Community Acquired Pneumonia (Adults) Management Clinical Guideline

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Disclaimer

This guideline provides advice of a general nature. This statewide guideline has been prepared to promote and facilitate standardisation and consistency of practice, using a multidisciplinary approach. The guideline is based on a review of published evidence and expert opinion.

Information in this statewide guideline is current at the time of publication.

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Health practitioners in the South Australian public health sector are expected to review specific details of each patient and professionally assess the applicability of the relevant guideline to that clinical situation.

If for good clinical reasons, a decision is made to depart from the guideline, the responsible clinician must document in the patient’s medical record, the decision made, by whom and detailed reasons for the departure from the guideline.

This statewide guideline does not address all the elements of clinical practice and assumes that the individual clinicians are responsible for:

- Discussing care with consumers in an environment that is culturally appropriate and which enables respectful confidential discussion. This includes the use of interpreter services where necessary,
- Advising consumers of their choice and ensure informed consent is obtained.
- Providing care within scope of practice, meeting all legislative requirements and maintaining standards of professional conduct and
- Documenting all care in accordance with mandatory and local requirements.
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Introduction

This guideline has been developed with reference to the Australian Therapeutic Guidelines: Antibiotic [1], recent studies on community acquired pneumonia in Australia [2] and abroad, and with reference to locally available bacterial susceptibility data.

This guideline does not apply to patients with aspiration pneumonia or immunosuppression, exacerbations of COPD, or paediatric populations.

Background

Community acquired pneumonia (CAP) is usually suspected in patients who present with acute respiratory symptoms (e.g. cough, dyspnoea, sputum production, pleuritic chest pain), fever and new infiltrates on chest X-ray. In some patients, non-respiratory symptoms may be prominent (e.g. diarrhoea and headache) or, particularly in the elderly, clinical features may be nonspecific [1].

Careful assessment of pneumonia severity is required in all patients to guide the need for inpatient management and the most appropriate empirical antibiotic therapy.

Definitions and acronyms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>BD</td>
<td>Twice daily</td>
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<tr>
<td>CAP</td>
<td>Community acquired pneumonia - pneumonia occurring in individuals who are not in hospital (or have been in hospital for less than 48 hours). The definition does not apply to patients who are significantly immunocompromised, or those who have chronic suppurative lung diseases (e.g. cystic fibrosis, bronchiectasis) in whom the pathogen spectrum and management decisions are different.</td>
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<tr>
<td>CBE</td>
<td>Complete blood exam</td>
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<tr>
<td>CKD</td>
<td>Chronic kidney disease</td>
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<tr>
<td>COAD</td>
<td>Chronic obstructive airway disease</td>
</tr>
<tr>
<td>COPD</td>
<td>Chronic obstructive pulmonary disease</td>
</tr>
<tr>
<td>CrCl</td>
<td>Creatinine clearance</td>
</tr>
<tr>
<td>CXR</td>
<td>Chest X-ray</td>
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<tr>
<td>CRP</td>
<td>C-reactive protein</td>
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<tr>
<td>DRESS</td>
<td>Drug rash with eosinophilia and systemic systems</td>
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<tr>
<td>ID</td>
<td>Infectious Disease</td>
</tr>
<tr>
<td>LDH</td>
<td>Lactate dehydrogenase</td>
</tr>
<tr>
<td>LFT</td>
<td>Liver function test</td>
</tr>
<tr>
<td>MIC</td>
<td>Minimum inhibitory concentration</td>
</tr>
<tr>
<td>SpO₂</td>
<td>Saturation of peripheral oxygen - an estimation of the oxygen saturation level in the blood</td>
</tr>
<tr>
<td>SMART-COP</td>
<td>A mnemonic scale assessing the risk of a patient with pneumonia requiring ICU admission and respiratory support based on clinical findings at presentation. This tool includes readily available clinical information and has been validated in a number of different patient populations [3].</td>
</tr>
<tr>
<td>ml/min</td>
<td>millilitres per minute</td>
</tr>
<tr>
<td>PA</td>
<td>posteroanterior</td>
</tr>
<tr>
<td>PCR</td>
<td>Polymerase chain reaction</td>
</tr>
<tr>
<td>PO</td>
<td>per oral</td>
</tr>
<tr>
<td>SJS/TEN</td>
<td>Stevens-Johnson syndrome / Toxic epidermal necrolysis</td>
</tr>
<tr>
<td>TDS</td>
<td>Three times daily</td>
</tr>
<tr>
<td>IV</td>
<td>intravenously</td>
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</tbody>
</table>
Standards
The following National Safety and Quality Health Service Standard (NSQHSS) standards apply:

**Standard 3 – Preventing & Controlling Healthcare Associated Infections**
> Criterion 3.14 – Developing, implementing and regularly reviewing the effectiveness of the antimicrobial stewardship system.

**Standard 4 – Medication Safety**
> Criterion 4.1 – Developing and implementing governance arrangements and organisational policies, procedures and/or protocols for medication safety, which are consistent with national and jurisdictional legislative requirements, policies and guidelines.

**Principles of the standards**
Standard 3 aims to prevent patients from acquiring preventable healthcare associated infections and effectively manage infections when they occur by using evidence-based strategies that are based on the risk to both patients and staff.

Standard 4 aims to ensure competent clinician safely prescribe, dispense and administer appropriate medicines to informed patients and carers.
Suspected Community Acquired Pneumonia

Criteria for preliminary diagnosis of pneumonia

- Evidence of consolidation on CXR with 1 or more of the following:
  - Temperature >38°C or chills
  - Chest pains
  - Dyspnoea
  - Cough, especially productive

Initial investigations (all patients)

- Urgent CXR (PA and lateral)
- CBE & differential
- Sputum, deep nasal swab or throat swab for respiratory PCR

PLUS for admitted patients with probable moderate to severe CAP consider:

- Arterial blood gases if SpO₂ < 94% or significant underlying respiratory disease on air, or for patients on oxygen or with SMART-COP scores > 2
- Sputum Gram stain and culture (including Legionella)
- Blood cultures prior to antibiotics
- Urinary Legionella antigen detection

If tappable pleural effusion or empyema on CXR:

- Consult a Thoracic specialist if available
- Request pH, Gram stain and culture, protein, LDH, cell count
- Consider pleural aspiration

Treatment - Commence antibiotic therapy ASAP within four hours of presentation

Evaluate risk factors for severity of pneumonia – Refer to SMART-COP (Box A) scoring system. Clinical judgement is essential in assessing disease severity and the need for hospital admission. Consider other co-morbidities such as diabetes, alcohol abuse, CKD.

<table>
<thead>
<tr>
<th>Class 1: Score 0 - 2 points</th>
<th>Class 2: Score 3 - 4 points</th>
<th>Class 3: Score 5 - 6 points</th>
<th>Class 4: Score &gt; 7 points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low risk (0 – 2.5%) of needing ICU admission</td>
<td>Moderate risk (8-20%) of needing ICU admission</td>
<td>High risk (30-49%) of needing ICU admission</td>
<td>Very high risk (70%) of respiratory / vasopressor support required</td>
</tr>
<tr>
<td>30 day mortality risk &lt; 2%</td>
<td>30 day mortality risk 5–13%</td>
<td>30 day mortality risk 11-18%</td>
<td>30 day mortality risk 33%</td>
</tr>
</tbody>
</table>

Where influenza is suspected or when there are high rates of influenza community transmission, addition of empiric oseltamivir is recommended if SMART-COP score ≥3. Empiric oseltamivir is recommended in all pregnant women pending testing (see Appendix, sections 5 & 6)

amoxicillin
500mg-1g orally TDS for 5 days
AND / OR
doxycycline
200 mg orally to start, then 100mg orally TWICE DAILY for 5 days
(for outpatient therapy a single antibiotic is generally sufficient)

benzylicillin
1.2g IV 6 hourly AND
azithromycin
500mg orally DAILY for 3 days AND
In high risk groups (Box C)
gentamicin
5mg/kg (ideal body weight) IV single dose

benzylicillin
1.2g IV 6 hourly AND
azithromycin
500 mg IV/PO DAILY for 5 days* AND
gentamicin
5mg/kg (ideal body weight) IV DAILY for 2 days (if CrCl<40mL/min single dose, then seek expert advice for subsequent dosing or selection of alternate drug)

# Penicillin/Cephalosporin allergy:

- High risk penicillin / cephalosporin allergy: History suggesting of high risk (e.g. anaphylaxis, angioedema, bronchospasm, urticaria, DRESS/SJS/TEN): Use doxycycline alone.
- Moderate risk penicillin allergy (delayed rash which is NOT urticarial or DRESS/SJS/TEN):
  - Replace amoxicillin with:
    - cefuroxime 500mg orally BD OR
doxycycline 100mg orally TWICE DAILY
  - If intolerance to doxycycline replace with: roxithromycin 150mg orally twice daily
  - Treatment duration: 5 days

- High risk penicillin / cephalosporin allergy: History suggestive of high risk (e.g. anaphylaxis, angioedema, bronchospasm, urticaria, DRESS/SJS/TEN):
  - Consult ID/micro specialist.
  - Moderate risk penicillin allergy (delayed rash which is NOT urticarial or DRESS/SJS/TEN, OR CrCl < 40mL/min):
    - Replace benzylpenicillin and gentamicin with:
      - ceftriaxone 1g IV daily AND
      - azithromycin 500mg PO / IV daily (for 3 days only)*

- High risk penicillin / cephalosporin allergy: History suggestive of high risk (e.g. anaphylaxis, angioedema, bronchospasm, urticaria, DRESS/SJS/TEN):
  - Moxifloxacin orally or IV 400mg daily.
  - Consult ID/micro specialist.
  - Moderate risk penicillin allergy: History suggestive of moderate risk (delayed rash which is NOT urticarial or DRESS/SJS/TEN, OR CrCl < 40mL/min):
    - Replace benzylpenicillin and gentamicin with:
      - ceftriaxone 2g IV daily AND
      - azithromycin 500mg IV/PO daily for 5 days*

Usual duration of treatment: Class 1 CAP - 5 days; Class 2-3 CAP – 7 days

Total treatment duration depends on patient response and result of microbiological investigations. In severe cases or if patient is immunocompromised, seek expert advice.

For pregnant/ breastfeeding women refer to Appendix, section 6 & 7

*For proven Legionella, azithromycin is continued for 7 days or doxycycline for 14 days, seek expert advice.

See Box D for criteria for intravenous to oral switch.
Box A: Risk Analysis and Scoring Factors

SMART –COP: Risk of the need for Intensive Respiratory or Vasopressor support (IRVS)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Score</th>
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<tbody>
<tr>
<td>Systolic BP &lt; 90 mmHg</td>
<td>2 points</td>
</tr>
<tr>
<td>Multi-lobular chest X-ray involvement</td>
<td>1 point</td>
</tr>
<tr>
<td>Albumin &lt; 35 g/L</td>
<td>1 point</td>
</tr>
<tr>
<td>Respiratory rate:</td>
<td></td>
</tr>
<tr>
<td>&gt; Age: ≤ 50 yrs ≥ 25 breaths/min</td>
<td>1 point</td>
</tr>
<tr>
<td>&gt; Age: &gt; 50 yrs ≥ 30 breaths/min</td>
<td></td>
</tr>
<tr>
<td>Tachycardia (Heart rate) ≥ 125 bpm</td>
<td>1 point</td>
</tr>
<tr>
<td>Confusion (new onset)</td>
<td>1 point</td>
</tr>
<tr>
<td>Oxygen low (on room air):</td>
<td></td>
</tr>
<tr>
<td>&gt; Age ≤ 50 yrs: PaO₂ &lt; 70 mmHg or O₂ Sat ≤ 93%</td>
<td>2 points</td>
</tr>
<tr>
<td>&gt; Age &gt; 50 yrs: PaO₂ &lt; 60 mmHg or O₂ Sat ≤ 90%</td>
<td></td>
</tr>
<tr>
<td>pH (arterial) &lt; 7.35</td>
<td>2 points</td>
</tr>
</tbody>
</table>

Total score

Box B: Consult Infectious Diseases/Microbiology/ Respiratory for:

> Failure to improve by day 3 of treatment
> Patients with a history of anaphylaxis to any of the recommended antibiotics
> Pregnant women
> Recent travel overseas or to Northern Australia (risk of Gram-negative pathogens including *Burkholderia pseudomallei*)
> Suspected tuberculosis infection
> Suspected influenza or when there are high rates of influenza community transmission
> Suspected staphylococcal pneumonia

Box C: Risk Factors for Gram-negative pneumonia

> History of chronic lung disease
> Indigenous Australian
> Hospitalisation or antibiotic treatment in last 30 days
> High care nursing home resident
> Corticosteroid use
> Altered conscious state or other risk factors for aspiration
> Diabetes
> Alcohol dependence

Box D: Criteria for intravenous to oral antibiotic switch

Refer to [Intravenous to oral switch guideline for adult patients - can antibiotics S.T.O.P.](#)

> Afebrile after 48 hours of therapy
> Clinical symptoms improving
> Able to swallow
Appendix – Additional information

1. Risk stratification of patients presenting with pneumonia

One of the key features of managing CAP is to accurately assess the patient’s risk of an adverse outcome. This assessment allows clinicians to choose the most appropriate location for treatment (home, inpatient, intensive care) and the type of therapy (intravenous antibiotics versus oral, cover for atypical organisms or not). A number of tools have been developed to attempt to predict a patient’s outcome on the basis of their presenting symptoms and underlying risk factors. Some of the better known tools include the Pneumonia Severity Index (PSI) score developed by Fine and colleagues [4], CURB-65 [5] and SMART-COP [6]. A brief summary of these three scales is included below.

<table>
<thead>
<tr>
<th>Pneumonia risk scale</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSI</td>
<td>&gt; Best predictor of low-risk patients who can be discharged, best validation.</td>
<td>&gt; Most cumbersome, severity mostly based on age and co-morbidities rather than severity of pneumonic process</td>
</tr>
<tr>
<td>SMART-COP</td>
<td>&gt; Best predictor of need for ICU &gt; Used in Australian therapeutic guidelines</td>
<td>Validation on fewer patients, should not be used to guide admission decisions</td>
</tr>
<tr>
<td>CURB-65</td>
<td>&gt; Simplest mnemonic</td>
<td>Least sensitive and specific for either mortality or need for ICU</td>
</tr>
</tbody>
</table>

The use of SMART-COP is now recommended rather than PSI. There are three main reasons for this change:

> The mnemonic “SMART-COP” is easy to remember includes readily available clinical information and has been validated in a number of different patient populations.
> It helps identify those patients who may require invasive ventilation as well as those with an increased mortality rate.
> In the most recent Australian Therapeutic Guidelines: Antibiotic, SMART-COP is the preferred severity scoring system due to its ease of use. This means it will become familiar to users around Australia.

It is important to note that unlike PSI, SMART-COP has not been validated to guide clinicians in regards to whether a patient should be admitted to hospital or not. Although Class 1 patients will have a low risk or mortality or ICU admissions, the presence of patient co-morbidities and social considerations may still mean that admission is the most appropriate course of action.

2. Aetiology of community acquired pneumonia

Even in rigorous clinical studies, the aetiology of CAP can be identified in only about 50% of cases [7]. The importance of viral infections as a cause for CAP (around 30% in recent studies) is increasingly recognised, probably due to increasing use of PCR-based techniques to identify respiratory viruses [8]. Of the bacterial causes of CAP, S. pneumoniae is the most common (around 30-40%), followed by *Mycoplasma pneumoniae* (8-18%), *H. influenzae* (9-10%), *Legionella* sp. (3-7%) and *Chlamydophila* sp. (3-5%).

3. Diagnostic tests

Obtaining a diagnosis for the aetiology of pneumonia is helpful in directing antibiotic therapy and informs duration of treatment. It is also important to guide future recommendations for empirical treatment. The utility of various diagnostic tests, such as Gram stain, blood cultures, *Legionella* antigen, *Legionella* culture, and respiratory virus serology (low yield) have been reviewed. Due to
the limitations of diagnostic methods the aetiology of CAP is only identified in approximately 50% of cases [7]. While the identity of the infecting organism may not alter empiric antibiotic choice, it can help to narrow therapy and provide prognostic information (bacteraemia together with \textit{S. pneumoniae} pneumonia is associated with a high mortality). Identifying viral causes of pneumonia is important to prevent nosocomial transmission of respiratory viruses and to allow directed therapy for influenza. PCR for respiratory pathogens should be performed routinely on respiratory secretions of patients presenting with CAP. A sputum specimen has the highest sensitivity followed by a deep nasal swab. Serology for either atypical bacterial pathogens, respiratory viruses or other respiratory pathogens is no longer routinely recommended due to the low specificity of single measurements, delayed results, and the need for paired titres for adequate interpretation.

4. Antibiotic susceptibility

Antibiotic susceptibility patterns of common respiratory pathogens have been tracked over the years by the SA Pathology laboratory. The most common respiratory isolates from sputa from general practices in Adelaide include \textit{H. influenzae}, \textit{P. aeruginosa}, \textit{S. pneumoniae}, \textit{S. aureus} and \textit{M. catarrhalis} [9]. These are not necessarily from patients with pneumonia but also include COAD exacerbations and bronchitis. Local data show that amoxicillin is effective therapy for the majority of circulating \textit{S. pneumoniae} strains. \textit{H. influenzae} causes only 5% of CAP and would be adequately covered by amoxicillin oral plus doxycycline, or benzylpenicillin IV plus azithromycin based on local data [1, 9]. For specific information on antibiotic susceptibility, clinicians are advised to refer to their local (LHN) antibiograms.

5. Oseltamivir

Empiric oseltamivir is recommended in patients with class 2-3 CAP during periods of high community transmission of influenza and in patients with suspected or confirmed influenza. All patients who are pregnant should also be considered for oseltamivir therapy. Controversy exists around the benefit of oseltamivir in patients that are at low risk of influenza-related complications [10]. However, several studies have demonstrated a mortality benefit in hospitalised patients treated with neuraminidase inhibitors [11-13]. Empiric oseltamivir for hospitalised patients is supported by the US Center for Disease Control whom recommends prompt antiviral therapy for all patients with suspected or confirmed influenza requiring hospitalization, regardless of comorbidities or vaccination status [14]. Neuraminidase inhibitors can be ceased once influenza has been excluded.

6. Considerations in pregnancy

> **Oseltamivir:** Where influenza is suspected or when there are high rate of influenza community transmission addition of empiric oseltamivir is recommended for all pregnant women, including class 1 (SMART COP Score 0-2). Pregnant women are at higher risk of poor outcomes from influenza and the maternal benefit outweighs any risks of oseltamivir exposure to the foetus [1]. Oseltamivir is classified by the Therapeutic Goods Administration as category B1 in pregnancy [15].

> **Doxycycline:** Doxycycline is contraindicated in second and third trimester [16]. Use Roxithromycin 150mg twice daily for 5 days

> Reassurance for inadvertent use of doxycycline for the first 16 weeks post conception.

(For more information contact Medicines Information at WCH on 81617222 Monday to Friday 09:00-17:00).
7. Lactation

All antimicrobials mentioned in CAP Pathway/Protocol are considered safe in breastfeeding.

(For more information, contact Medicines Information at WCH on 81617222 Monday to Friday 09:00-17:00).

8. Penicillin / cephalosporin hypersensitivity

For more information on the classification of penicillin / cephalosporin allergies, refer to: https://www.allergy.org.au/health-professionals/papers/ascia-penicillin-allergy-guide-for-health-professionals
References

## Document Owner & History

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**Next review due:** 10/10/2022

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  - If so, which version?
  - Does this policy replace another policy with a different title? **N**
  - If so, which policy (title)?

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<td>10/10/17</td>
<td>V1</td>
<td>Safety &amp; Quality Strategic Governance Committee</td>
<td>Original approved version.</td>
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