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Best care goals	☒ Safe ☐ Personal ☐ Connected ☐ Effective		
Applies to	National		
Version	**Approval authority**	**Effective from**	**'Review by' date**
3	Executive Director, Care, Governance & Risk	5/03/2024	5/03/2027

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1. Rationale

The purpose of this Clinical Protocol is to provide a guiding framework for Medical Practitioners and clinical staff caring for clients with community acquired pneumonia (CAP).

2. Scope

The Clinical Protocol applies Nationally for clients diagnosed with community acquired pneumonia (or hospital acquired pneumonia where the patient has been in hospital for less than 48 hrs).

This protocol also provides guidance for management of CAP for people living in Residential Aged Care Facilities (RACFs).

This Clinical Protocol does not apply to clients who have been in a tertiary hospital for more than 48hrs and does not provide guidance for all antimicrobial prescribing in less common clinical scenarios (e.g in the tropics, unusual organisms etc).

These are to be checked with both the Medical Governor (preferably an Infectious Diseases specialist) and in Therapeutic Guidelines to ensure prescribing is best practice and that there

3. Acceptance to HATH criteria and pathway

RED • Unacceptable for community admission to HATH • Refer to ED/ Inpatient management. (May become suitable for HATH after ED or inpatient stabilisation).	• CRB65 score equal or above one, see Appendix A • New requirement for supplementary oxygen • Chest X-ray showing multi -lobar infiltrates/consolidation and/or pleural effusion • Coexisting complex medical conditions requiring hospital admission • Signs of sepsis (eg. T >38.5, PR >100, sys BP<100), haemodynamically unstable, RR>22, oxygen saturation <92, acute confusion • Client has been in hospital for greater than 48hrs • History of aspiration • Pregnancy beyond 20 weeks • Clients lives alone • History of recent IV drug abuse
ORANGE Requires discussion with referring Medical Governor prior to acceptance.	• Risk factors for drug resistance/treatment failure/sepsis: • Evidence or suspicion of multi resistant or unusual organisms. • International travel • Recent antibiotic exposure • Lack of evidence of a course of oral antibiotics prior to referral

	• Residential care-particularly if CRB65 score is not 0. Goals of care must be clarified with client and family in this instance • Immunocompromised • Severe underlying chronic respiratory conditions • Suspected or confirmed immediate penicillin or cephalosporin hypersensitivity (anaphylaxis, angioedema and/or urticaria) • Antibiotics outside of these guidelines-clinical reasoning to be discussed with Medical Governor and documented • Aged between 13 and 18, suitable for adult dosing who are not under the care of a paediatrician
GREEN Accepted for HATH protocol.	All criteria must be met: • Mild/moderate pneumonia confirmed by chest X-ray (radiologist report to be included in the referral). • CRB65 score 0 or PSI (Pneumonia Severity Index) class I – III. • Unsuitable for or intolerance to oral antibiotics. • Client's medical condition has been assessed as stable, has a clear diagnosis/prognosis and is at low risk of deterioration. Adults 18 years or over.

4. Pathology work up

- Full blood picture (FBP), urea and electrolytes, blood glucose, CRP.
- Blood cultures times two sets if temperature > 38^0C.
- Sputum culture and sensitivity (ideally prior to antibiotics but it should not delay commencement of treatment).
- Measure creatinine clearance using Cockcroft-Gault (CG) calculation for all clients as below: -
  - Measure the client's height and weight.
  - Ascertain the Ideal body weight for the height and gender using the table in Appendix B.
  - CG calculation is based on actual or ideal body weight (whichever is less).
  - If the client's weight is at or below the estimated ideal body weight, then use the actual measured body weight in the CG formula to calculate Creatinine clearance.
  - If the measured body weight is above the ideal body weight for the height, use the Ideal body weight for the CG calculation of Creatinine clearance.
- Serology testing may be available but is not essential and rarely influences management acutely

- CXR report confirming mild/moderate pneumonia. A CXR confirmation may not be required for the treatment of palliative patients, but these cases must be discussed with a Silver Chain medical officer
- Note that throat/nasal swab (dry swab) for NAAT testing for respiratory viruses including influenza and COVID 19, Chlamydia, Mycoplasma and Legionella and Urinary antigen assays-Streptococcal and Legionella may be supplied by referrers and may be requested by Silverchain to justify choice of antimicrobials by referrers but absence of them need not lead to declination of the referral.
- Evidence of the offending microorganism(s) should be supplied in order to meet AMS requirements

5. General management

- Access blood results and most recent CXR report from referral source.
- Liaise with medical governance doctor regarding any abnormal results.
- Initiate intravenous access and commence intravenous therapy as prescribed.
- Nursing assessment and care delivery as per Clinical Pathway for Community Acquired Pneumonia.
- Twice daily visits to monitor patient's vital signs and report/escalate any deterioration to levels outlined in monitoring section. Virtual reviews may occur in between face to face if confident it is safe to do so, and if remote monitoring tools are available eg pulse oximetry
- Beware of potential for sepsis especially in the elderly, Aboriginal and Torres Strait Islander people and those who are immunocompromised
- Educate patient and carer regarding patient's condition and action plan if condition deteriorates.
- If no clinical signs of improvement after two days, liaise with medical governance doctor regarding need for referral to hospital or discussion with respiratory or infectious disease physician.

6. Medical management/treatment plan

Note that the principles of appropriate antimicrobial prescribing, and antimicrobial stewardship apply in community-based parenteral antimicrobial therapy programs and note also that guidelines currently suggest there is little role for community based IV therapy for CAP.

- Choose the antimicrobial regimen according to prescribing guidelines.
- **Do not use parenteral antimicrobial therapy when oral therapy is available and appropriate**. Some antimicrobials have good oral bioavailability and can often be given orally rather than intravenously, noting however, that clients referred to SCG HITH services may well have already been trialled on oral therapy
- It is clear also then, that SCG has a clear responsibility to not use parenteral antimicrobial therapy for any longer than is absolutely necessary and that patients must be switched to oral therapy as soon as it is clinically appropriate to do so
- Document the infection treatment plan in the patient's records including the expected duration of intravenous therapy and the plan for follow-up after completing therapy.

6.1 Regime for Patients not living in Residential Aged Care Facilities

6.1.1 Oral Therapy

- Oral Monotherapy is recommended for patients with low-severity CAP to minimise adverse effects and optimise adherence to therapy (unless there are concerns regarding risk of poor follow up). Use
- amoxicillin **1 g orally, 8-hourly**
- In rural and remote Australia procaine benzylpenicillin **1.5 g intramuscularly**, daily is often preferred to aid in compliance and in prevention of rheumatic fever in high-risk groups
- Initial monotherapy with doxycycline can be used if atypical pathogens (eg Mycoplasma pneumoniae, Chlamydophila [Chlamydia] pneumoniae) are suspected based on epidemiology or the clinical presentation (eg a young adult who presents with non-productive cough for 5 or more days and bilateral lower zone infiltrates on chest X-ray). Use:
- doxycycline 100 mg orally, 12-hourly;
- OR if doxycycline is poorly tolerated, use
- clarithromycin **500 mg orally, 12-hourly**;

Duration of therapy: if the patient has significantly improved after 2 to 3 days of antibiotic therapy, treat for 5 days. If the clinical response is slow, treat for 7 days. If the patient is not improving after 48 hours of monotherapy, reassess the diagnosis

- If the patient was treated with monotherapy initially but is not improving after 48 hours, consider escalating to combination therapy and reassess the need for hospital admission.
- For patients with low-severity CAP who require combination empirical oral therapy, use a two-drug regimen:
  - amoxicillin **1 g orally, 8-hourly**; see below for duration of therapy

  PLUS

  - doxycycline **100 mg orally, 12-hourly**; see below for duration of therapy
- For patients with low-severity CAP with immediate non-severe or delayed hypersensitivity to penicillins, use:
  - cefuroxime 500 mg orally, 12-hourly;

  PLUS

  - doxycycline 100 mg orally, 12-hour
- If doxycycline is poorly tolerated in the above regimens, use:
  - clarithromycin 500 mg orally, 12-hourly

For patients with **immediate severe** or **delayed severe** hypersensitivity to penicillins, use as monotherapy:

- moxifloxacin 400 mg orally, daily

6.1.2 IV Therapy

Suggested antibiotic regimen if patient requires intravenous antibiotics (and provided a trial of a course of oral antibiotics has occurred prior to referral to HATH), and the client is suitable for HATH with mild-moderate Community Acquired Pneumonia (see traffic lights):

- benzylpenicillin **1.2 g intravenously, 6-hourly**;

PLUS EITHER

- doxycycline 100 mg orally, 12-hourly;

OR

- if doxycycline is poorly tolerated, clarithromycin 500 mg orally, 12-hourly;

In patients who can take oral therapy and have appropriate clinical review, oral amoxicillin can be used as initial therapy instead of benzylpenicillin because it has good bioavailability.

If oral therapy is not possible, consider giving doxycycline or clarithromycin enterally, or change to intravenous azithromycin.

If intravenous azithromycin is not available, seek expert advice.

- In those patients at risk of gram - negative lung infections (eg pre-existing structural lung disease, previous Pseudomonas Aeruginosa infection, positive blood or sputum cultures for gram negative bacteria) consult with an Infectious Disease Physician and/or Clinical Microbiologist
- If immediate non-severe or delayed non severe hypersensitivity to penicillins
- ceftriaxone 1 g intravenously, daily

OR

- cefotaxime 1 g intravenously, 8-hourly

PLUS EITHER

- doxycycline 100 mg orally, 12-hourly

OR

- if doxycycline is poorly tolerated, clarithromycin 500 mg orally, 12-hour

OR

If 6hrly visits are not possible, use

- Ceftriaxone **1g IV, daily**

PLUS

- Doxycycline **100mg orally, 12-hourly**

OR

- Clarithromycin **500mg orally, 12 - hourly**

In rural and remote regions of Australia, supervised administration and clinical review through a community management program is sometimes preferred. Use a two-drug regimen:

- procaine benzylpenicillin **1.5 g intramuscularly, daily;**

PLUS EITHER

- doxycycline 100 mg orally, 12-hourly;

OR

- if doxycycline is poorly tolerated, use clarithromycin **500 mg orally, 12-hourly**

For patients with **immediate non-severe** or **delayed non-severe** hypersensitivity to penicillins, use a two-drug regimen:

- ceftriaxone **1 g intravenously, daily**

OR

- cefotaxime **1 g intravenously, 8-hourly;**

PLUS EITHER

- doxycycline **100 mg orally, 12-hourly**

OR

- if doxycycline is poorly tolerated, use clarithromycin 500 mg orally, 12-hourly

For patients with severe immediate hypersensitivity reaction to penicillins (anaphylaxis, angioedema and/or immediate type urticaria) use

- Moxifloxacin **400mg orally, once daily.**

If oral therapy is not possible, consider giving moxifloxacin enterally or intravenously. Seek ID advice in this instance.

Once there has been significant improvement with any IV regime - consider changing to oral therapy:

- Amoxycillin **1g orally, eight - hourly, (oral)**

PLUS EITHER

- doxycycline 100 mg orally, 12-hourly

OR

- if doxycycline is poorly tolerated, use clarithromycin 500 mg orally, 12-hourly;

NB: Do not use Amoxicillin + clavulanate for the switch to oral therapy.

It is not an appropriate choice for de-escalation of therapy.

Compared with amoxicillin + clavulanate (875+125 mg, 12-hourly), amoxicillin:

- is less selective for resistance
- has fewer adverse effects
- at the dosage recommended for CAP (1 g orally, 8-hourly), achieves significantly higher concentrations of amoxicillin (which is needed in case of infection due to Streptococcus pneumoniae with a higher minimum inhibitory concentration to penicillin).

For patients with immediate non-severe or delayed non-severe hypersensitivity to penicillins, use as a two-drug regimen:

6.1.3 cefuroxime 500 mg orally, 12-hourly; see Duration of therapy [Note 8]

PLUS EITHER

6.1.3.1 doxycycline 100 mg orally, 12-hourly; see Duration of therapy

OR if doxycycline is poorly tolerated, use

- clarithromycin 500 mg orally, 12-hourly

6.2 Duration of combination of IV and oral therapy:

- If a patient with moderate-severity CAP improves within 2 to 3 days, treat for 5 days total (intravenous + oral).
- Treat for 7 days total (intravenous + oral) if clinical response is slow. Patients with lung abscess, empyema or large parapneumonic effusion will require a longer duration of therapy—will be guided by specialist referrer's advice as to duration
- If the patient is not improving after 48 hours, reassess the diagnosis
- Note adjunctive corticosteroids are not currently recommended in the management of CAP
- Early cessation of antibiotics is recommended if viral pneumonia is proven.
- During the influenza season (May to November) all admitted cases of CAP with recent onset of symptoms (< 72 hours) should also be considered for oral antiviral treatments after collection of influenza investigations (nose/throat swab usually).
- In confirmed cases, continue antiviral treatment for five days and consider cessation of other antimicrobials.
- Patient can be discharged to the care of their own GP once:
  - Stable on oral antibiotics
  - Afebrile > 24 hours
  - Sustained improvement in respiratory symptoms
  - No unstable comorbidities
  - Adequate social support

6.3 Management of CAP in Residents of Aged Care Facilities (RACFs)

- Establish whether an advance care plan is in place and whether antibiotic therapy is appropriate for the patient. Antibiotic therapy may be consistent with a declared palliative treatment plan.

- Assess aspiration risk. If the patient has had an aspiration event, aspiration pneumonitis will need to be excluded before starting antibiotic therapy for pneumonia. If aspiration pneumonia is suspected (e.g. pneumonia in a patient with recurrent aspiration), start empirical therapy for CAP.
- Consider whether a viral respiratory infection, such as influenza, could be the cause of the patient's symptoms. Viral respiratory infections are common in aged-care facility residents and difficult to differentiate from CAP. Do not rule out influenza in a vaccinated patient because circulating strains may differ from the vaccine, and vaccine response can be suboptimal in elderly patients.
- If a viral respiratory infection is suspected, consider performing nucleic acid amplification testing (NAAT) (e.g. polymerase chain reaction [PCR]) to establish the diagnosis, guide appropriate treatment and direct infection control measures (e.g. facility outbreak control and influenza prophylaxis for other residents; see Influenza and local infection control guidelines)
- If antibiotic therapy was started, review the results of investigations (e.g. NAAT, PCR], full blood count, C-reactive protein) within 24 to 48 hours. If a respiratory viral infection is likely, consider stopping antibiotic therapy.
- Sputum samples can be difficult to obtain in residents of aged-care facilities. If sputum samples are taken for Gram stain and culture, interpret with care
- Check that the patient is immunised against Streptococcus pneumoniae and influenza. Alert the GP if it is suspected the client is not vaccinated
- If antibiotic treatment is indicated and consistent with the patient's goals of care, determine the appropriate site of care by assessing:
- severity of pneumonia (use CRB65 tool)
- physiological status (e.g. hypoxaemia requiring supportive oxygen therapy)
- comorbidities (particularly cardiac, respiratory and cognitive comorbidities)
- functional status
- ability to tolerate, swallow and absorb oral therapy

- Consider management in the aged-care facility with oral therapy if the patient can eat and drink, and the following clinical parameters are met:
  - heart rate less than 100 beats/minute
  - systolic blood pressure higher than 90 mmHg
  - respiratory rate less than 25 breaths/minute
  - oxygen saturation higher than 92%
  - no evidence of acute-onset confusion.

6.3.1 For Mild pneumonia start with oral therapy

- Treat with amoxicillin 1 g orally or enterally, 8-hourly

OR

- For patients hypersensitive to penicillin treat with:
- doxycycline 100 mg orally or enterally, 12-hourly

OR

- If doxycycline is contraindicated or not tolerated (e.g. in bed-bound patients) and the patient has **immediate non-severe** or **delayed non-severe** hypersensitivity to penicillins, use cefuroxime **500 mg orally or enterally, 12-hourly;**
- If transfer to hospital is indicated (e.g. patients who do not meet the above criteria or who require supportive oxygen therapy for hypoxaemia) and is consistent with the goals of care (this may need to be discussed with the GP and/or Substitute Decision Maker), transfer the patient to hospital

6.3.2 If transfer to hospital is not consistent with the patient's goals of care, consider parenteral therapy in the aged-care facility.

Treat with:

- ceftriaxone 1 g intravenously, daily

OR

- if intravenous administration not possible, ceftriaxone **1 g intramuscularly, daily**
- Alternatively, procaine benzylpenicillin can be considered in patients able to tolerate intramuscular injections, especially if it is expected that oral antibiotics can be resumed after two to three doses. Close clinical review is necessary.

Use **procaine benzylpenicillin 1.5 g intramuscularly, daily**

- For patients with **immediate non-severe** or **delayed non-severe** hypersensitivity to penicillins, use
- ceftriaxone 1 g intravenously, daily

OR

- if intravenous administration not possible, ceftriaxone 1 g intramuscularly, daily

For patients with immediate severe or delayed severe hypersensitivity to penicillins, seek expert advice.

Review the patient's response to therapy within 24 to 48 hours and reassess the diagnosis if the patient is not improving or an alternative diagnosis (e.g. aspiration pneumonitis, a respiratory virus) is more likely.

7. Monitoring

Indicators for urgent medical re-assessment or hospital admission as per the Adult Standard Observation and Escalation Chart (unless this is not consistent with end of life goals of care and client choice) are:

- New onset confusion
- O^2 saturation < 92%
- Respiratory rate ≥ 21 breaths/minute
- Heart rate ≥ 100 beats/min
- Systolic BP ≤100mmHg
- Persistent fever (≥38^0C) for ≥ 72 hours
- Raising CRP on day three
- Drug reaction

8. Red Flags indicating need for Hospital Readmission

Patients with **any** of the following parameters will need close clinical observation, and are therefore likely to need inpatient management

- tachypnoea (respiratory rate 22 breaths/minute or more)
- heart rate equal to or higher than 100 beats/minute
- hypotension (systolic blood pressure equal to or lower than 100 mmHg)
- acute-onset confusion
- oxygen saturation lower than 92% on room air (or lower than baseline in patients with comorbid lung disease)
- multi-lobar involvement on chest X-ray
- blood lactate concentration more than 2 mmol/L (if available)

9. Medical governance

- The client must have access to medical governance support for 24 hours per day, 7 days per week.
- Primary medical governance can be held by referring medical specialists, credentialed referring GPs or by Silverchain medical staff.
- When governance is retained by a Silverchain medical officer the client will have a medical review within 24 hours of admission and the medical officer will determine when the scheduled follow up and discharge will occur.
- Where the primary medical governor is unavailable the Silverchain medical officer will provide the medical governance.
- Care delivery is planned and provided in consultation with the client, medical officer/specialist holding medical governance and nursing staff.
- In the instance when a client's condition deteriorates, the Silverchain medical officer or nursing staff will confer with an emergency department medical officer.
- A summary of the episode of care is sent to the referrer or the client's GP at discharge highlighting any significant clinical or additional risks and recommendations (eg for vaccinations) that exist.

10. Discharge planning

- Ensure the client has an appointment arranged with own General Practitioner (GP) prior to discharge to ensure continuity of care.
- Discharge summary must include the key clinical risks for handover
- Fax protocol with client discharge summary to GP.

11. Supporting documents

Silverchain Group documents that directly relate to and inform this Clinical Protocol are available with this document in the Policy Document Management System (PDMS).

Other documents that directly relate to and inform this Clinical Protocol are as follows:

- Australian Commission on Safety and Quality in Health Care 2017 National Safety and Quality Health Service Standards (2nd), Sydney. Australia
- eTG Community Acquired Pneumonia https://tgldcdp-tg-org.silverchain.idm.oclc.org/viewTopic?etgAccess=true&guidelinePage=Antibiotic&topicfile=community-acquired-pneumonia-adults
- eTG complete. 2023. Therapeutic Guidelines. CCG and Ideal body weight tables

12. Document details

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Silverchain's policies align with relevant legislation and standards and are based on providing a fair, inclusive, and safe working environment free from bullying and discrimination and one that enables equal opportunity for all Silverchain staff.

Our policies embody our values of integrity, respect, trust, and compassion.

Appendix A Assessment for Community Patients Suitability for Home Hospital Treatment-CRB65 scoring tool

https://www.mdcalc.com/calc/324/curb-65-score-pneumonia-severity

CRB Score 0, appropriate for HATH management

CRB Score of ≥ 1 point, **NOT SUITABLE for HATH Management.**

Appendix B Ideal Body weight for height and gender

Height		**Ideal body weight in kg**	
cm	Feet (‘) & Inches (“)	Female	Male
155	5’	48	53
160	5’ 2”	53	57
165	5’ 4”	57	62
170	5’ 6”	62	66
175	5’ 7”	66	71
180	5’ 9”	71	75
185	6’	75	80
190	6’ 2”	80	84
195	6’ 4”	84	89
200	6’ 6”	89	93
205	6’ 7”	93	98
210	6’ 9”	98	102
215	7’	102	107
220	7’ 2”	107	111

eTG complete. 2023. Therapeutic Guidelines. CCG and Ideal body weight tables