IV if unable to take orally or patient severely ill. Adjust antibiotic treatment based on culture results * may need dose adjustment in renal impairment. Discuss with Pharmacist if unsure.
<u><i>Pseudomonas</i> previously isolated</u> from sputum AND severely unwell. OR <u><i>Pseudomonas</i> previously isolated</u> from sputum AND no response to 1 st line after 48hrs.	*Piperacillin + tazobactam 4.5g TDS IV <u>Penicillin allergy (non life threatening)</u> *Ceftazidime 2g TDS IV <u>Penicillin allergy (life threatening)</u> *Ciprofloxacin 750mg BD PO	Unless regime already contains one of these agents, in which case no additional treatment necessary	COPD 5 days Bronchiectasis 7-14 days

5) Lung abscess/Empyema thoracis

Definitions

Lung abscess is a localised collection of pus within a cavitating lesion in the lung parenchyma with a CXR that shows a cavity with an air-fluid level. The clinical features include cough with large amounts of foul-smelling sputum often with fever, haemoptysis, weight loss and malaise. Aspiration is the main predisposing factor with bronchial obstruction, bronchiectasis, infarction due to PE with secondary bacterial infection, necrotising pneumonia, tuberculosis and septic embolisation (infective endocarditis or suppurative phlebitis) accounting for the rest.

Empyema thoracis is defined as the presence of pus in the pleural cavity. It may be secondary to pneumonia or may be due to ruptured oesophagus, subphrenic/hepatic abscess, post-thoracic surgery or penetrating injury of the chest.

Common causative organisms	Microbiological Investigations
Anaerobes <i>Streptococcus milleri</i> <i>Staphylococcus aureus</i> Aerobic gram negative bacilli especially <i>Klebsiella spp</i> <i>Mycobacterium tuberculosis</i> <i>Streptococcus pneumoniae</i> (esp Empyema) In immunocompromised host: - <i>Pseudomonas aeruginosa</i> , <i>Nocardia</i> & fungi	Sputum(please specify if TB is suspected) Blood cultures Pus from pleural cavity or lung abscess

Treatment

Lung abscess/Empyema thoracis		If <u>MRSA</u> colonised in nose, throat or sputum:	Duration	Comments
1 st line	*Co-amoxiclav 1.2g TDS IV	Add in:		
Penicillin allergy (non-life threatening)	*Cefuroxime 1.5g TDS IV AND Metronidazole 500mg TDS IV	1 st line: Doxycycline PO 200mg stat, then 100mg OD PO OR 2 nd line: Clarithromycin 500mg BD IV/PO OR	Please discuss with microbiologist as the antibiotic treatment will be prolonged (e.g. until CXR shows small stable lesion or is clear). Treatment may require adjusting after culture results.	* may need dose adjustment in renal impairment. Discuss with Pharmacist if unsure. Drainage of empyema is critical and may be required in lung abscesses not responding to antibiotics.
Penicillin allergy (life threatening)	*Levofloxacin 500mg BD IV/PO AND Metronidazole 500mg TDS IV	3 rd line: *Linezolid 600mg BD IV/PO Unless regime already contains one of these agents, in which case no additional treatment necessary		

Notes:

- For patients with **previous history of confirmed toxigenic *C.difficile* infection** please discuss with microbiologist.