

CLINICAL PRACTICE GUIDELINE	
------------------------------------	--

Adult Pneumonia Guideline (Community and Hospital-acquired)

Document Registration Number: HNEH CPG xxxx

Sites where CPG applies	Acute Networks Hospitals Primary & Community Networks
Target Clinical Audience	This CPG is applicable to adults All clinicians who treat adult pneumonia Pharmacists
Applicability	<i>(Please indicate with a X in the appropriate box)</i>
*NB: *Please be aware that young people between 16 and 18 years of age may have a number of other guideline, policy or legal requirements that should be adhered to but for the purposes of guideline development can be considered adult	Neonate – less than 29 days N
	Children up to 16 years* N
	Adult (18 years and over) Y
	All of the above <input type="checkbox"/>
Summary	This document describes expert recommendations relating to management of CAP in facilities managed by Hunter New England Health Service.
Keywords	Pneumonia, <i>Legionella</i> , influenza, antibiotic stewardship
Replaces existing clinical practice guideline or policy?	Yes
Registration Numbers of Superseded Documents	HNEH CPG 09_06 (CAP CPG) HNEH CPG 08_05 (HAP CPG)
<i>Related documents (Policies, Australian Standards, Codes of Conduct, legislation etc)</i>	
<i>Detail main parent documents that informs this CPG</i>	
<ul style="list-style-type: none"> • Therapeutic Guidelines: Antibiotic, Therapeutic Guidelines, Melbourne, Victoria 2010 • Buising, K et al. Identifying severe community-acquired pneumonia in the emergency department: A simple clinical prediction tool. <i>Emergency Medicine Australasia</i> (2007) 19, 418–426 	
Clinical Network/stream leader responsible for CPG	
Contact Person/Position Responsible	
Contact Details	
Review Due Date:	July 2012
Date authorised by Area Quality Use of medicines	
Date authorised by Area Clinical Network/stream	
Date Authorised by HNE Clinical Quality and Patient Safety Committee	
Trim Number	

CLINICAL PRACTICE GUIDELINE	
------------------------------------	--

Glossary

AFB	acid fast bacilli – e.g. <i>Mycobacteria</i> species such as tuberculosis
BAL	Broncho-alveolar lavage
CAP	community-acquired pneumonia
CAPAC	Community Acute Post-Acute Care (CAPAC)- hospital in the home care team that operates from several HNE Centres
CI	Contraindication
CORB	acronym for the severity scoring system (C onfusion, O xygenation, R espiratory rate, B lood pressure) in use for CAP assessment in adults
HAP	Healthcare (hospital)-associated pneumonia
HAPS	Hunter Area Pathology Service
HDU	High Dependency Unit
ICU	Intensive Care Unit
IV	Intravenous
LP1	<i>Legionella pneumophila</i> serogroup 1, the commonest cause of legionellosis
MRSA	methicillin-resistant <i>Staphylococcus aureus</i>
NPA	nasopharyngeal aspirate
P2 mask	particulate filter mask used for protection against airborne fine particle infected aerosols
PCR	Polymerase chain reaction – a test that amplifies very small quantities of DNA or RNA from a pathogen within a sample so that detection (diagnosis) can occur
PPE	personal protective equipment (e.g. mask, gown, gloves, eye protection)
RSV	Respiratory syncytial virus – the commonest cause of bronchiolitis in infants. Also a cause of pneumonia in adults
TB	tuberculosis

The current CAP/HAP business card-sized summary is available from Acute Networks Pharmacy Departments.

IMPORTANT NOTE:

Clarithromycin potential interactions: Clarithromycin inhibits the metabolism of HMG-CoA reductase inhibitors that are metabolized by CYP3A4 (i.e., **atorvastatin**, **cerivastatin**, **lovastatin**, **simvastatin**). This interaction may result in myopathy and rhabdomyolysis, particularly in patients with renal insufficiency or those who are concurrently taking medications associated with myopathy.

Also avoid clarithromycin with **colchicine** as a potentially life threatening reaction may occur.

1.0 COMMUNITY-ACQUIRED PNEUMONIA (CAP) GUIDELINE

Overview (CAP)

Optimal management of CAP improves patient outcome. Important aspects include:

- Assessment to identify unusual risk exposures
- Severity assessment using the CORB (**C**onfusion, **O**xygenation, **R**espiratory rate, **B**lood pressure) scoring at presentation (use the worst parameters recorded for each during the ED stay or first 24 hrs) to identify patients with severe pneumonia. CORB can also be used to assess patients with influenza-like illness.
- Investigation of patients with severe pneumonia to demonstrate an infective cause that enables later targeting of antibiotic therapy
- Influenza testing of admitted CAP cases during May-November period. Pending influenza results, start antiviral treatment for patients with recent onset of symptoms (< 72hrs) or with severe disease (at any time following symptom onset)
- Broad spectrum empiric antibiotic treatment for all severe cases to ensure that atypical causes such as *Legionella* and Gram negative pneumonia are treated from the outset.
- Cases of severe pneumonia due to strains of community MRSA are becoming more frequent in Northern NSW. It is important to give consideration to this diagnosis and adjust empiric treatment if pneumonia due to *Staph. aureus* is considered possible.

Clinical Assessment

*In view of the danger to healthcare staff posed by transmissible respiratory pathogens such as influenza, it is essential that **Droplet Additional Infection Control Precautions** are followed (alcohol hand rub, don personal protective equipment upon room entry- surgical mask and protective eye wear) for all initial clinical interactions and specimen collection. Collection of NPA requires donning of P2 mask, protective eye wear, long sleeve impervious gown and gloves in that order- seek advice if uncertain about this PPE process.*

i) Is it 'severe' community-acquired pneumonia?

This is the most important determination. Presence of two or more CORB criteria is sufficient to indicate presumptive severe pneumonia (quite aside from whether the patient has or will be admitted to ICU) and indicates that broad-spectrum empiric antibiotics are required from the start. The therapy is selected to particularly provide adequate cover for:

- *Streptococcus pneumoniae* (i.e. benzylpenicillin)
- *Legionella* (azithromycin)
- aerobic Gram negatives such as *Klebsiella* species (gentamicin)
- *Staph. aureus* (gentamicin or add vancomycin to cover community methicillin-resistant *Staph. aureus* (MRSA) if suspicion high- see Sputum examination below).

An assessment of the patient by the ICU team is advisable in all severe cases.

ii) Admission criteria

Patients who have no preceding cardiac and respiratory disease and who present with mild or moderate pneumonia can usually be managed as an outpatient. **All of these patients need review the next day by their General Practitioner (GP) or the Community Acute Post-Acute Care (CAPAC) team and later review by their GP.**

Patients with chronic cardiac, respiratory or neurological problems or who are immunosuppressed, are at higher risk of complications and should be considered for admission. All immunocompromised patients with CAP should be discussed with a consultant upon admission and before discharge (if going home from ED).

Adult Pneumonia Guideline HNEH CPG xxxxx

Patients who have failed to respond to a reasonable course of oral antibiotics, should be considered for admission and parenteral therapy. Clinical judgement and the patient's social circumstances are important factors in this decision.

iii) Diagnostic considerations

Relevant considerations include:

- Season (winter- pneumococcus, Respiratory syncytial virus (RSV) (even in adults; onset of season often in May), Influenza (June to November usually)
- Comorbid conditions Chronic Airflow Limitation (*Haemophilus*), other lung disease (complex)
- exposure to birds (psittacosis), potting mix or gardening (*Legionella longbeachae*), animals/rural (*Coxiella burnetii* - Q Fever)
- pregnancy- throughout pregnancy and puerperum, women are at risk from severe influenza
- immune-competency: in particular, cell-mediated immune deficiency (eg. AIDS, post organ transplant patient) raises the possibility of *Pneumocystis* or tuberculosis.

The clinical and radiological presentation seldom permits prediction of the aetiology. Occurrence of abscess(es) indicates a pyogenic cause (e.g. *Staph. aureus*, β -haemolytic strains of streptococci, anaerobic organisms, *Klebsiella* species.)

Presence of sudden onset rigors, pleuritic pain, purulent sputum with lobar consolidation has a sensitivity of 30% and specificity of 91% for pneumococcal pneumonia.

Presence of an asthma-like presentation in adult with prominent wheeze is suggestive of primary RSV pneumonia.

Investigation of CAP

i) Routine investigations (All patients in the Emergency Department) :

- Two blood culture sets (20mLs in two bottles for adult/adolescent). Collect with correct asepsis from different venepuncture sites. Collect prior to antibiotics.
- Sputum (if possible) microscopy and culture (an acceptable specimen contains >25 neutrophils and <10 epithelial cells per high power field).

ii) Additional investigations for patients who require admission

In the ED:

- Serum for *Mycoplasma* IgM (acute-phase)

In the ED or on the ward:

- May to November- Influenza PCR on nose and throat swab sample (NPA is an acceptable alternative from infants).
- Consider urine for *Legionella* LP1 antigen.

iii) Additional investigations for patients with severe CAP (see Appendix A- Checklist for Severe CAP in ICU)

- Sputum *Legionella* PCR.
- Urine for *Legionella* (LP1) and *Streptococcus pneumoniae* antigens (can be collected up to 1 week post presentation).
- NPA or BAL for respiratory virus detection (in ICU), especially if initial influenza testing is negative (see below).

iv) Additional notes:

Legionella detection

Detection is by polymerase chain reaction (PCR) nucleic acid detection (must be specifically requested from HAPS) AND urinary antigen detection for *Legionella pneumophila* serogroup 1 antigen. See also Acute Serology, next section below.

Adult Pneumonia Guideline HNEH CPG xxxxx

Sputum gram stain and culture

If the patient can produce a well-expectorated specimen (not salivary, >25 neutrophils and <10 epithelial cells per high power field), presence of typical organisms suggestive of either *Strep. pneumoniae* (pneumococcus -Gram positive diplococci) or *Haemophilus* (small Gram negative rods) had the following sensitivity and specificity in one of many studies:

	<i>S. pneumoniae</i> (presumptive)	<i>Haemophilus</i> (presumptive)
Sensitivity	56%	82%
Specificity	97%	99%

Presence of predominant Gram positive cocci in clusters, i.e. Staphylococci and profuse white cells indicates probable *Staph. aureus* pneumonia. In this case pre-treatment blood cultures are often positive within 24hrs.

Acute Serology

Acute serum for *Mycoplasma* IgM is usually tested twice a week in the laboratory. For other causes, an acute serum is important but it may be held untested (as it would normally be negative) until a convalescent serum is also received in the laboratory (at least 3 weeks after onset of illness). Note that delayed seroconversion is the rule in *Legionella* infection. If *L. longbeachae* is suspected, then request this specifically as routine *Legionella* serology seldom detects this.

Mycobacterial Ziehl-Nielsen (acid fast bacilli- AFB) stain and culture

Should be considered in the appropriate clinical circumstance, and is a particular concern in the elderly, immunosuppressed and immigrants from high prevalence countries.

Pleural fluid studies

Presence of significant amount of pleural fluid should prompt aspiration for microscopy, biochemistry and culture (+/- AFB examination). The presence of a complicated parapneumonic effusion dictates urgent drainage. Where TB is a possibility, pleural biopsy with culture is optimal for detection.

Virus detection

Nasopharyngeal aspirate or bronchial lavage/washing best in ICU case.

Request "RSV only" for a same day rapid test.

Request "respiratory virus screen" for rapid testing locally by immunofluorescence for influenza, parainfluenza, adenovirus, RSV & metapneumovirus.

(PCR for an extended range of respiratory viruses is more sensitive but is a sendaway test with a one week turnaround)

During influenza season (Late May to November), send combined nose/throat swab & request Influenza PCR (done second daily locally).

ICU experience in 2009 and 2010 showed that repeat influenza PCR testing from a nasopharyngeal aspirate or lower tract sample was of value in confirming a diagnosis in patients with initial negative results from nose/throat.

Adult Pneumonia Guideline HNEH CPG xxxxx

CAP Empirical treatment (see right)

During the influenza season, all admitted cases of CAP with recent onset of symptoms (< 72hrs) should also be considered for oral oseltamivir treatment after collection of influenza investigations (nose/throat swab usually). In confirmed cases, continue anti-viral treatment for 5 days and consider cessation of antimicrobials. ICU patients may need longer treatment.

The adult CAP pathway (see Appendix) is available on SALMAT.

Potential for clarithromycin interactions

Clarithromycin inhibits the metabolism of HMG-CoA reductase inhibitors that are metabolized by CYP3A4 (i.e., **atorvastatin, cerivastatin, lovastatin, simvastatin**). This interaction may result in myopathy and rhabdomyolysis, particularly in patients with renal insufficiency or those who are concurrently taking medications associated with myopathy. Also avoid clarithromycin with **colchicine** as a potentially life threatening reaction may occur.

Review clinical & microbiology status at 48 hours

Change to directed (targeted) therapy against a demonstrated pathogen as soon as possible.

In particular it may be possible to cease gentamicin or switch to an oral option. See Therapeutic Guidelines:Antibiotic for specific recommendations for a demonstrated bacteriological cause of CAP.

Duration of therapy

The usual duration of antimicrobial therapy for non-severe CAP is 5-7 days. Early cessation is recommended if viral pneumonia is proven.

Possible causes of CAP treatment failure

Reason for failure	Examples
Incorrect diagnosis	pulmonary embolism, pulmonary oedema, pulmonary eosinophilia, Wegener's granulomatosis, drug allergy, lung cancer
Resistant organism/infection	<i>Mycoplasma pneumoniae</i> , <i>Chlamydia psittaci</i> , <i>Coxiella burnetii</i> , <i>Staphylococcus aureus</i> , β -lactamase-producing <i>Haemophilus influenzae</i> (unusual) viral infection pulmonary tuberculosis <i>Pneumocystis carinii</i>
Inadequate drug, dose or route of administration	oral erythromycin for <i>Legionella</i> infection (inadequate tissue levels achieved) azithromycin is inactive against <i>Coxiella burnetii</i> (Q Fever)
Complication	empyema, abscess, pulmonary embolism, fever related to drug therapy
Underlying disease	lung cancer, cardiac failure, immunodeficiency

Community-acquired pneumonia HUNTER NEW ENGLAND NSW HEALTH

Criterion	First line	Pen.allergy ²
Mild Social supports OK Stable comorbidities No CORB factor	amoxicillin 1 g oral 8-hrly, 5-7 days	clarithromycin 250 mg oral 12-hrly, 5-7 days
Moderate One CORB factor OR Requires admission (may still require ICU assessment)	benzylpenicillin 1.2 g IV 6-hrly, 7 days AND doxycycline 100 mg oral 12-hrly, 7 days OR clarithromycin 500 mg oral 12-hrly, 7 days	ceftriaxone² 1 g IV daily, 7 days AND doxycycline 100 mg oral, 12-hrly 7 days OR clarithromycin 500 mg oral 12-hrly, 7 days
Severe/ICU/HDU¹ Adult with ≥ 2 of: C onfusion: new onset pO₂ < 60 mm or O ₂ sat $\leq 90\%$ R R ≥ 30 /min B P syst.< 90 mmHg or diast. ≤ 60 mm	benzylpenicillin 1.2 g IV 4-hrly AND gentamicin daily IV (see doses over) AND azithromycin 500 mg IV/oral daily	ceftriaxone² 1 g IV daily AND azithromycin 500 mg IV/oral daily (usually stop azithromycin at 5 days if legionella unlikely)
Investigation (severe): acute serology, two blood culture sets, urinary <i>Legionella</i> and <i>Pneumococcal</i> antigens, NPA or sputum for extended respiratory virus PCR and <i>Legionella</i> PCR.		

Notes: ¹ If MSSA or MRSA pneumonia probable, consult Infectious Diseases and add **vancomycin**: CrCl > 90 mL/min: 1.5 g IV 12-hourly (maximum infusion rate 10 mg/min). Trough level if therapy > 48hrs (target 12-18 mg/L).
² Immediate β -lactam hypersensitivity: consult Infectious Diseases.

Ref: CPG on intranet
Expires Dec 2012

2.0 HOSPITAL-ACQUIRED PNEUMONIA (HAP) GUIDELINE

Overview (HAP)

Hospital-acquired pneumonia (HAP) is pneumonia manifesting > 48 hrs after hospital admission. Early HAP (within 5 d admission) is often due to the same organisms (bacteria and viruses) that cause community-acquired pneumonia. Late HAP may be caused by community or hospital pathogens, the latter more likely in ventilated ICU patients.

Optimal management of HAP requires consideration of the following elements:

- Appropriate investigation prior to treatment
- Appropriate empiric antibiotic therapy
- Review of the patient's clinical and microbiological status at 48 hrs to optimise treatment and target treatment at a demonstrated pathogen(s)
- Minimising the duration of treatment to reduce antibiotic exposure

Investigation of HAP

Collect sputum or BAL for bacterial culture, blood cultures (2 sets) prior to antibiotic therapy., *Legionella* urinary antigen, nose/throat swabs for influenza PCR / viral culture should also be considered. Non-infective causes for consolidation should always be considered.

Empiric HAP treatment (see right)

Modify in the light of organisms known to be colonising the patient.

Gentamicin is relied upon for initial therapy in pneumonia because it penetrates well to the lung and has a much broader spectrum against most Gram negatives than does cefotaxime or ceftriaxone. It is also more rapidly bactericidal than β -lactam agents. It has demonstrated safety in patients with severe sepsis.

Review clinical & microbiology status at 48 hours

Options at that point include:

- ceasing therapy (if an alternative cause for consolidation is likely)
- ceasing gentamicin and continuing betalactam (Gram negative infection excluded by negative cultures (blood / sputum))
- targeting therapy against demonstrated pathogen(s)
- switch to an oral option at that point (patient improving)
- obtaining Infectious Diseases advice in the event of progressing pneumonia

Adult Hospital-acquired pneumonia

HUNTER NEW ENGLAND
NSW HEALTH

Criterion	First line	Pen. allergy
Low risk for MRO: - Non-ICU OR - ICU/HDU cases admitted to hospital < 5 days	amoxicillin/ clavulanate 875/125 mg 12-hrly, 5-7 days OR benzylpenicillin 1.2 g IV 6-hrly, 5-7 days AND gentamicin (<i>below</i>)	ceftriaxone 1 g IV daily, 5 days (MRO= multi-resistant Gram negative micro organism)
High risk for MRO: - ICU/HDU adm. \geq 5 days - known MRO	piperacillin/ tazobactam 4 /0.5 g IV 6-hrly AND gentamicin (<i>below</i>)	cefepime 2 g IV 8-hrly AND gentamicin(<i>below</i>)
MRSA ADD vancomycin CrCl > 60 mL / min: 1.5 g IV 12-hourly (max. infusion rate 10 mg/min) and Consult Infectious Diseases.		

Empiric gentamicin IV dosing (TG: Antibiotic, Edition 14)

Number of doses (calculate creatinine clearance):

CrCl > 60 mL/min: dose at 0, 24, 48 hr then cease
 40-60 mL/min: dose at 0 and 36 hr then cease
 30-40 mL/min: dose at 0 and 48 hr then cease
 < 30 mL/min: dose once only, then seek advice.

NO levels required for empiric dosing

Recommended dose (round to nearest 40 mg):

Child < 10 yr: 7.5 mg/kg to max 320 mg | 10-29 yr: 6 mg/kg to max 560mg
 30-60 yr: 5 mg/kg to max 480 mg | > 60 yr: 4 mg/kg to max 400mg

Do NOT use if previous vestibular or auditory toxicity or serious hypersensitivity (rare) due to aminoglycosides.

Duration of therapy

For non-ICU or high dependency patients, 5-7 days is sufficient.

For Intensive care cases, 7 days is the usual duration with longer (up to 14 days) therapy required for proven pseudomonal infection. Short course therapy (3 days) can be considered in circumstances where either an alternative diagnosis for consolidation has been documented and/or patient response to initial antibiotics was rapid.

Appendix 1: Adult CAP Pathway (2 pages back-to-back)

Adult Community Acquired Pneumonia
Emergency Department Clinical Pathway

Name: _____
MRN: _____

Signs/Symptoms	Score ONE point for each feature present
Confusion new onset or worsening of existing state if cognitive impairment present	
Oxygen PaO ₂ ≤ 60mm Or O ₂ sat ≤ 90%	
Respiratory Rate ≥ 30/min	
Blood Pressure systolic BP <90 mmHg or diastolic ≤ 60 mmHg	
Total Score	



Empiric Antibiotic Therapy	MILD score = 0	MODERATE score = 1	SEVERE/ICU/HDU ¹ score = 2 or more
First line	Amoxycillin 1 g oral 8-hrly, 5-7 days	Benzylpenicillin 1.2 g IV 6-hrly TOGETHER WITH EITHER Doxycycline 100 mg oral 12-hrly, 7 days OR Clarithromycin 500 mg oral 12-hrly, 7 days See overleaf for PBS prescribing information	Benzylpenicillin 1.2 g IV 4-hrly AND Gentamicin daily IV See overleaf for dosing AND Azithromycin 500 mg IV or oral daily <i>(usually stop azithromycin at 3 days if Legionella unlikely)</i>
Penicillin allergy	Clarithromycin 250 mg oral 12-hrly, 5-7 days	Ceftriaxone 1g IV daily, 7 days TOGETHER WITH EITHER Doxycycline 100 mg oral 12-hrly, 7 days OR Clarithromycin 500 mg oral 12-hrly, 7 days See overleaf for PBS prescribing information	Ceftriaxone 1 g IV daily AND Azithromycin 500 mg IV or oral daily <i>(usually stop azithromycin at 3 days if Legionella unlikely)</i>
Notes	<i>MRSA pneumonia has high mortality: always consult Infectious Diseases</i>	¹ Add vancomycin if staph pneumonia possible (CXR or sputum Gram stain): CrCl > 60 mL/min: 1.5 g IV 12-hrly (maximum infusion rate 10 mg/min). See Therapeutic Guidelines: Antibiotic on CIAP for doses in patients with renal failure.	
Investigations in ED	FBC, UEC, BSL, sputum culture (if possible)	Add: Blood culture (2 separate sets), <i>Mycoplasma</i> IgM (acute serum), May-November: viral throat/nose swabs for influenza PCR. Severe (ICU): add <i>Legionella</i> sputum PCR, urine antigens for <i>Legionella</i> and <i>Strep. pneumoniae</i> , serum for Q fever IgM. Extended respiratory virus PCR on nose/throat sample or BAL.	
Home treatment usually feasible Mild or moderate CAP Good social supports No unstable co-morbidities LIAISE WITH CAPAC OR GP PRIOR TO DISCHARGE		Hospital admission usually required Moderate or severe CAP Failure to respond to oral therapy as outpatient Immunocompromised patients (seek consultant advice) ICU consultation advised (i.e. severe CAP or respiratory failure)	

Doctor Name (print) _____ Doctor Name (Signature) _____

Date: _____ Time: _____

PLEASE RETAIN in Patient File

Adult Community-Acquired Pneumonia (CAP): Key Points

Correct identification of severe pneumonia enables appropriate investigation, early broad spectrum antibiotic therapy (that includes *Legionella* cover) and necessary respiratory support.

Immunocompetency: patients with chronic cardiac, respiratory or neurological problems or who are immunosuppressed, are at higher risk of complications and should be considered for admission and should be discussed with the consultant prior to discharge if going home from ED.

Serology: Acute serum sent for *Mycoplasma* IgM. Acute serum will be stored by Virology for later testing. Testing for other requested causes will proceed once a convalescent sample (> 3 wks after onset) is received.

PCR diagnosis of respiratory viruses: The combined nose/throat sample for flu PCR has a special collection procedure (see below). Request extended respiratory virus PCR on severe CAP ICU cases.

Atypical pathogens: *Legionella* diagnosis has important public health implications. Additional tests for *Legionella*, are required particularly if renal failure and/or GI symptoms present.

Antibiotic administration within 4 hours of arrival is associated with decreased mortality¹.

***Streptococcus pneumoniae* remains the most important cause of CAP in our community.** Amoxycillin and benzylpenicillin retain efficacy in CAP due to pneumococcal strains with raised minimal inhibitory concentration to betalactams. Benzylpenicillin is also active against most (80%) of *Haemophilus influenzae*.

Azithromycin is retained for severe CAP in order to provide cover against *Legionella*, pertussis and other atypical pathogens. It is NOT active against *Coxiella burnetii* (Q fever agent).

Clarithromycin; PBS listing is for 250mg tablets (14) + 1 repeat (note the 500mg tablets are NOT on the PBS)

MRSA strains with enhanced potential for causing pneumonia circulate in the community. Adult vancomycin dosing recommendations have changed recently (Therapeutic Guidelines: Antibiotic, Edition 14).

Gentamicin

Recommended gentamicin starting doses:

Patient age	Initial dose
10 – 29 years	6 mg/kg up to 560 mg
30 – 60 years	5 mg/kg up to 480 mg
> 60 years	4 mg/kg up to 400 mg
Septic shock	7 mg/kg up to 640 mg

Adult doses: these should be rounded to the nearest 40mg increment

Recommended gentamicin dosing interval:

Creatinine clearance (mL/min)	Dosing interval	Maximum number of empiric doses
> 60	24 hrs	3 (at 0, 24 and 48 hours)
40 – 60	36 hrs	2 (at 0 and 36 hours)
30 – 40	48 hrs	2 (at 0 and 48 hours)
< 30	Give initial dose only and seek expert advice	

Collection procedure: nasal/throat swab for influenza or respiratory virus PCR

Equipment

- Viral swabs (green top viral transport swab) x 2 (**must be correct swab type**)
- Wooden or plastic disposable tongue depressor
- Personal protective equipment (surgical mask, eye goggles)
- Alcohol based hand rub (ABHR)

Procedure

1. Explain the procedure to the patient.
2. Clean hands with alcohol based hand rub (ABHR) and put on PPE (protective glasses and mask)
3. Sample nose by gently rubbing the medial nasal mucosa on both sides while rotating the swab; then insert swab into transport medium.
4. Sample both tonsils and the posterior oropharynx with the other swab. Avoid touching the swab on the tongue or other parts of the mouth; insert swab into transport medium.
5. Forward the labelled specimens to Pathology service as soon as possible
6. Discard PPE and clean hands with ABHR or wash hands.

¹ Houck PM, et al Administration of first hospital antibiotics for community-acquired pneumonia: Curr Opin Infect Dis 2005; 18:151–156.

Appendix 2:

Investigation Checklist for Severe Community Acquired Pneumonia Cases Admitted to Intensive Care Units

Date collected	Investigation
	Pre-treatment blood cultures – at least two sets (20mLs each set for adult, 3-5mL for child/infant)
	Serum for <i>Mycoplasma</i> IgM - this sera is automatically for later testing
	EDTA blood for <i>Coxiella burnetii</i> (Q fever) PCR (adults)
	Throat and nose viral swabs for influenza PCR (May-Nov only)
	Pre-treatment sputum for routine culture and <i>Legionella</i> culture & PCR (adults only)
	Urine for <i>Streptococcus pneumoniae</i> and <i>Legionella pneumophila</i> type 1 antigen detection
	NPA/BAL for respiratory virus detection (send if initial influenza PCR and bacterial cultures are negative at 24hrs)

Notes:

- Sputum sample is also suitable for *Legionella* PCR and respiratory virus detection.
- ICU experience in 2009 and 2010 shows that repeat influenza testing from a lower tract sample is of value in confirming a diagnosis in patients with initial negative results from nose/throat.
- Tests as above must be requested specifically on pathology request form. Additional serological requests can be made on sera held in the laboratory by referring back to the relevant lab number.

3.0 IMPLEMENTATION PLAN

- Dr Paul Wilson is the lead Infectious Disease Clinician responsible for the implementation of this CPG. He will form a small implementation team to consider necessary strategies for communication, audit and evaluation relating to the CPG. Respiratory Medicine, ED and ICU representation on the implementation group will occur.
- The small card form is issued to all JMOs and Registrars.
- ICUs implement the checklist for CAP cases (Appendix 2)
- EDs carry the CAP pathway which is made available on SALMAT (Appendix 1).
- GUIDANCE-DS at JHH will carry a computerised guideline algorithm for adult CAP that is consistent with this CPG.

4.0 EVALUATION PLAN

1. Individual patient review takes place during the weekly and twice weekly ICU liaison meetings conducted by Clinical Microbiology. Compliance with the CPG is promoted during these meetings
2. Annual Drug usage evaluation studies of CAP take place at Belmont, JHH, Mater & other sites with feedback to clinical groups. These DUE studies provide evidence of pathway compliance.

5.0 REFERENCES

Therapeutic Guidelines: Antibiotic, Therapeutic Guidelines, Edition 14, Melbourne, Victoria 2010

Busing, K et al. Identifying severe community-acquired pneumonia in the emergency department: A simple clinical prediction tool. *Emergency Medicine Australasia* (2007) 19, 418–426

6.0 CONSULTATION LIST

- Infectious Diseases and Immunology, HAPS Microbiology
- Intensive Care and Emergency Departments
- Respiratory Medicine, JHH
- Area Quality Use of Medicines Committee
- Anti-microbial Working Group