

**LOWER RESPIRATORY TRACT INFECTIONS - TREATMENT**

Patients with pneumonia should be assessed immediately for the severity of their disease. A decision can then be made as to whether to admit the patient to hospital, and regarding the need for transfer to the ITU.

**Markers of Severity**

The risk of death is increased substantially if 2 of the following 3 severity markers (CURB-65 criteria) are present:

- **C**onfusion (defined as Mental test score of  $\leq 8$ , or new disorientation in person, place or time)
- **U**rea  $> 7$  mmol/L
- **R**espiratory rate  $\geq 30$ /minute
- **B**lood pressure (SBP  $< 90$ mmHg or DBP  $\leq 60$ mmHg)
- **A**ge  $\geq 65$  years

**Other clinical and laboratory markers of severity include:**

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| <ul style="list-style-type: none"> <li>• Atrial fibrillation</li> <li>• Multilobar involvement</li> <li>• Concurrent disease</li> <li>• Bacteraemia</li> </ul> | <ul style="list-style-type: none"> <li>• PO<sub>2</sub> <math>&lt; 8</math>kPa (despite Fi O<sub>2</sub> of 60%)</li> <li>• PCO<sub>2</sub> <math>&gt; 6.4</math>kPa</li> <li>• Leucopenia (WBC <math>&lt; 4,000 \times 10^9/L</math>)</li> <li>• Leucocytosis (WBC <math>&gt; 20,000 \times 10^9/L</math>)</li> </ul> |
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**Investigations**

1. O<sub>2</sub> saturation on air. Arterial blood gases should be obtained if saturations are  $\leq 92\%$  and/or the patient is confused and exhausted.
2. Full blood count.
3. Urea and electrolytes, blood sugar and liver function tests.
4. Sputum for culture. Gram stain is not routinely performed, but may be indicated on acute purulent sputum. Contact Microbiology laboratory.
5. Blood cultures.
6. Serology for mycoplasma-specific immunoglobulin and for baseline titres for atypical organisms (eg. Influenza A and B, mycoplasma, chlamydia, legionella, etc.). A second blood sample for convalescent titres should be obtained after 4 to 6 weeks.
7. Urine for legionella antigen detection in suspected cases during first week of illness.
8. Urine for pneumococcal antigen detection if severe disease and recent antibiotic treatment.
9. Pleural fluid (if present) should be aspirated to check for empyema and sent for microscopy and culture.
10. Bronchoscopy should be performed to exclude endobronchial obstruction and obtain lavage specimens if the patient is not responding to treatment. This must be discussed with the chest physicians.

**Antibiotic Therapy**

- Antibiotics should be given **as soon as the diagnosis** of pneumonia has been made.
- Antibiotics started are starting regimens to be modified in light of clinical developments, isolates and sensitivity results.
- Duration of treatment may be longer than indicated for legionella, staphylococcal or gram-negative pneumonia. Discuss with Microbiologist.



**UNCOMPLICATED COMMUNITY ACQUIRED PNEUMONIA**

Start antibiotics immediately. If no response in 48 hours consider hospital admission or add erythromycin to amoxicillin if atypical pneumonia suspected.

Those with features of severe infection should be admitted urgently to hospital. The majority of infections are caused by *Streptococcus pneumoniae*. Other atypical organisms may include *Mycoplasma pneumoniae*, *Chlamydia pneumoniae*, and *Legionella pneumophila*.

Note: the quinolones ciprofloxacin and ofloxacin have poor activity against pneumococci.

<b>1<sup>st</sup> choice</b>	Amoxicillin 500mg – 1 g PO 8 hourly <b>plus</b> Erythromycin 500mg PO 12 hourly for 7-10 days <b>OR</b> Amoxicillin 500mg IV 8 hourly <b>plus</b> Clarithromycin 500mg IV 12 hourly
<b>Penicillin allergy</b>	Clarithromycin 500mg IV 12 hourly <b>OR</b> Erythromycin 500mg PO 12 hourly for 7 - 10 days

**COMMUNITY ACQUIRED PNEUMONIA REQUIRING HOSPITAL ADMISSION**

Requires assessment of respiratory function.

Treat with parenteral antibiotics: a penicillin for *S. pneumoniae* and macrolide for atypical pathogens.

The majority of infections are caused by *Streptococcus pneumoniae*. Other atypical organisms may include *Mycoplasma pneumoniae*, *Chlamydia pneumoniae*, and *Legionella pneumophila*. Rarely, other pathogens such as *Klebsiella* or *Staph. aureus* may be involved. Requires expert assessment.

**1. Severely ill**

<b>1<sup>st</sup> choice</b>	Benzylopenicillin 1.2 g IV 4 – 6 hourly <b>plus</b> Clarithromycin 500mg IV 12 hourly  <b>Duration of therapy:</b> 7 to 10 days
<b>2<sup>nd</sup> choice</b>	Cefuroxime 1.5g IV 8 hourly <b>plus</b> Clarithromycin 500mg IV 12 hourly  <b>Duration of therapy:</b> 7 to 10 days

<b>Penicillin allergy</b>	Clarithromycin 500mg IV 12 hourly for 7 to 10 days
<b>Step Down</b>	To oral therapy when appropriate by consultation
<b>2. Post-influenzal (severe)</b>	
<b>1<sup>st</sup> choice</b>	Flucloxacillin 1 g IV 6 hourly <b>plus</b> Clarithromycin 500mg IV 12 hourly
<b>Penicillin allergy</b>	Cefuroxime 1.5g IV 8 hourly <b>plus</b> Clarithromycin 500mg IV 12 hourly
<b>3. Atypical pneumonia (e.g. <i>Mycoplasma sp.</i> or <i>Chlamydia sp.</i> or <i>Legionella sp.</i>)</b>	
<b>1<sup>st</sup> choice</b>	Erythromycin 500mg PO 12 hourly <b>OR</b> Clarithromycin 500mg IV 12 hourly <b>OR</b> Doxycycline 200mg PO stat, then 100mg PO 24 hourly  <b>Duration of therapy:</b> determined by diagnosis and clinical response; typically 7 – 14 days.
<b>Penicillin allergy</b>	Cefuroxime 1.5g IV 8 hourly <b>plus</b> Clarithromycin 500mg IV 12 hourly

## PNEUMONIA IN SPECIAL PATIENT GROUPS

### Intravenous drug abusers

<b>If staphylococcal lung abscess suspected</b>	Flucloxacillin 1g - 2g IV 6 hourly <b>plus</b> Sodium fusidate 750mg PO 8 hourly
<b>If septicaemic or suspected endocarditis</b>  (Refer to Endocarditis treatment guideline for further detailed information)	Flucloxacillin 2g IV 4-6 hourly <b>plus</b> Gentamicin IV 80 mg 8 hourly  Refer to gentamicin dosing guideline for advice on monitoring levels.

<b>INFECTIVE EXACERBATION OF COPD</b>	
If patient has community acquired pneumonia, then treat as above.	
<b>If change in sputum colour or volume, or if patient is pyrexial</b>	Cefuroxime 750mg IV 8 hourly for 48 hours then Amoxicillin 500mg PO 8 hourly for 5-7 days
<b>For more severe exacerbations, or if there is lack of response to the above agents, or proven atypical agent</b>	<b>Add</b> Erythromycin 500mg PO 12 hourly
<b>Penicillin allergy</b>	Doxycycline 200mg PO as a single dose, then 100mg PO 24 hourly for 5 -7 days

<b>ASPIRATION PNEUMONIA</b>	
Often mouth flora ie. anaerobes and microaerophilic streptococci	
<b>1<sup>st</sup> choice</b>	Co-amoxiclav 1.2 g IV 8 hourly <b>OR</b> Co-amoxiclav 625mg PO 8 hourly for 5-7days
<b>Penicillin allergy</b>	Clindamycin 300mg IV / PO 6 hourly for 5 to 7 days

<b>HOSPITAL ACQUIRED PNEUMONIA</b>	
Often due to coliforms which may be multiresistant. <b>The need for intravenous therapy should be reviewed after 48 hours.</b> If no response to treatment, take advice from a microbiologist and/or chest physician. Remember TB, HIV infection, and underlying diseases such as lung cancer. Consider the possibility that the diagnosis of pneumonia was incorrect.	
<b>1<sup>st</sup> choice</b>	Cefuroxime 750mg IV 8 hourly <b>OR</b> Co-amoxiclav 1.2g IV or 625mg PO 8 hourly  <b>Duration of therapy:</b> 5 to 7 days
<b>Penicillin allergy</b>	Clindamycin 300mg PO 6 hourly for 5 to 7 days

## VENTILATOR ASSOCIATED PNEUMONIA

Refer to separate ICU antibiotic guidelines.

## PNEUMONIA IN SPECIAL PATIENT GROUPS

### Intravenous drug abusers

#### **If staphylococcal lung abscess suspected**

Flucloxacillin 1g - 2g IV 6 hourly  
**plus** Sodium fusidate 750mg PO 8 hourly

#### **If septicaemic or suspected endocarditis**

(Refer to Endocarditis treatment guideline for further detailed information)

Flucloxacillin 2g IV 4-6 hourly  
**plus** Gentamicin IV 80 mg 8 hourly

Refer to gentamicin dosing guideline for advice on monitoring levels.

- High doses of oral flucloxacillin are poorly tolerated because of oesophago-gastritis.
- Note that pneumonia and IV drug use are both associated with renal impairment.
- Review treatment in light of isolate and sensitivities.

## ACUTE ASTHMA

Usually there is no bacterial infection and treatment with an antibiotic is not needed

## ACUTE BRONCHITIS

Systematic reviews indicate benefits of antibiotics are marginal in otherwise healthy adults. Only treat if illness persists beyond 7 days (or if frail / elderly / underlying disease)

Likely pathogen

Viral

May be secondary bacterial infection

First choice

No antibiotic

If underlying superinfection is suspected

Amoxicillin 500mg 8 hourly for 5 days

Penicillin allergy: oxytetracycline 250mg 6 hrly for 5 days OR if pregnancy risk: Erythromycin 250mg 6 hourly for 5 days