Appendix

2 Resource materials

A2.1 Examples of committee terms of reference, policies, guidelines and educational materials from Australian hospitals

Disclaimer: The Australian Commission on Safety and Quality in Health Care does not warrant the content of the materials in this section. They are provided as examples only. They may contain therapeutic recommendations that are not consistent with the latest version of *Therapeutic Guidelines: Antibiotic*.[19]

Additional antimicrobial stewardship resources are available from the ACSQHC web site www.safetyandquality.gov.au/internet/safety/publishing.nsf/Content/PriorityProgram-03#five

Australian hospitals

Committee terms of reference

Restricted antimicrobials policies and forms

Prescribing guidelines

Guidelines: pocket versions, other

International

Southern Health

Antimicrobial Management Program at Southern Health (AMPS)

Program Meetings
TERMS OF REFERENCE

Background

The Antimicrobial Management Program (AMPS) will operate across all Southern Health campuses and aims to review and optimise clinical outcomes of antimicrobial use while minimising unintended consequences including: toxicity; under or overdosing; inappropriate antimicrobial selection and emergence of resistant organisms.

The appropriate use of antimicrobials is a critical component of patient safety and deserves careful management and guidance. The combination of an effective antimicrobial management program with a comprehensive infection control program has been shown to be a cost effective measure in limiting the emergence and transmission of antimicrobial resistant bacteria.

Role

The role of the AMPS team will be to:

- Conduct prospective audit with intervention and feedback;
- Review and implement formulary restrictions and preauthorisation;
- Develop antibiotic policies;
- Provide education to pharmacy, medical and nursing staff to impart a foundation of antimicrobial knowledge in order to enhance acceptance;
- Update, develop and implement clinical practice guidelines for antimicrobial treatment and prophylaxis;
- Promote streamlining or de-escalation of therapy on the basis of culture results;
- Introduce automatic stop orders;
- Optimise antimicrobial dosing based on individual patient characteristics, the causative organism, site of infection as well as pharmacokinetic and pharmacodynamic parameters;
- Encourage parenteral (IV) to oral conversion when appropriate;
- Implement an electronic antimicrobial approval system to improve antimicrobial decisions through the provision of clinical decision support;
- Provide clinical microbiology data to enable targeted antimicrobial selection and optimisation of individual treatment regimens as well as assist infection control efforts in the surveillance of resistant organisms;
- Take action to reduce the incidence of nosocomial infections and resistance;
- Review antimicrobial prescribing practice against national usage data;
- Promote efficient and cost effective prescribing practices;
- Promote accountability of treating units who fail to obtain Infectious Diseases approval for restricted antimicrobials.

Membership

Infectious Diseases Physician
Clinical Microbiologist
Surgeon
Director of Pharmacy
Clinical Pharmacist with infectious diseases training
Infection Control nurse representative
Executive medical sponsor (as required)
Information system specialist (as required)

Responsibilities

- To oversee antimicrobial use at Southern Health and apply appropriate interventions in order to reduce inappropriate use of broad spectrum antimicrobials.
- To reduce hospital acquired resistance and reduce other unintended consequences of antimicrobial use.

Reporting

The AMPS will report to the Therapeutics Committee and provide minutes to the Joint Programs Quality and Safety Committee (JPQSC).

Meeting Frequency

TBA

Minutes

Pharmacist

SH Strategic Policy	Quality and Risk Management	***ACHS Function***	Leadership and Management
Reviewer	Antimicrobial Management Program Committee	***Last review date***	March 2009
Authoriser	Chair of Antimicrobial Management Program	***Next review date***	March 2012

References

Alison A, et al. A World Wibe Web- Based Antimicrobial Stewardship Program Improves Efficiency, Communication and User Satisfaction and Reduces Cost in a Tertiary Care Paediatric Medical Centre. WWW-Based Antimicrobial Stewardship; CID 2008:47 (15 September); 747 – 753

Government of South Australia
Children, Youth and Women's Health Service

PROCEDURE:
Antimicrobial Agents Requiring Infectious Diseases Approval

POLICY:
Individual Health Care – Care Planning and Delivery

PROCEDURE STATEMENT	
Intent:	The intent of this procedure is to provide all prescribers antimicrobial agents with information about the procedures required to gain approval from Infectious Diseases staff to prescribe certain restricted antimicrobial agents. This procedure applies to all prescribers (medical, dental and nursing staff) of systemic and some topical antimicrobial agents in the Children's Youth and Women's Health Service. It does not cover the use of most of the topical antimicrobials.
Exceptions:	None.
Definitions and Acronyms:	***Antimicrobial agent:*** any therapeutic substance designed to treat an infection by directly inhibiting the replication of the pathogen causing that infection. It includes antibacterial, antimycobacterial, antiprotozoal, anthelminthic, antifungal and antiviral (including antiretroviral) agents. ***Prescriber:*** any medical, dental or nursing practitioner approved by CYWHS to prescribe therapeutic substances. ***Infectious Diseases Staff:*** Registrar and Consultants from the Microbiology and Infectious Diseases Department, Division of Laboratory Medicine. ***Department:*** Specialty within a clinical Division of CYWHS. ***ID:*** Infectious Diseases.
Related Forms, Records and Electronic Databases:	• CYWHS Medication Sheet. • CYWHS Outpatient Prescription Form. • Intranet – Drug Info – Therapeutic Guidelines (eTG).
Supporting Procedures/ Protocols/Flow Charts etc:	• Laminated Card – WCH Antibiotic Guidelines.
Key Words:	Antimicrobial, antibiotic, prescribing.

DETAILED STEPS, PROCEDURES AND ACTIONS		
	Procedure	**Responsibility**
1.	**Objectives**	
	The importance of a hospital adhering to defined antimicrobial agent (antibiotic) prescribing practices is internationally accepted. The objectives are to minimise the selection of antibiotic-resistant organisms, promote safe and effective antibiotic prescribing, minimise unnecessary prescribing and prevent unnecessary expenditure. Of these, the most important is the selection and amplification of resistant organisms. Inappropriate prescribing (e.g. the use of an agent when none is required, or the selection of an incorrect agent, dose, combination or duration) is wasteful and may endanger patient wellbeing. It may also have infection control and public health implications as antimicrobial use can promote the spread resistant bacteria to from person to person, and resistance genes from species to species. The aim of this procedure is to optimise rational prescribing of antimicrobial agents in the Children's Youth and Women's Health Service. As part of achieving this aim, certain antimicrobial agents have been given the status of restricted availability to prescribers. These agents will only be made available from Pharmacy after approval by Infectious Diseases medical staff. Some restricted antimicrobial agents are pre-approved for specific Departments for listed indications. In making the selection of what agents should be restricted, the following points have been considered: spectrum, safety, prevalence of resistance, resistance-inducing and amplification potential, frequency of indication, potential patient hypersensitivity and cost.	
2.	**Basis for Decisions and Approvals**	
	The primary basis for decision-making approval is the latest edition of the Therapeutic Guidelines–Antibiotic (13th), a thoroughly researched, peer-reviewed, national standard for empirical and directed antimicrobial therapy using the latest published evidence. Where these guidelines do not provide guidance, available literature is used to assist in defining the most rational therapy. It is considered good medical practice at the CYWHS to collect appropriate specimens whenever possible PRIOR to the commencement of empirical antimicrobial therapy. The following factors are important in determining the list to which agents are allocated: – Known WCH epidemiology of resistance. – Known risks of selective pressure with different antimicrobial classes. – Pharmacoeconomic considerations. – Training and skill level in quality use of antimicrobials by specialities outside ID. (Frequency of interaction between ID and specialty is relevant here).	
3.	**Procedural Guidelines for Prescribers**	
3.1	The following agents must be approved by the Infectious Disease Registrar or Consultants. Where the need for such agents arises, medical staff must contact the Infectious Diseases Registrar (in hours) or Consultant on service (in and after hours), who will determine the appropriateness of the request and either approve the request or endorse an alternative antimicrobial agent. If the requested agent is approved by Infectious Diseases, the prescription or drug chart (in the "Additional Information" box) must be endorsed by the prescriber with **"Approved by (name of ID person)"**.	PRESCRIBER
3.2	***The A List: Agents frequently requested but always requiring ID approval.*** The words **"Approved by..."** should appear on the script • Meropenem. • Liposomal amphotericin B or other lipid formulations of amphotericin B.	PRESCRIBERS/ PHARMACY STAFF

3.3	***The B List: Agents with pre-approval for use by nominated departments for listed indications.*** These agents can be prescribed by the nominated clinical departments for the listed indication without the need to seek approval or to endorse the medications chart/prescription. Pharmacy staff are not required to confirm that the antibiotic is for the requested indication. Instead, the indications listed will be used for auditing purposes. If the antimicrobial agents on the B List are requested by other clinical departments, Infectious Diseases approval is required and the words **"Approved by..."** should appear on the medications chart or prescription. The listed indications for pre-approved departments do not require confirmation by Pharmacy staff; they will be used for audit purposes only. <u>Cefepime</u> pre-approval in Oncology for febrile neutropenia <u>Ceftriaxone or Cefotaxime</u> pre-approval in PED, Paediatric General Medicine, PICU, Pulmonary Medicine and Neonatology for (1) Severe pneumonia (2) Moderate to sever periorbital (preseptal) and orbital cellulitis (3) Presumptive occult bacteraemia (PED protocol) (4) Presumptive or proven bacterial meningitis, or severe community-acquired sepsis and meningitis not excluded (5) Nosocomial neonatal sepsis <u>Ceftazidime</u> pre-approval in Pulmonary Medicine for cystic fibrosis patients only <u>Ciprofloxacin oral</u> pre-approval in (1) Pulmonary Medicine for cystic fibrosis patients only (2) Oncology for patients with febrile neutropenia <u>Ciprofloxacin ear drops</u> pre-approval in ENT for chronic suppurative otitis media or otitis externa in the presence of perforated tympanic membrane or grommets. <u>Ciprofloxacin eye drops</u> pre-approval in Ophthalmology for sight-threatening eye infections <u>Colistin inhaled and IV</u> pre-approval in Pulmonary Medicine for cystic fibrosis patients only <u>Fluconazole</u> pre-approval in Neonatology for neonates with serious fungal disease and Oncology and Immunology for the treatment and prophylaxis of serious fungal disease <u>Itraconazole</u> pre-approval in Pulmonary Medicine for cystic fibrosis patients and Oncology and Clinical Immunology for treatment and prophylaxis of serious fungal disease <u>Pentamidine</u> pre-approval for Oncology and Clinical Immunology for Pneumocystis treatment and prophylaxis <u>Piperacillin-tazobactam</u> pre-approval in Oncology for patients with febrile neutropenia and mucositis <u>Rifampicin</u> pre-approval by protocol in PED for meningococcal prophylaxis <u>Vancomycin</u> pre-approval in PICU and Neonatal ICU for patients with presumptive line sepsis, Oncology for patients with febrile neutropenia, PED/General Paediatrics for possible/proven pneumococcal meningitis, and Neurosurgery for possible shunt meningitis <u>Voriconazole</u> pre-approval for Oncology for patients with non-responsive febrile neutropenia	PRESCRIBERS/ PHARMACY STAFF

3.4	***The C List: Other infrequently requested agents always requiring ID approval.*** The words **"Approved by..."** should appear on the medication chart or prescription. <u>Antibacterials</u> Amikacin Chloramphenicol IV Ciprofloxacin IV Ertapenem Fusidic acid Imipenem Linezolid Moxifloxacin Ofloxacin topical Quinupristin-dalfopristin Spectinomycin Spiramycin Teicoplanin Tigecycline Vancomycin oral <u>Antimycobacterials</u> Capreomycin Clofazimine Cycloserine Dapsone Ethambutol Isoniazid Prothionamide Pyrazinamide Rifabutin Streptomycin <u>Antiprotozoals</u> Atovaquone Chloroquine Diloxanide furoate Mefloquine Pentamidine (except Oncology) Primaquine Proguanil Pyrimethamine Quinine Sulfadiazine Sulfadoxine-pyrimethamine <u>Anthelminthics</u> Albendazole Diethylcarbamazine Ivermectin Praziquantel Thiabendazole <u>Antifungals</u> Caspofungin Flucytosine Ketoconazole (oral) Posaconazole <u>Antivirals</u> Cidofovir Entecavir Famciclovir Foscarnet Ganciclovir Oseltamivir Ribavirin Valaciclovir Valganciclovir Zanamivir Antiretrovirals – all	PRESCRIBERS/ PHARMACY STAFF

4.	**Procedural Guidelines for Pharmacy Staff**	
4.1	On receipt of drug chart/script request for one of the agents requiring approval: **For inpatients** 1. Check for **"Approved by...."** if on the A or C List, or prescribed by Infectious Diseases, or if on the B List from a pre-approved department. (Pharmacy staff do <u>not</u> have to confirm that the indication is appropriate; the indications on the B List will be used for audit purposes only.) 2. If Yes, dispense. 3. If No, page ID Registrar in hours (Pager 18048) or Consultant after-hours (through Switchboard who has the roster) and ask them to contact prescriber. ID Registrar/Consultant will ring back with "Approved" or otherwise, which will be documented by Pharmacy staff. 4. Fax (ext. 16051) all **"Approved by..."** drug charts/scripts to Micro/ID Department on a daily basis (for audit purposes). Micro/ID Registrar and Consultants will keep a record of what and for whom they have given approval. Those from the B List <u>that are pre-approved</u> do not need to be faxed; only those B List agents with **"Approved by..."**	PHARMACY STAFF
4.2	**For outpatients on the B List** 1. Dispense. 2. Fax (ext. 16051) drug chart/script to Micro/ID Department on a daily basis. 3. ID will follow-up with prescriber verbally or by written communication.	PHARMACY STAFF
4.3	**For outpatients on the C List** 1. DO NOT DISPENSE. 2. Page/contact prescriber and request referral to ID. If no response within 5 minutes, dispense, and fax script to Micro/ID Department.	PHARMACY STAFF
4.4	**B List Drugs by Pre-Approved Department**	PHARMACY STAFF

	Cefepime	Ceftriaxone or cefotaxime	Ceftazidime	Ciprofoxacin oral	Ciprofoxacin topical	Colistin	Fluconazole	Itraconazole	Pentamidine	Piperacillin-tazobactam	Rifampicin	Vancomycin	Voricoazole
Oncology	√			√			√	√	√	√		√	√
PED and General Paediatrics		√									√	√	
PICU		√										√	
Neonatology		√					√					√	
Neurosurgery												√	
Pulmonary Medicine		√	√	√		√		√					
ENT					√								
Ophthalmology					√								

5.	**Procedural Guidelines for Infectious Diseases Staff**	
5.1	In hours, the Infectious Diseases Registrar and the on-service Infectious Diseases Consultant will be available to take calls from prescribers and pharmacists, for queries or requests to prescribe agents if they are (i) on the A or C List, or (ii) on the B List and not from an approved unit. After hours, the on-service Infectious Diseases Consultant is available to take such calls. The on-service Registrar or Infectious Diseases Consultant will contact any prescriber who has not followed the procedures listed at their earliest convenience should the antibiotic need to be dispensed (e.g. outpatients). The ID Registrar and on-service ID Consultant will keep a record of verbal approvals. On at most a weekly basis, the on-service Consultant will review approvals sent from Pharmacy. On a less frequent but regular basis, the ID service will audit individual B List approved units for adherence to the listed indications.	INFECTIOUS DISEASES STAFF
6.	**Training**	
6.1	The contents of this procedure will be promulgated by Infectious Diseases staff to prescribers and Pharmacy staff through meetings, education sessions and at orientation.	INFECTIOUS DISEASES STAFF
7.	**Maintenance of Records**	
7.1	Medication charts will be retained in the medical records.	MEDICAL RECORDS
7.2	Outpatient prescriptions with approvals and non-compliant with this procedure will be retained by Pharmacy.	PHARMACY STAFF
7.3	Records of approvals and non-compliant requests will be retained for review and auditing by Infectious Diseases staff.	INFECTIOUS DISEASES STAFF
ACCOUNTABILITY		
Effectiveness of this Procedure:	• Regular audits of compliance with this procedure will be undertaken by Infectious Diseases staff, and reported to the Drug and Therapeutics Committee on at least an annual basis.	

St. Vincent's Hospital Antibiotic Policy

St. Vincent's Hospital has an Antibiotic Policy. Antibiotics are classified as either Red, Orange or Green drugs, with each colour representing a certain level of restriction for use within the hospital. When selecting an antimicrobial agent, the prescriber must ascertain the status of the drug. The table below outlines the three groups of antibiotics and lists the drugs in each colour group. The steps required to access restricted drugs are listed in each of the columns. Contact the Microbiology registrar, page 6890, or ward pharmacist if you have any questions.

RED ANTIBIOTICS:

All *RED* antimicrobial agents must have **prior** Microbiology approval before they can be prescribed and supplied at SVH. An approval code, which is valid for a specified period, will be issued by the microbiology department and must be included on the medication chart.

- Amphotericin (liposomal and phospholipid complex)
- Caspofungin
- Linezolid
- Meropenem
- Moxifloxacin
- Pristinamycin (SAS)
- Tigecycline
- Voriconazole

ORANGE ANTIBIOTICS:

ORANGE antibiotics may be prescribed according to the SVH Indications (shown overleaf) without a Microbiology approval code. The antibiotic is then classified as a green antibiotic (see green column). In **ALL** other situations a Microbiology approval code will be required as for red antibiotics (see red column).

- Aciclovir IV
- Amikacin
- Azithromycin IV/PO
- Cefepime
- Ceftriaxone / Cefotaxime
- Ciprofloxacin IV/PO
- Clarithromycin
- Fluconazole IV
- Sodium Fusidate
- Itraconazole
- Piperacillin + Tazobactam (Tazocin®)
- Ribavirin (SAS)
- Teicoplanin
- Terbinafine
- Ticarcillin + Clavulanate (Timentin®)
- Valganciclovir
- Vancomycin IV/PO

GREEN ANTIBIOTICS:

Antibiotics are *GREEN* when:

1. The drug is prescribed according to the "Therapeutic Guidelines - Antibiotic 13th Edition" and/or
2. The drug is prescribed within the SVH Indications (overleaf).

Under these circumstances the antibiotic does not require a Microbiology approval number before it is prescribed and dispensed.

See Therapeutic Guidelines - Antibiotics 13th Edition for further details about infections and antibiotic choice, OR contact the Microbiology department.

8th July 2009

SUMMARY OF SVH INDICATIONS FOR ORANGE ANTIBIOTICS

ORANGE ANTIBIOTIC	GREEN INDICATIONS NOTE: ANY OTHER INDICATION REQUIRES MICROBIOLOGY APPROVAL CODE (as for RED ANTIBIOTICS)
Aciclovir IV	**1)** Use by HLTX, BMT and HIV medical units **2)** Use by neurology unit for suspected herpes simplex encephalitis.
Amikacin	Treatment of MAC in HIV patients
Azithromycin PO	Prevention and treatment of MAC in HIV patients
Azithromycin IV	Community-acquired pneumonia (CAP) with Pneumonia Severity Index (PSI) >90*, where oral roxithromycin is inappropriate
Cefepime	**1)** Serious pseudomonal infection in patients with non-anaphylactic penicillin allergy, in combination with an aminoglycoside **2)** Febrile neutropenia, in combination with an aminoglycoside
Ceftriaxone/Cefotaxime	**Ceftriaxone 1g daily or Cefotaxime 1g TDS:** **1)** Intra-abdominal bacterial sepsis in patients over 70 years, or with calculated creatinine clearance < 70 mL/min, or with non-anaphylactic penicillin allergy **2)** Community-acquired pneumonia (CAP) with Pneumonia Severity Index (PSI) >90* **3)** Moderately severe, radiologically proven hospital-acquired pneumonia (HAP), or less severe HAP/CAP in a patient with non-anaphylactic penicillin allergy **Ceftriaxone 2g BD or Cefotaxime 2g QID:** Bacterial meningitis where the organism is unknown or penicillin resistant
Ciprofloxacin IV Ciprofloxacin PO	Only where gentamicin is contraindicated. For serious infection due to a resistant Gram negative organism (eg Pseudomonas) in patients with a contraindication to gentamicin (ie pts over 70 years, or with calculated creatinine clearance < 70 mL/min.) The IV formulation may be used only where oral therapy is inappropriate. Any oral use >5days requires microbiology approval.
Clarithromycin	**1)** Treatment of MAC in HIV patients **2)** Use by gastroenterologists as part of combination *H. pylori* eradication
Fluconazole IV	HIV medicine, HLTX and BMT units for appropriate fungal prophylaxis and treatment, where oral therapy is inappropriate
Itraconazole	HIV medicine, BMT, HTLX units for appropriate fungal prophylaxis and treatment
Piperacillin + Tazobactam (Tazocin®)	**1)** Severe intra-abdominal sepsis in patients over 70 years, or with calculated creatinine clearance < 70 mL/min **2)** Severe hospital-acquired pneumonia (eg. RR>30, PO2 <60, SaO2<90%, SBP<90 mm Hg, or acute renal failure)
Sodium Fusidate	Significant MRSA infection in combination with rifampicin
Ribavirin (SAS)	For proven respiratory syncytial virus (RSV)
Teicoplanin	Significant MRSA infection where the patient is hypersensitive to vancomycin and oral therapy is inappropriate
Terbinafine	**1.** Dermatology use for laboratory-proven dermatophyte infection. **2.** Proven *Scedosporium Prolificans* infections
Ticarcillin +Clavulanate (Timentin®)	**1)** Febrile neutropenia in combination with an aminoglycoside **2)** Serious pseudomonal infection in combination with an aminoglycoside **3)** Suspected pseudomonal infection in CF patients post-transplant while awaiting cultures **4)** Severe intra-abdominal sepsis in patients over 70 years, or with calculated creatinine clearance < 70 mL/min **5)** Severe hospital-acquired pneumonia (eg. RR>30, PO2 <60, SaO2<90%, SBP<90 mm Hg, or acute renal failure)
Valganciclovir	**1)** CMV retinitis in patients with AIDS **2)** Treatment and prophylaxis of CMV in solid organ transplants
Vancomycin IV	**1)** Febrile neutropenia unresponsive to first line therapy **2)** Clinically significant MRSA infection **3)** Empiric therapy of line sepsis in patients with MRSA, or at high risk of MRSA, while awaiting cultures
Vancomycin PO	Second line *C. difficile* treatment after failure of a 10 day course of oral metronidazole, or after a second relapse following metronidazole therapy

* To be calculated as per Therapeutic Guidelines - Antibiotic 13th Edition

9th March 2009

Government of South Australia
Central Northern Adelaide Health Service

ROYAL ADELAIDE HOSPITAL - RESTRICTED ANTIBIOTICS DECLARATION FORM

Patient Details (use patient sticker if available)

Name: _____ Ward: _____

UR No:_____

Turn over for list of restricted antibiotics and usage guidelines

Antibiotic	
Dosage Regimen	
Duration	

Please tick boxes / provide details for relevant sections

☐ **EMPIRIC USE**
Infecting organism(s) unknown
- 3 day review of therapy required

OR

☐ **DIRECTED THERAPY**
Infecting organism(s) known
- 7 day review of therapy required

(Please provide details below)

INDICATION

Please tick appropriate box on reverse side. Give details below if indication not listed:

_____

_____

NOTE: Infectious Diseases or Clinical Microbiology approval may be required for other indications

CULTURE AND SENSITIVITY DATA

Organism(s) _____ _____ _____

Sensitive to _____ _____ _____

Resistant to _____ _____ _____

☐ **Recommended infectious disease or clinical microbiology approval**

Details: _____

REQUESTING DOCTOR (print) _____ **PAGER NO** _____

PHARMACIST (print) _____ **DATE** _____

Please contact the clinical pharmacist or antibiotic pharmacist if additional assistance is required

Note: Doses may require modification based on renal function

ANTIBIOTIC	USAGE GUIDELINES – approved indications, usual dosage regimens
CEFTRIAXONE 1 g injection ($3.95)	☐ **Treatment of:** ( ) lower respiratory tract infections, ( ) urinary tract infections, ( ) cholecystitis, ( ) ascending cholangitis, or ( ) pelvic inflammatory disease, **under the following circumstances:** ☐ In patients hypersensitive to penicillins (excluding immediate hypersensitivity) ***OR*** ☐ Due to susceptible organisms (resistant to earlier generations of cephalosporins) ***OR*** ☐ Where the use of aminoglycosides are contraindicated due a calculated creatinine clearance of ≤20mL/min or evidence of accumulation as per SEBA-Gen ☐ Empirical treatment, with penicillin, of bacterial meningitis pending culture and sensitivity results ☐ Acute epiglottitis, orbital / periorbital cellulitis, and gonococcal infections ☐ Prophylaxis for meningococcal contacts ☐ Spontaneous bacterial peritonitis pending culture and sensitivity results
CIPROFLOXACIN **oral** only ☐ 500 mg tablet ($0.99) ☐ 750 mg tablet ($1.39)	☐ Infections due to *Pseudomonas aeruginosa* or other Gram negative bacteria resistant to all other oral agents ☐ Bacterial gastroenteritis in severely immunocompromised patients ☐ Bone and joint infections, epididymo-orchitis, prostatitis or perichondritis of the pinna, involving proven/ suspected Gram negative or Gram positive bacteria resistant to all other appropriate agents • Usual dose: 500 – 750 mg twice daily
FAMCICLOVIR 250 mg tablet ($1.07)	**See RAH Antiviral Guidelines for dosage recommendations** ☐ Mucocutaneous herpes (herpetic whitlow, eczema herpeticum) ☐ Genital herpes – initial, episodic or suppression of recurrent infection ☐ Herpetic blepharitis, with aciclovir eye ointment (Ophthalmology consult recommended) ☐ Herpes zoster (shingles) – initial infection in all patients (within 72hrs of rash onset) ☐ Zoster ophthalmicus (Ophthalmology consult recommended) ☐ Varicella (chicken pox) – complicated cases or immunocompromised patient
FLUCONAZOLE ☐ 100 mg cap ($1.97) ☐ 200 mg cap ($3.40) ☐ 200 mg injection ($22)	☐ Oropharyngeal / oesophageal candidiasis ☐ Serious candida infections in patients unable to tolerate amphotericin B • Usual dose: 200 – 400 mg once daily
ITRACONAZOLE ☐ 10 mg/mL solution ($146 for 150 mL) ☐ 100 mg capsule ($2.89)	☐ Treatment/ prophylaxis of systemic candidiasis (not responding to other agents), aspergillosis histoplasmosis, cryptococcosis in immunocompromised patients intolerant of or not responding to amphotericin B ☐ Long term suppression of above infections after amphotericin B treatment • Treatment: 200 – 400 mg once daily • Prophylaxis or suppression:100 – 200 mg once daily • Specify oral solution for high risk patients or when high blood levels required
PIPERACILLIN 4 g injection ($25.71)	☐ Treatment of *Pseudomonas aeruginosa* infections in combination with another anti-pseudomonal agent • Usual dose: 4 g every 8 hours
TOBRAMYCIN 80 mg injection ($2.14)	**See RAH Aminoglycoside Guidelines for dosing and monitoring** ☐ Treatment of *Pseudomonas aeruginosa* infections, in combination with another anti-pseudomonal agent, **and** where there is proven resistance to gentamicin • Usual dose: 5 – 7 mg/kg as first dose, adjusted based on serum levels and renal function

RAH Pharmacy Department, August 2005, revised November 2006, July 2007, October 2008

Government of South Australia
Central Northern Adelaide Health Service

ROYAL ADELAIDE HOSPITAL

Guidelines for the Management of Hospital Acquired Pneumonia

Not for immunosuppressed or ventilated patients

Definition: pneumonia that is not incubating upon admission, and differs in causative micro-organisms from community acquired pneumonia. In general, patients developing pneumonia (as defined in Therapeutic guidelines, Antibiotic) after 48 hours of admission qualify as hospital acquired (nosocomial) infections.

Initial Investigations*:*

- Urgent CXR, electrolyte, urea, creatinine, glucose, LFTs, CBE & differential, SaO_2, and arterial blood gas (if $SaO_2 < 94\%$)
- **Prior to the initiation of antibiotic therapy, specimens should be sent for identification of causative organism.**
  - Blood cultures
  - Sputum Gram stain and culture including Legionella
  - Nasopharyngeal aspirate/swab in viral transport medium or sputum for rapid viral detection
- The following specimens should also be obtained
  - Urinary Legionella antigen detection

Mild to Moderate

amoxycillin + clavulanic acid 875/125 mg (1 tablet) orally 12 hourly

Or

cephazolin 1 g IV 8 hourly **plus** Gentamicin* 5 mg/kg/day IV
Due to risks of ototoxicity and nephrotoxicity, it is recommended that gentamicin should be **ceased** after 3 days unless strongly indicated

If CrCl < 30 mL/min use ceftriaxone 1 g IV daily

Add metronidazole 500 mg IV 12 hourly if suspect aspiration or recent thoraco-abdominal surgery

For patients with a history of anaphylaxis to penicillin and/or who have an allergy to cephalosporins consult Infectious Diseases or Clinical Microbiology

Alternative therapy needs discussion with Infectious Diseases or Clinical Microbiology

Response to treatment should be assessed at 48-72 hours after initiation of therapy

Severe

Seek advice from Infectious Diseases or Clinical Microbiology in all cases

Preferred regimen piperacillin/tazobactam (Tazocin®) 4.5 g IV 8 hourly **plus** Gentamicin* 5 mg/kg/day IV

(Piperacillin/tazobactam (Tazocin®) requires approval from Infectious Diseases or Clinical Microbiology)

In patients known to be colonised with, or at high risk of MRSA, vancomycin should be added.

***Consult the once daily aminoglycoside chart for dosing and monitoring.**

Approved by the Antibiotic Working Party of the RAH Drug Committee September 2005, December 2005, May 2009

s:\pharmacy\phardata\clinical\antibiotic pharmacist\guidelines\protocols\hap\hospital acquired pneumonia 0409.doc

HUNTER NEW ENGLAND HEALTH

Facility_____

EMERGENCY DEPARTMENT ADULT COMMUNITY ACQUIRED PNEUMONIA MANAGEMENT

PLEASE USE GUMMED LABEL IF AVAILABLE

SURNAME	UNIT NUMBER
OTHER NAMES	
ADDRESS	
DOB	M.O.

HOSPITAL / WARD

JHH7F

Signs/Symptoms	Score ONE point for each feature present
Confusion New onset or worsening of existing state if cognitive impairment present	
Oxygen Rate PaO_2 <60mm Or O_2 sat < 90%	
Respiratory Rate ≥30/min	
Blood Pressure systolic BP <90mmHg or diastolic ≤ 60mmHg	
Total Score	

Empiric Antibiotic Therapy	MILD score = 0	MODERATE score = 1	SEVER/ICU/HDU[1] score = 2 or more
First line	amoxycillin 500mg tds oral	penicillin G 1.2g q6h IV After inpatient team review +/- Doxycycline	penicillin G 1.2g q4h IV AND gentamicin[2] 5mg/kg daily IV AND azithromycin 10mg/kg up to 500mg/day IV (max 5d usual)
Penicillin allergy	doxycycline 200mg stat, then 100mg daily	doxycycline 200mg stat, then 100mg daily	ceftriaxone 1g daily IV AND azithromycin 10mg/kg up to 500mg/day IV (max5d usual)
Notes	***MRSA pneumonia has high mortality: always consult Infectious Diseases***	[1] Add vancomycin if staph pneumonia possible: 1g IV 12-hourly (max infusion 1g/h). Target trough=10-20mg/ [2] Gentamicin dose is based on calculated 'ideal' body wt. Avoid gentamicin if hearing/vestibular problems.	
Investigations In ED	FBC, U/E/C, Blood culture, Store serum (virology), BSL	**Add:...** LFTs, Blood cuiture (2 sets), Mycoplasma IgM (acute serum), Sputum micro/culture, Severe: add Legionella culture and urine LP antigen, viral throat/nose swabs (influenza PCR and extended respiratory virus pcr)	
	Likely suitable for home treatment Social Supports No unstable co-morbidities	**Hospital Admission** Consider ICU Consultation (2 or more CORB factors or respiratory failure)	
	All immunocompromised patients: seek consultant advice		

PLEASE RETAIN in Patient File

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

Date: _____ Time: _____

11/07 (November 2007)

BINDING MARGIN - DO NOT WRITE

EMERGENCY DEPARTMENT ADUL COMMUNITYT ACQUIRED PNEUMONIA MANAGEMENT

Emergency

Community-Acquired Pneumonia (CAP) Guidelines for Adults

A synopsis of this guideline is available as a laminated ID-sized card from your hospital pharmacy.

Key Points:

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

Time to Antibiotic: One of the PhD (Maggie) project key performance indicators is the time taken from MO review until first antibiotic administered. Antibotic administration within 4 hours of arrival is associated with decreased mortality and length of stay.[1]

***Streptococcus* pneumoniae remains the most important cause of CAP in our community.** Amoxycillin and penicillin G retain efficacy in CAP due to pneumococcal strains with raised MICs to betalactams. Penicillin-G is also active against most (80%) of *Haemophilus influenzae.*

Serology testing: Acute serum sent for Mycoplasma Igm will be stored by Virology for later testing. Testing for other causes will proceed once a convalescent sample (at least 3 weeks after on set) is received with a pathology request.

PCR diagnosis strategy for respiratory viruses: The combined nose/throat sample for flu PCR has a special collection procedure (see below). Extended respiratory virus PCR currently should be requested on all Severe CAP cases.

Atypical pathogens: Legionella diagnosis has important public health implications. Please do not neglect the additional tests for legionella, particularly if renal failure and/or GI symptoms present.
If atypical pneumonia is suspected, seek consultant advice and consider possible addition of doxcycyline.

Azithromycin is retained for severe CAP in order to provide cover against pertussis and other atypical pathogens.

MRSA strains with enhanced potential for causing pneumonia are circulating in the community. Adult vancomycin dosing recommendations have changed recently. Doses are calculated on total body weight.

Immunocompetency: patients with chronic cardias, respiratory or neurological problems or who are immunocompromised patient with CAP seek consultant advice.

Community Procedure: nasal/throat swab for Influenza PCR

Equipment (Emergency Departments in JHH and Belmont have available a collection kit)

- Viral swabs (green top viral transport swab) x 2 **(must be correct swab type)**
- Normal saline (0.9%) 10mL disposable plastic ampule
- Wooden or plastic disposable tongue depressor
- Personal protective equipment (surgical mask, eye goggles)
- Alcohol hand gel (Aqium)

Procedure

1. Explain the procedure to the patient.
2. Clean hands with alcohol gel (aquim) and put on PPE (protective glasses and mask)
3. Take viral culture **nasal swab**
   - moisten swab with sterile normal saline
   - sample the anterior nostril by gently abrading the nasal mucosa on both sides
   - insert swab into transport medium.
4. Take viral culture **Throat swab**
   - take the other swab and moisten in sterile normal saline
   - sample both tonsils and the posterior oropharynx with the 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 HAPS ASAP
6. Discard PPE and **clean hands with alcohol gel** or hand wash.

---

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

CLINICAL PRACTICE GUIDELINE	HUNTER NEW ENGLAND NSW HEALTH

Community-Acquired Pneumonia (CAP) Guidelines for Adults and Children

Document Registration Number: HNEH CPG 09_06

Sites where CPG applies	Acute Networks Hospitals Primary & Community Networks
Target Clinical Audience	This CPG is applicable to adults and children (all age groups other than neonates). All clinicians who treat community-acquired pneumonia Pharmacists
Applicability ***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**	*(Please indicate with a X in the appropriate box)* Neonate – less than 29 days □ Children up to 16 years* Y Adult (18 years and over) Y All of the above □
Summary	This document describes expert recommendations relating to management of CAP in facilities managed by Hunter New England Health Service.
Keywords	Pneumonia, *Legionella*, influenza antibiotic stewardship
Replaces existing clinical practice guideline or policy?	Yes
Registration Numbers of Superseded Documents	HNEH CPG 08_03

Related documents (Policies, Australian Standards, Codes of Conduct, legislation etc)

Detail main parent documents that informs this CPG

- Therapeutic Guidelines: Antibiotic, Therapeutic Guidelines, Melbourne, Victoria 2006
- Buising, K et al. Identifying severe community-acquired pneumonia in the emergency department: A simple clinical prediction tool. Emergency Medicine Australasia (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	14 April 2009
Date authorised by Area Clinical Network/stream	March 2009
Date Authorised by HNE Clinical Quality and Patient Safety Committee	29 July 2009
Trim Number	09/101-1-6

Version One July 2009

CLINICAL PRACTICE GUIDELINE	HUNTER NEW ENGLAND NSW HEALTH

Community-Acquired Pneumonia (CAP) Guidelines for Adults and Children

1.0 Glossary

AFB	acid fast bacilli – e.g. *Mycobacteria* 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	*Legionella pneumophila* serogroup 1, the commonest cause of legionellosis
MRSA	methicillin-resistant *Staphylococcus aureus*
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

2.0 GUIDELINE

Executive Summary

Correct management of community-acquired pneumonia (CAP) improves patient outcomes. Important aspects of management include:

- Clinical 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.

A synopsis of this guideline is available as a laminated ID-sized card from your hospital pharmacy service.

Clinical Assessment (adults)

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 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.*

Mild pneumonia

- Social supports; **AND**
- No unstable comorbidities; **AND**
- Non-severe CAP by clinical and diagnostic criteria below.

Moderate pneumonia

- Non-severe cases requiring admission (see admission criteria below).

Severe pneumonia (CORB criteria)- 2 or more of:

- **Confusion** new onset or worsening of existing state if cognitive impairment present
- **Oxygen** PaO_2 <60mm Or O_2 sat $\leq$ 90%
- **Respiratory Rate** ≥ 30/min
- **Blood Pressure** systolic BP <90mmHg or diastolic ≤ 60mmHg

Is it 'severe' 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.

For assessment of children, consult the Clinical Pathway at the back of this document

Admission Criteria

Patients who have no preceding cardiac and respiratory disease and who present with mild 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 immuno-suppressed, are at higher risk of complications and should be considered for admission. All immunocompromised patients with CAP should be discussed with a consultant before discharge.

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.

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

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.

Recommended Laboratory Investigations

Routine

All patients in the Emergency Department (ED) :

- Two blood culture sets (20mLs in two bottles for adult/adolescent, 3-5mLs in child in to single bottle). Collect with correct asepsis from different venepuncture sites. Collect prior to antibiotics.

Additional Investigations for Patients Requiring Admission

In the ED:

- Serum for *Mycoplasma* IgM (acute-phase).
- Sputum microscopy and culture.

In the ED or on the ward:

- Naso-pharyngeal aspirate (NPA) for respiratory virus testing and bacterial culture (infants < 2yr only).
- May to November- Influenza PCR on nose and throat swab sample (NPA is an acceptable alternative from infants).
- Consider urine for *Legionella* LP1 antigen.

Additional Investigations for Patients with Severe CAP (see Appendix A- Checklist for Severe CAP in ICU)

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

Notes on investigations:

***Legionella* detection**

Detection is by culture and 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.

Sputum gram stain and culture

If the patient can produce a well-expectorated specimen (not salivary), 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:

	S. pneumoniae (presumptive)	*Haemophilus* (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 L*egionella* infection. If *L. longbeachae* is suspected, then request this specifically as routine *Legionella* serology seldom picks this up.

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.

Viral detection

Nasopharyngeal aspirate or bronchial lavage/washing best in infant or ICU case. Testing will usually be by PCR for an extended range of respiratory viruses (sent away); if rapid immunofluorescence testing required, then this must be specifically requested.

Combined nose/throat swab during influenza season- request Influenza PCR.

Initial ICU experience in 2009 shows that repeat influenza testing from a nasopharyngeal aspirate or lower tract sample is of value in confirming a diagnosis in patients with initial negative results from nose/throat.

Empiric antimicrobial therapy in the non-immunocompromised host

Empiric therapy should be carefully reviewed and substituted with 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 targeted recommendations.

The usual duration of antimicrobial therapy for non-severe CAP is 3-7 days. Early cessation is recommended if viral pneumonia is proven.

***NB**. 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.*

	Mild	Moderate	Severe/ICU/HDU[1]
First line	Amoxycillin 15mg/kg up to 500mg tds oral	Benzylpenicillin 30mg/kg up to 1.2g q6h IV After inpatient team review oral doxycycline may be added dependent on assessment and previous treatment details.	Benzylpenicillin 30mg/kg up to 1.2g q4h IV **AND** Gentamicin[2] 5mg/kg (ideal weight) daily IV **AND** Azithromycin[3] 10mg/kg up to 500mg /d IV
Penicillin allergy or gentamicin CI[2]	Adult or older child: Doxycycline 200mg stat, then 100mg daily oral Child under 9yrs: Roxithromycin 4mg/kg up to 150mg q12h oral		Ceftriaxone 25mg/kg up to 1g daily IV **AND** Azithromycin 10mg/kg up to 500mg/d IV
Immediate β-lactam allergy	Same		Vancomycin 25mg/kg up to 1g IV 12-hrly **AND** Gentamicin[2] 5mg/kg (ideal weight) daily IV **AND** Azithromycin 10mg/kg up to 500mg/d IV

Notes

1. **Add IV vancomycin if *Staph. aureus* pneumonia possible**: 25mg/kg up to 1g IV 12-hrly Use actual body weight. Change to flucloxacillin if methicillin-susceptible. Continue vancomycin if MRSA proven. Adjust doses to achieve trough levels of 10-20mg/L. MRSA pneumonia has high mortality: always consult Infectious Diseases.
2. **Contraindications (CI) for use of aminoglycosides include:**
   - pre-existing significant conductive hearing loss or vestibular problems including - dizziness, vertigo or tinnitus
   - previous vestibular or auditory toxicity due to an aminoglycoside or serious hypersensitivity to an aminoglycoside (rare)
   - relative CI- cholestasis (bilirubin > 90uM/L)- increased risk of drug-induced renal failure

Patients with chronic renal failure or deteriorating renal function can safely be given empiric doses of gentamicin provided there are no other contraindications. Also see **HNE CPG Aminoglycosides dosage and monitoring (adult).**

Dose of gentamicin in obese patients is based on ideal body weight (IBW):

IBW (**male**) = 50kg + 0.9kg x [each cm in height over 152cm]

IBW (**female**) = 45kg + 0.9kg x [each cm in height over 152cm]

3. **IV azithromycin** should be given as an appropriately diluted infusion over greater than or equal to 60 minutes. It may be given through a peripheral line. Empiric use should usually be ceased at 3 days unless a specific atypical pathogen such as *Mycoplasma* or *Legionella* has been demonstrated. Early switch to oral azithromycin is worthwhile. Note that *Coxiella burnetii* (Q-Fever agent) is NOT susceptible to azithromycin- use doxycycline instead.

Possible causes of treatment failure

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

Community-acquired pneumonia treatment pathways

The adult CAP pathway (see overleaf) incorporating the CORB severity scoring system was implemented across HNE Emergency Departments in 2008. Pathway is produced overleaf and is available on SALMAT.

A separate paediatric version is also available (overleaf)

The CAP/HAP business card-sized summary is available from Acute Networks Pharmacy Departments. An image of the text is opposite.

Community Acquired Pneumonia

Criterion	First line	Pen.allergy
Mild **Social supports OK** **Stable comorbidities** **No CORB factor(s)**	**amoxycillin** 15mg/kg up to 500mg tds oral	Child under 9yrs: **roxithromycin** 4mg/kg up to 150mg q12h Others: **doxycycline** 200mg stat, then 100mg/d
Moderate **1 or less CORB factors OR** **Requires admission for another reason** *(may still require ICU assessment)*	**benzylpen** 30mg/kg up to 1.2g q6h IV **+/-doxycycline** (age >8 yrs) if atypical cover required	
Severe/ICU/HDU[1] Adult with ≥ 2 of: **C**onfusion: new onset pO_2 <60mm or O_2sat≤90% **R**R ≥30/min **B**P- (sys. <90mmHg or diast. ≤60mm Hg)	**benzylpen** 30mg/kg up to 1.2g q4h IV **AND** **gentamicin** 5mg/kg daily IV **AND** **azithromycin** 10mg/kg up to 500mg/day IV (max 5d usual)	**ceftriaxone**[2] 25mg/kg up to 1g daily IV **AND** **azithromycin** 10mg/kg up to 500mg/d IV (**stop at 3 days** if no atypical pathogen demonstrated)

Invest. (severe): blood-cult. sets x2, *Mycoplasma* IgM, **urine**- *Legionella* & pneumo. antigen, **nose/throat**-'flu PCR, **NPA**-resp. virus det., **sputum**–m/c/s & *Legionella* cult./PCR

Notes: [1]**Add vancomycin if staph pneumonia possible: 25mg/kg up to 1 gram IV 12-hrly** (max. rate 1g/hr). Use actual body weight. Target trough is 10-20mg/L. **Consult ID**.
[2]For immediate hypersensitivity, use **vancomycin, gentamicin, azithromycin**

Expires Dec 2010

HUNTER NEW ENGLAND AREA HEALTH SERVICE

Facility _____

EMERGENCY DEPARTMENT ADULT COMMUNITY ACQUIRED PNEUMONIA MANAGEMENT

PLEASE USE GUMMED LABEL IF AVAILABLE

SURNAME	UNIT NUMBER
OTHER NAMES	
ADDRESS	
DOB	M.O.

HOSPITAL / WARD

Signs/Symptoms	Score ONE point for each sign/symptom present
Confusion New onset or worsening of existing state if cognitive impairment present	
Oxygen Rate PaO_2 <60mm Or O_2 sat ≤90%	
Respiratory Rate ≥30/min	
Blood Pressure systolic BP <90mmHg or diastolic ≤60mmHg	
Total Score	

Empiric Antibiotic Therapy	MILD score = 0	MODERATE score = 1	SEVERE/ICU/HDU# score = 2 or more
First line	amoxycillin 500mg tds oral	benzylpenicillin 1.2g q6h IV After inpatient team review +/- doxycycline 200mg stat then 100mg daily	benzylpenicillin 1.2g q4h IV AND gentamicin* 5mg/kg daily IV AND azithromycin 10mg/kg up to 500mg/day IV (max 5d usual)
Penicillin allergy	doxycycline 200mg stat, then 100mg daily	doxycycline 200mg stat, then 100mg daily	ceftriaxone 1g daily IV AND azithromycin 10mg/kg up to 500mg/day IV (max5d usual)
Notes	***MRSA pneumonia has high mortality: always consult Infectious Diseases***	**Add** vancomycin if staph pneumonia possible: 1g IV 12-hourly (max infusion 1g/h). Target trough=10-20mg/L * gentamicin dose is based on calculated "ideal" body wt. Avoid gentamicin if hearing/vestibular problems.	
Investigations in ED	FBC, U/E/C, Blood culture, Store serum (virology), BSL	**Add** LFTs, Blood culture (2 sets), Mycoplasma IgM (acute serum), Sputum micro/culture. Severe: add Legionella culture/PCR and urine LP antigen, viral throat/nose swabs (influenza PCR and extended respiratory virus PCR).	
	Likely suitable for home treatment Social Supports No unstable co-morbidities	**Hospital Admission** Consider ICU Consultation (a score of 2 or more (CORB factors) or respiratory failure). Significant aspiration pneumonia: add metronidazole IV or oral (refer TG: Antibiotic, Edition 13, page 225).	
	All immunocompromised patients: seek consultant advice		

PLEASE RETAIN in Patient File

Clinician's Name (print) _____ Clinician's Signature _____

Date: _____ Time: _____ Designation _____

BINDING MARGIN - DO NOT WRITE

EMERGENCY DEPARTMENT - ADULT COMMUNITY ACQUIRED PNEUMONIA MANAGEMENT

Emergency

08/08 (August 2008)

HUNTER NEW ENGLAND AREA HEALTH SERVICE
EMERGENCY DEPARTMENT

PLEASE USE GUMMED LABEL IF AVAILABLE	
SURNAME	UNIT NUMBER
ADDRESS	
DATE OF BIRTH	M.O.

Paediatric Community Acquired Pneumonia Management Guidelines (Age 4 months – 17 years)

*This pathway is for suspected viral or bacterial pneumonia in children who are greater than 4 months old. Excluded from this pathway are (patients with any one of these):

- Patients less than 4 months old
- Patients immunocompromised
- Patients with congenital heart disease
- Patients with Cystic Fibrosis
- Patients with effusion
- Patients with pneumatoceles

*If bronchiolitis considered please use appropriate pathway.
For the above exclusions early consultation with a Paediatric Respiratory Specialist should be undertaken once initial stabilisation has occurred.

Features of viral lower respiratory tract infection

- Cough
- Infants and young children
- Wheeze
- Fever < 38.5 °C
- Marked recession
- Hyperinflation
- CXR shows hyperinflation and patchy change
- Lobar collapse when severe

Features of bacterial lower respiratory tract infection

- Cough
- Fever > 38.5 °C
- Respiratory rate> 50
- Chest recession
- Wheeze not a sign (other than *Mycoplasma*)
- Clinical and CXR signs of consolidation rather than collapse

Features of *Mycoplasma* lower respiratory tract infection

- Cough
- School children
- Wheeze, crackles
- Interstitial infiltrates, hilar adenopathy, lobar consolidation
- Arthralgia

#Only need to meet one criteria to be assigned to that severity grade (vomiting and temperature excluded)

#Severity Assessment	Mild If all the following criteria are met patient may be discharged from ED *(temperature excluded)*	Moderate *(Hospital Admission)*	Severe *Senior doctor review (Requires ICU Admission)*
Temperature	< 38.5 °C	> 38.5 °C	> 38.5 °C
Respiratory Rate	Within normal range for age (see nursing observation sheet for normal range)	Above range given for age (see nursing observation sheet for normal range)	Continuing to rise, and or evidence of exhaustion
Saturation	> 94% in room air	< 94% in room air	Failing to maintain SpO^2 >94% on 6 L FiO^2
Work of breathing (nasal flare, recession)	Mild	Moderate	Severe, may exhibit paradoxical chest wall movement in older child
Vomiting	No	May be present	May be present
Perfusion	No tachycardia	Tachycardia	Shock
Multi-lobar consolidation	No (if diagnosis can be made on history or examination alone – chest x-ray not needed)	No	Yes
Social situation	Family able to provide appropriate observations or supervisions	Family unable to provide appropriate observations or supervisions	N/A

XXX Emergency PAEDIATRIC COMMUNITY ACQUIRED PNEUMONIA Emergency XXX

HUNTER NEW ENGLAND AREA HEALTH SERVICE
EMERGENCY DEPARTMENT

Paediatric Community Acquired Pneumonia Management Guidelines (Age 4 months – 17 years)

PLEASE USE GUMMED LABEL IF AVAILABLE	
SURNAME	UNIT NUMBER
ADDRESS	
DATE OF BIRTH	M.O.

Investigations/Monitoring	Mild	Moderate	Severe
Saturation	YES	YES	YES *(continuous)*
CXR	Consider (see below) *	YES	YES
FBC	NO	YES	YES
UEC	NO	YES	YES
Serology (hold serum)	NO	YES	YES
Blood culture	NO	YES	YES
NPA (RSV)	NO	Discuss with inpatient team	YES
NPA (extended screen)	NO	NO	YES
Flu pCR nose/throat	NO	NO	YES
ABG/VBG	NO	NO	YES

- *Mild CAP - if Diagnosis can be made on history or exam alone then CXR is not needed*
- *If viral pneumonia withhold antibiotics*

Treatment	Mild	Moderate	Severe
Oxygen	NO	YES	YES
IV fluids, NBM (2/3 maintenance)	NO	YES	YES
Antipyretics Analgesics	YES	YES	YES
Antibiotics (first line)	▪ Amoxycillin 25 mg/kg up to 500 mg TDS oral for 3-5 days	▪ Benzylpenicillin 30 mg/kg up to 1.2g 6 hrly IV for 3-5 days ***After inpatient team review may add*** ▪ Doxycycline oral 200 mg stat then 100 mg daily if >9 yrs	A. Benzylpenicllin 30 mg/kg up to 1.2 g 4 hrly IV ***AND*** B. Gentamicin 5 mg/kg IV ***AND*** C. Azithromycin 10 mg/kg up to 500 mg/day IV (max 5 days)
Antibiotics (penicillin allergy)	Children < 9yrs ▪ Roxithromycin 4 mg/kg up to 150 mg 12 hrly oral for 3-5 days Children > 9yrs ▪ Doxycycline 200 mg stat then 100 mg daily for 3-5 days	Children < 9yrs ▪ Roxithromycin 4 mg/kg up to 150 mg 12 hrly oral for 3-5 days Children > 9yrs ▪ Doxycycline oral 200 mg stat then 100 mg daily for 3-5 days	A. Ceftriaxone 25 mg/kg up to 1 g daily IV ***AND*** B. Azithromycin 10 mg/kg up to 500 mg/day IV (max 5 days)
Antibiotics (if *Mycoplasma* considered)	▪ Roxithromycin 4 mg/kg up to 150 mg oral 12 hrly for 3-5 days *OR* ▪ Erythromycin ethyl succinate (EES) 10 mg/kg QID for 3- 5 days	▪ Roxithromycin 4 mg/kg up to 150 mg oral 12 hrly for 5 days *OR* ▪ Erythromycin ethyl succinate (EES) 10 mg/kg QID for 3-5 days	As above
Disposition	A. Home - GP followup in 2-3 days B. Follow up CXR only if after lobar collapse, an apparent round pneumonia, or continuing symptoms. C. Parent fact sheet	**Admit to Ward**	**Admit to ICU/HDU**

Doctor Name (print): _____ Signature: _____ Date ___/___/___ Time: _____

3.0 IMPLEMENTATION PLAN

Detail how the clinical practice guideline will be implemented including education and communication strategies ensuring staff knowledge.
It should clearly address WHAT, HOW, WHEN, WHY and WHO statements.

The Chair of the Antimicrobial Working Party will be responsible for the following rollout over the next 1 month:

1. Publicity about the revised CPG to go to JMOs, Registrars, ED, Respiratory Medicine, Infectious Diseases, Divisions of Medicine and Intensive Care streams
2. Issue of small revised CPG card to members of these Streams
3. All EDs to carry the Paediatric and Adult Pathway forms
4. Checklist for ICU investigation to be promoted over the weekly ICU liaison process when individual cases of pneumonia are discussed with Infectious Diseases and Microbiology
5. Infectious Matters Newsletter item in next Edition – goes out to all clinical staff.

4.0 EVALUATION PLAN

Provide evidence that the clinical practice guideline will be evaluated according to clinical effectiveness, socioeconomic impact, compliance and staff acceptance.
It should clearly address WHAT, HOW, WHEN, WHY and WHO statements.

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 and Mater sites with feedback to clinical groups. These DUE studies provide evidence of pathway compliance.

5.0 REFERENCES

Therapeutic Guidelines: Antibiotic, Therapeutic Guidelines, Melbourne, Victoria 2006

Buising, 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
- Kaleidoscope network- B Whitehead, M Lee, P Davidson
- Area Quality Use of Medicines Committee
- Anti-microbial Working Group

Appendix A

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 *Mycoplasma* IgM - this sera automatically is stored as well for later testing
	EDTA blood for *Coxiella burnetti* (Q fever) PCR (adults)
	Throat and nose viral swabs for influenza PCR (May-Nov only)
	Pre-treatment sputum for routine culture and *Legionella* culture & PCR (adults only)
	Urine for *Streptococcus pneumoniae* and *Legionella pneumophila* 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* culture/PCR and respiratory virus detection.
- Initial ICU experience in 2009 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.

Guidelines for RGH surgical antibiotic prophylaxis in antibiotic naïve patient

Administration of prophylactic antibiotics, time-frame –aim for no greater than one hours prior to procedure

NOTE: PROCEDURE** = skin incision or application of tourniquet**, whichever occurs earlier

Vascular Surgery	Orthopaedic Surgery	Urological surgery	General & Plastic Surgery
VASCULAR RECONSTRUCTION: - AAA repair - Graft / Stent insertion - Carotid endarterectomy ***CEPHAZOLIN*** *prior to incision if in theatre at 6 hours, repeat 1gm*	**SURGERY INVOLVING JOINT PROSTHESES** **STANDARD REGIMEN:** ***CEPHAZOLIN*** *before skin incision or before inflation of tourniquet.* ***Repeat 1gm for further 2 doses at 8 hourly intervals***	**REGULAR CYSTOSCOPY +/- BIOPSY OR DIATHERMY:** **NON-INFECTIVE NEPHRECTOMY:** *Antibiotics not required unless another indication present*	**COLORECTAL SURGERY:** ***AMPICILLIN*** *plus* ***GENTAMICIN*** *plus* ***METRONIDAZOLE*** *prior to skin incision.* *If penicillin allergy: use* ***CEFTRIAXONE*** *as solo therapy*
RE-DO GRAFTS: ***CEPHAZOLIN*** *and* ***GENTAMICIN****, repeat* ***CEPHAZOLIN*** *if in theatre after 6 hours*	**HIGH RISK or SERIOUS PENICILLIN or CEPHALOSPORIN ALLERGY:** - Current or previous MRSA colonisation / infection (within 5 yrs) - Nursing Home resident - Inter-hospital transfer until cleared by IC ***VANCOMYCIN*** *plus* ***GENTAMICIN****.* *Repeat* ***VANCOMYCIN*** *in 12hours (once only), unless impaired renal function (GFR less than 30ml/min)*	**HIGH RISK ENDOSCOPIC PROCEDURE:** **NEPHROURETERECTOMY:** **PERCUTANEOUS NEPHROLITHOTOMY:** **RADICAL PROSTATECTOMY:** **RADICAL CYSTECTOMY:** **TURP:** **TURBT:** **URETERIC IMAGING OR INSTRUMENTATION:** ***GENTAMICIN*** *plus* ***AMPICILLIN***	**UPPER GASTRO-INTESTINAL SURGERY:** ***CEPHAZOLIN***
MRSA +ve: ***VANCOMYCIN*** *1gm prior to incision*			**HERNIA REPAIR WITH MESH:** ***CEPHAZOLIN***
RECONSTRUCTION IN PRESENCE OF ULCER OR GANGRENE: *Adjust protocol according to swab results (if no swab results, manage as re-do graft)*			**HERNIA REPAIR without MESH:** *Antibiotics not required unless another indication present*
AMPUTATION: (major or minor) ***CEPHAZOLIN*** *plus* ***METRONIDAZOLE*** *prior to incision*	**JOINT REVISIONS:** ***NO ANTIBIOTICS*** *PRE-OPERATIVELY IF INFECTION SUSPECTED!* ***After deep specimens collected administer CEPHAZOLIN*** *or if* ***high risk*** *(as above) administer* ***VANCOMYCIN*** *plus* ***GENTAMICIN*** *Post-operatively: continue* ***CEPHAZOLIN*** *or* ***VANCOMYCIN*** *for 5 days while awaiting culture results. Modify therapy based on microscopy and / or culture. If organism known or no specimen required and high risk, use appropriate antibiotic +/-* ***VANCOMYCIN***	**TRUS BIOPSY:** ***CIPROFLOXACIN*** *oral 500mgs 2 hours prior to procedure, repeat 6-12 hours* ***ADD GENTAMICIN*** *if high risk*	**ABDOMINOPLASTIES:** **BREAST REDUCTIONS:** **IMPLANT:** **HEAD AND NECK PROCEDURES:** **BONE GRAFTING:** ***CEPHAZOLIN*** *before skin incision or before inflation of tourniquet.*
AV FISTULA: ***CEPHAZOLIN*** *prior to incision*			
OTHER PROCEDURES: - Thoracoscopic sympathectomy - Varicose vein surgery *Prophylaxis not recommended*		**FEMALE INCONTINENCE SURGERY:** ***GENTAMICIN*** *plus* ***AMPICILLIN*** *plus* ***METRONIDAZOLE***	

Reminder:

These surgery-specific guidelines pre-suppose antibiotic-specific naïve patient

Standard Dose:

AMPICILLIN DOSAGE	- 1gm
CEPHAZOLIN DOSAGE	- 2gms, one dose only unless otherwise indicated (1gm 8 hourly if continuing)
VANCOMYCIN DOSAGE	- 1gm infused over at least 1 hour prior to procedure (1gm in 250mls; use with infusion pump)
GENTAMICIN DOSAGE	- 3mgs per kg, one dose only, any subsequent doses based on trough level (*consult if already receiving gentamicin*)
METRONIDAZOLE DOSAGE	- 500mgs with infusion completed prior to procedure

ALLERGIES:

Patient allergic to **beta lactams** (penicillins and cephalosporins) AND **vancomycin**, use lincomycin 600mgs infused over 1 hour

Patient allergic to **GENTAMICIN** (rare) used cephazolin or vancomycin or lincomycin.

Serious **PENICILLIN ALLERGY** - immediate type – angio-oedema, urticaria, raised wheals

If further information required (i.e. special or unusual cases): contact FMC Infection Diseases Registrar or Consultant-on-Call on RGH extension 3022 (FMC switchboard)

Authorized: Unit Head Vascular Unit Head Orthop. Unit Head Urology Unit Head Gen Surg Unit Head Anaes. Div. Dir. Date: 15/12/2009

Government of South Australia
Central Northern Adelaide Health Service

Royal Adelaide Hospital

Approved by the Antibiotic Working Party of the RAH Drug Committee September 2003, August 2008

Empiric treatment of sepsis syndrome for patients at presentation to hospital

Infection plus signs of systemic inflammation, such as: tachycardia, hypotension, fever or hypothermia, tachypnea, leukocytosis, leucopenia

SOURCE	ANTIBIOTIC	TYPE III PENICILLIN HYPERSENSITIVITY (serum sickness-type reactions, rash) For penicillin anaphylaxis, contact Infectious diseases or Clinical Microbiology
SOURCE OF SEPSIS NOT KNOWN	Flucloxacillin 2g IV 4 to 6 hourly PLUS Gentamicin* PLUS Vancomycin^ 1g IV, then refer to vancomycin guidelines	Substitute cephazolin 2g IV 8 hourly for flucloxacillin PLUS Gentamicin* PLUS Vancomycin^ 1g IV
BILIARY OR GASTROINTESTINAL TRACT OR FEMALE GENITAL TRACT	Amoxycillin 2g IV 6 hourly PLUS Gentamicin* PLUS Metronidazole 500mg IV 12 hourly	Use metronidazole 500mg IV BD PLUS ceftriaxone 1g IV once daily For female genital tract, or if infection sexually acquired then add in place of amoxycillin: doxycycline 100mg po BD
URINARY TRACT SOURCE	Amoxycillin 2g IV 6 hourly PLUS Gentamicin*	Use gentamicin alone (no cover for enterococci). If gentamicin contraindicated, use ceftriaxone 1g IV once daily (no cover for pseudomonas or enterococci)
SKIN SOURCE (If ischaemic or diabetic foot ulcers contact ID)	Flucloxacillin 2g IV 6 hourly PLUS Vancomycin^ 1g IV, then refer to vancomycin guidelines	Substitute cephazolin 2g IV 8 hourly for flucloxacillin PLUS Vancomycin^ 1g IV, then refer to vancomycin guidelines
INTRAVASCULAR DEVICES (Including CVC)	Flucloxacillin 2g IV 6 hourly PLUS Gentamicin* PLUS Vancomycin^ 1g IV, then refer to vancomycin guidelines	Substitute cephazolin 2g IV 8 hourly for flucloxacillin PLUS Gentamicin* PLUS Vancomycin^ 1g IV, then refer to vancomycin guidelines
COMMUNITY ACQUIRED PNEUMONIA, FEBRILE NEUTROPENIA	See the respective guidelines on the RAH Intranet	
MENINGITIS	Refer to the Antibiotic Therapeutic Guidelines available from the RAH Intranet: Library section	

*Consult the once daily aminoglycoside chart for dosing and monitoring. If patients have a creatinine clearance ≤20mL/min, contact Infectious Diseases or Clinical Microbiology

^ Infectious diseases approval required after the 3rd dose, please annotate the drug chart as to the indication. *Please refer to the Vancomycin dosing and monitoring guidelines on the intranet.*

Review therapy and modify based on pathogen and susceptibility results or if no improvement after 48 hours

CONSIDER CONVERSION FROM IV TO ORAL ANTIBIOTICS WHEN ALL THE FOLLOWING APPLY:

- temperature <38°C or improving over 24 hrs
- signs & symptoms improved or resolved
- oral / nasogastric intake tolerated & absorbed
- no diagnostic indication for IV therapy eg. endocarditis, febrile neutropenia, *S. aureus* bacteraemia, meningitis, osteomyelitis
- suitable oral alternative available
- patient likely to be adherent with oral therapy

RPH 70829002

IV TO ORAL SWITCH REGIMENS

IV	ORAL
AMOXYCILLIN 1-2g qid	**AMOXYCILLIN** 500mg-1g tds
AZITHROMYCIN* 500mg daily	**ROXITHROMYCIN** 300mg daily
BENZYLPENICILLIN 1.2-1.8g qid	**AMOXYCILLIN** 1g tds
CEFTRIAXONE* 1g daily	**CEFUROXIME** 500mg bd (chest inf)
CEPHAZOLIN 1-2g tds	**CEPHALEXIN** 500mg-1g tds-qid or **CEFUROXIME** 500mg bd (chest inf)
CIPROFLOXACIN* 200-400mg bd	**CIPROFLOXACIN*** 500-750mg bd
CLINDAMYCIN 450-600mg tds	**CLINDAMYCIN** 450mg tds
FLUCLOXACILLIN 1-2g qid	**FLUCLOXACILLIN** 500mg-1g qid
FLUCONAZOLE* 100-400mg daily	**FLUCONAZOLE*** 100-400mg daily
METRONIDAZOLE 500mg bd	**METRONIDAZOLE** 400mg bd
MOXIFLOXACIN* 400mg daily	**MOXIFLOXACIN*** 400mg daily
TAZOCIN®* 4.5g tds	**AUGMENTIN DUO FORTE®** 875/125mg bd (if Pseudomonas or resistant G-ve d/w MICRO/ID)
TIMENTIN® 3.1g qid	
AMOXYCILLIN 1-2g qid plus GENTAMICIN 5mg/kg/day	

*RESTRICTED-REFER TO RPH ELECTRONIC DRUG FORMULARY SYSTEM

Austin Health Adult Empiric Antibiotic Guidelines+

CNS	
Bacterial meningitis	• ceftriaxone* 2g IV 12H If the patient is immunosuppressed or Listeria infection is suspected *ADD* benzylpenicillin 1.8 to 2.4g IV 4H
HSV encephalitis	• aciclovir* 10mg/kg IV 8H *(adjust dose if ↓ renal function)*
GU tract	
UTI and mild pyelonephritis	trimethoprim *OR* cephalexin *OR* Augmentin • Non-pregnant women: 3 to 5 days treatment • Men and pyelonephritis: 14 days treatment • *Consider acute or chronic prostatitis:* up to 4 weeks treatment
Severe UTI/ pyelonephritis	• ampicillin 2g IV 6H PLUS gentamicin • *If renally impaired:* substitute gentamicin with ceftriaxone* 1g IV daily
GI tract	
Upper GI (cholangitis, cholecystitis)	• ampicillin 2g IV 6H *PLUS* gentamicin ± metronidazole 500mg IV 8H • *If renally impaired:* ceftriaxone* 1g IV daily *PLUS* ampicillin ± metronidazole
Peritonitis secondary to perforation	• ampicillin 2g IV 6H *PLUS* gentamicin *PLUS* metronidazole 500 mg IV 8H • *If renally impaired:* Tazocin*
SBP	• ceftriaxone* 1g IV daily *PLUS* ampicillin for 5 days treatment
Skin/soft tissue	
Cellulitis	• *Oral:* flucloxacillin 500mg po qid • *IV: HITH candidate:* cephazolin 2g IV daily PLUS probenecid 1g po daily • *In-patient:* flucloxacillin 2g IV 6H

This guideline must not replace clinical judgement. May not apply to paediatrics & immuno-compromised patients.
• Detailed guidelines available in Therapeutic Guidelines: Antibiotic, Version 13 (ABG13)
* Requires ID approval using IDEA^{3}S or contacting ID Reg
+ Doses are for patients with normal renal function

Respiratory

Community-Acquired Pneumonia (with CXR changes) • Calculate Pneumonia Severity Index (PSI) using IDEA^{3}S computer program • Hospital-acquired Pneumonia see ABG13	*Mild CAP: (PSI ≤ 70 = Class I/II)* • amoxycillin 0.5g to 1g po 8H *PLUS* doxycycline 100mg po 12H for 5 days treatment *Moderate CAP: (PSI 71 - 90 = Class III, 91 - 130 = Class IV)* • benzylpenicillin 1.2g IV 6H *PLUS* doxycycline 100mg po 12H for 5 to 7 days treatment *Severe CAP: (PSI > 130 = Class V, or patients requiring ICU management):* • ceftriaxone* 1g IV daily *PLUS* azithromycin 500mg IV daily
Infective exacerbation of COPD *Cardinal symptoms:* ↑ dyspnoea ↑ sputum volume ↑ sputum purulence	*2 to 3 symptoms:* • doxycycline100mg po 12H or amoxycillin 500mg po 8H *If unable to swallow or altered conscious state or new infiltrate on CXR:* • benzylpenicillin 1.2g IV 6H *PLUS* doxycycline 100 mg po 12H *1 symptom:* • Antibiotics are of no benefit

Timely conversion from IV to oral agents

Re-assess the need for IV antibiotic administration in your patient if the following exist:

- Temperature <38°C for 2 days
- Oral food and fluids tolerated
- No ongoing or potential absorption problems
- No unexplained tachycardia
- Oral formulation or suitable oral alternative available. Check with ward pharmacist.
- Oral therapy is often not suitable for patients with endocarditis, meningitis, osteomyelitis/ septic arthritis, *Staph. aureus* bacteraemia where a high tissue antibiotic concentration is required.

Expires May 2010

A Quick Guide to SWITCH!

Antibiotics: IV to Oral

Benefits of Early Switch to Oral Therapy

- Decreased risk of complications from IV lines: thrombophlebitis, catheter related infections
- More patient friendly (improves mobility and comfort)
- May lead to earlier discharge
- Saves medical and nursing time
- Reduction in costs: Direct - medication
  Indirect – diluents, equipment, needles

A Melbourne hospital that implemented a similar campaign estimated they saved nearly $100,000 per annum in medication costs alone, simply by reducing excess IV antibiotic use.

Safety of Switching

A large number of clinical trials support early switching to oral antibiotics, following **two to three** days of treatment with IV therapy[1],[2]

- Equal treatment efficacy
- No adverse effects on patient outcome

Criteria for Switching

- Oral fluids/foods are tolerated and no reason to believe that poor oral absorption may be a problem e.g. vomiting, diarrhoea
- Temperature less than 38°C for 24 to 48 hours
- No signs of sepsis
- An appropriate oral antibiotic is available
- Extra high tissue antibiotic concentrations or a prolonged course of IV antibiotics are not essential

Conditions where SWITCH should be considered

- Gram negative bacteraemia
- Hospital acquired infections
- Intra-abdominal infections
- Pneumonia
- Skin and soft tissue infections
- Urinary tract infections

---

[1] Barlow GD, Nathwani D. Sequential Antibiotic Therapy. Curr Opin Infect Dis. 2000; 13(6):599-607

[2] Sevinc F et al. Early Switch from Intravenous to Oral Antibiotics: Guidelines and Implementation in a Large Teaching Hospital. J Antimicrob Chemother. 1999; 43:601-606

Southern Health

Southern Health Therapeutics Committee
Southern Health Pharmacy Department
AMPS Committee

Conditions where SWITCH is not appropriate

Conditions which require a prolonged course of IV antibiotics or very high tissue concentrations

- Bone and joint infections
- Cystic fibrosis
- Endocarditis
- Deep seated abscess
- Meningitis
- *S. aureus* bacteraemia

Antimicrobials with Excellent Oral Bioavailability

Fluconazole (>90%)
Ciprofloxacin (70-80%)
Metronidazole (>95%)
Moxifloxacin (~90%)
Clindamycin (~90%)

Suggested Conversion Regimens

Refer to *Therapeutic Guidelines: Antibiotic* for dosing in specific indications

IV		Oral	
Antimicrobial	**Usual Dose***	**Antimicrobial**	**Usual Dose***
Ampicillin	1-2g IV QID	Amoxycillin	500mg-1g oral TDS
Azithromycin	500mg IV Daily	Roxithromycin	300mg oral daily
Benzyl penicillin	1.2g IV QID	Phenoxymethyl penicillin	500mg oral QID
Ceftriaxone	1g IV Daily	No oral formulation Choice of oral antibiotic depends on infection site/microbiology	
Cephazolin	1g IV TDS	Cephalexin	500mg oral QID
Ciprofloxacin^	200-400mg IV BD	Ciprofloxacin^	250-500mg oral BD
Flucloxacillin	1g IV QID	Flucloxacillin	500mg oral QID
Lincomycin	600-900mg IV TDS	Clindamycin^	300-600mg oral TDS
Fluconazole^	200-400mg IV daily	Fluconazole^	200-400mg oral daily
Metronidazole^	500mg IV BD	Metronidazole^	400mg oral TDS

*Usual dose for adult patients with normal renal function.
^Antimicrobials with excellent oral bioavailability

For further information contact:

Your ward pharmacist
Infectious diseases registrar/consultant
Infectious diseases pharmacist Pager 4325
Ext 41364

Southern Health

Southern Health Therapeutics Committee
Southern Health Pharmacy Department
AMPS Committee

SWITCH!
ANTIBIOTICS - IV to ORAL
GUIDELINES FOR WARD PHARMACISTS

WHAT IS THE SWITCH CAMPAIGN?
The Switch Campaign is being implemented at Southern Health in 2009. It encourages a timelier switch from IV to oral antibiotics, in appropriate patients.

WHY SWITCH?
- Decreased risk of infection from IV lines
- Decreased risk of thrombophlebitis
- Significantly less expensive than IV therapy
- Reduction in hidden costs (diluents, equipment, needles, nursing time)
- More patient friendly
- May lead to earlier discharge

WHAT ARE THE CRITERIA FOR SWITCHING FROM IV TO ORAL?
- Oral fluids/foods are tolerated and no reason to believe that poor oral absorption may be a problem e.g. vomiting, diarrhoea
- Temperature less than 38°C for 24 to 48 hours
- No signs of sepsis
- An appropriate oral antibiotic is available
- Extra high tissue antibiotic concentrations or a prolonged course of IV antibiotics are not essential*

*N.B.: Some conditions require a prolonged course of IV antibiotics or very high tissue concentrations e.g. bone and joint infections, endocarditis, meningitis, *S. aureus* bacteraemia, cystic fibrosis, deep seated abscess

WHEN SHOULD SWITCH BE CONSIDERED?
- Gram negative bacteraemia
- Hospital acquired infections
- Intra-abdominal infections
- Pneumonia
- Skin and soft tissue infections
- Urinary tract infections

Antimicrobial choice should always be guided by microbiology sensitivities when available.

PHARMACIST CAMPAIGN KIT
- Guidelines for ward pharmacists (to be kept in ward pharmacist's folder)
- Lanyard tags (for doctors and pharmacists)
- Posters (to be displayed on ward and a copy for ward pharmacist's folder)
- Intervention stickers (for use on medication chart and pharmacy communication form)
- Leaflets for prescribers – "A Quick Guide to Switch"

Southern Health

Southern Health Therapeutics Committee
Southern Health Pharmacy Department
AMPS Committee

WARD PHARMACIST ROLE

The successful implementation of this campaign will rely predominately on the ward pharmacist.

What to do:
Place switch campaign posters on ward notice boards.
Educate medical and nursing staff (leaflets, lanyard tags and verbal communication).
Proactively discuss switching options with medical staff.

Steps:

1. Assess all IV antibiotic orders for appropriateness of switching to oral therapy (during daily medication chart review) – **refer to flow chart.**

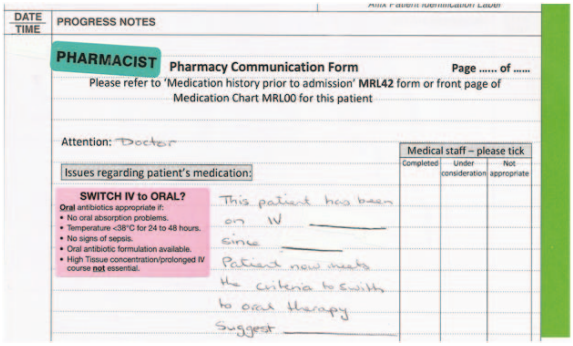
If appropriate to switch:

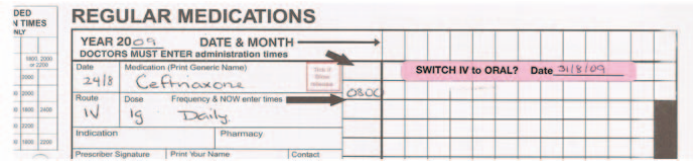
2. Place switch sticker on medication chart (place in section ensuring that you do not obscure or obstruct nursing administration signatures).
3. Use communication sticker on pharmacy communication form and suggest appropriate oral antimicrobial therapy.
4. Communicate this information with the medical officer (e.g. lanpage, verbally).
5. Ensure that Southern Health Traffic Light Antimicrobial Prescribing Restrictions are met. (e.g. ID approval numbers).

USEFUL CONTACTS

ID registrar
ID pharmacist: extension 41364 or pager 4325

EXAMPLES OF DOCUMENTATION

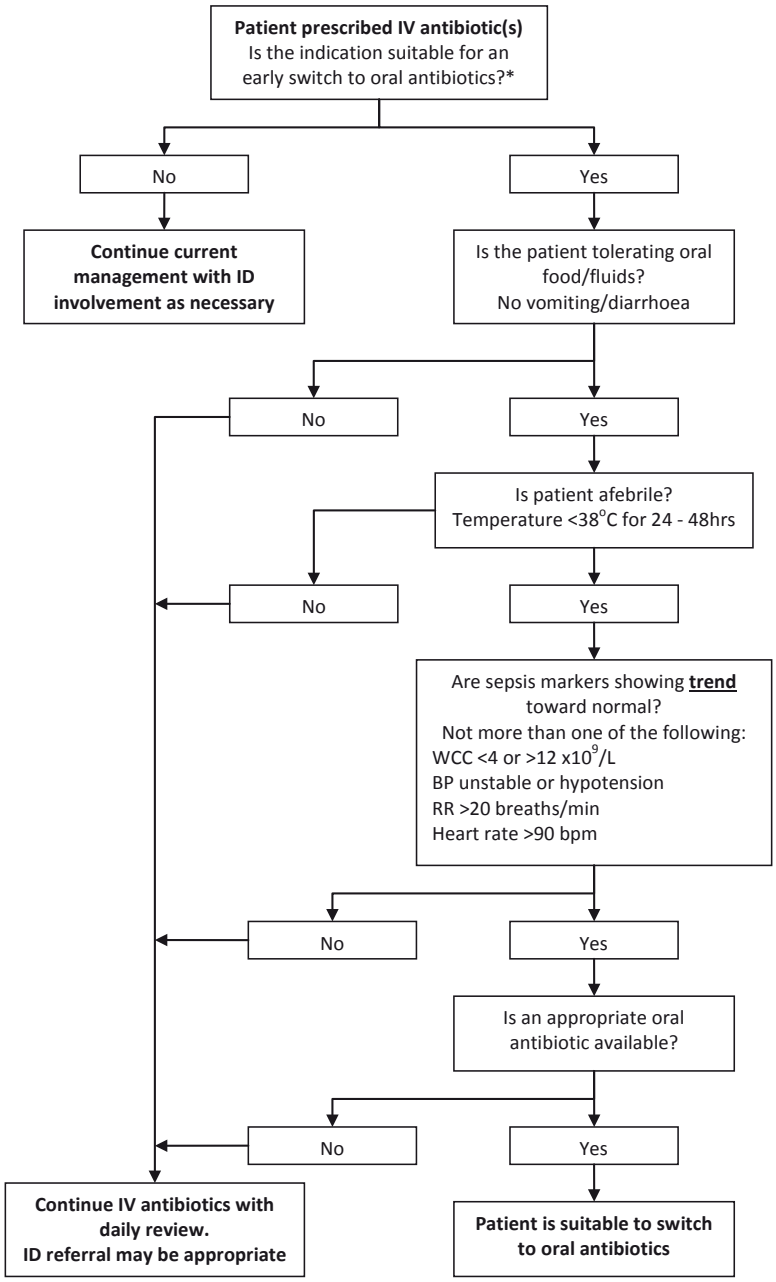




Southern Health

Southern Health Therapeutics Committee
Southern Health Pharmacy Department
AMPS Committee

Flowchart for Identification of Patients Suitable for Early Switch to Oral Antibiotics



* Some conditions require prolonged course of IV antibiotics OR high tissue concentration, so are not suitable for early switch.
E.G. Bone/joint infections, endocarditis, meningitis, *S. aureus* bacteraemia, cystic fibrosis, deep seated abscess

Southern Health

Southern Health Therapeutics Committee
Southern Health Pharmacy Department
AMPS Committee

ANTIMICROBIAL COSTS AND SAVINGS

Refer to *Therapeutic Guidelines: Antibiotic* for dosing in specific indications
If no equivalent oral formulation available choice of antimicrobial should be based on site of infection, microbiology or ID consultation.

IV		Oral		Saving per 24 hours
Antimicrobial/ usual dose*	**Cost per 24 hours**	**Antimicrobial/ usual dose***	**Cost per 24 hours**	
Ampicillin 1-2g IV QID	$4.32	Amoxycillin 500mg-1g oral TDS	$0.24	$4.08
Azithromycin 500mg IV daily	$25.00	Azithromycin 500mg oral daily	$7.07	$17.93
		Roxithromycin 300mg oral daily	$0.42	$24.58
Benzyl penicillin 1.2g IV QID	$19.12	Phenoxymethyl penicillin 500mg oral QID	$0.52	$18.60
Ceftriaxone 1g IV daily	$2.00	Amoxycillin/ Clavulanic acid# 875/125mg oral BD	$0.84	$1.16
Cephazolin 1g IV TDS	$5.79	Cephalexin 500mg orally QID	$0.72	$5.07
Ciprofloxacin^ 200-400mg IV BD	$30.00	Ciprofloxacin^ 250-500mg oral BD	$0.72	$29.28
Flucloxacillin 1g IV QID	$4.76	Flucloxacillin 500mg oral QID	$0.76	$4.00
Fluconazole^ 200-400mg IV daily	$19.90	Fluconazole^ 200-400mg oral daily	$2.60	$17.30
Lincomycin^ 600-900mg IV TDS	$24.96	Clindamycin^ 300-600mg oral TDS	$4.23	$20.73
Metronidazole^ 500mg IV BD	$5.80	Metronidazole^ 400mg oral TDS	$0.33	$5.47
Moxifloxacin 400mg IV daily	$70.05	Moxifloxacin 400mg oral daily	$11.37	$58.68
Piperacillin/ tazobactam 4.5g IV TDS	$47.85	Amoxycillin/ clavulanic acid 875/125mg oral BD	$0.84	$47.01
Ticarcillin/ clavulanic acid 3.1g IV QID	$42.96	Amoxycillin/ clavulanic acid 875/125mg oral BD	$0.84	$42.12

*Usual dose for adult patients with normal renal function
Ensure patient does not have penicillin hypersensitivity
^Antimicrobials with excellent oral bioavailability

Reviewed by: Infectious Diseases Pharmacists	Last Review Date: October 2009
Authorised by: AMPS Committee	Next Review Date: October 2012

Southern Health

Southern Health Therapeutics Committee
Southern Health Pharmacy Department
AMPS Committee

Getting to know your Penicillins

Does Tazocin contain Penicillin?
What's in Augmentin?

We need to be familiar with which drugs contain penicillin so that we don't expose our Penicillin allergic patients to any unnecessary risk.

AUGMENTIN TAZOCIN TIMENTIN

These drugs cause problems because their names do not immediately
suggest that they contain penicillin.

See table for commonly used Penicillins

Generic Name	Brand Name
Amoxycillin	Amoxil, Alphamox, Cilamox, Moxacin
Ampicillin	Alphacin, Ampicyn
Benzylpenicillin	Ben Pen
Dicloxacillin	Diclocil
Flucloxacillin	Flopen, Floxapen, Staphylex
Phenoxymethylpenicillin	Abbocillin VK, Cilicaine VK.
Piperacillin	Piperacillin
Procaine Penicillin	Cilicaine

Commonly used combination products;

Amoxycillin + Clavulanic Acid	Augmentin, Curam, Clamoxyl
Piperacillin + Tazobactam	Tazocin
Ticarcillin + Clavulanic Acid	Timentin

Specialist Advisory Committee on Antimicrobial Resistance (SACAR) template for hospital antimicrobial guidelines (Specialist Advisory Committee on Antimicrobial Resistance (SACAR) 2007)

Antimicrobial guidelines should be evidence-based and prepared in line with best practice recommendations for treatment guidelines. The provision of costing information within the guideline should be discussed locally. The following are additional recommendations for the content and details of local antimicrobial policies.

8.1 Title page

- Name of policy
- Specify the condition and patient group where appropriate
- Date
- Version
- Review date
- Authors
- Contact details for enquiries for normal hours and out of hours
- Contact details for microbiological and pharmacological information
- Details of electronic availability

8.2 Introduction section

- Statement as to whether the guideline is mandatory or for guidance only
- Contents
- Guidance on the loal procedure for microbiological samples
- Abbreviations used in the text
- Reference should be made to guidance in the British National Formulary under Prescription writing. These notes lay out a standard for expressing strengths and encourage directions in English not Latin abbreviations

8.3 Summary list of available antimicrobials

The antimicrobials that are recommended in the guidelines should be listed, with clear indications to the route of administration and should state whether they are:

- Unrestricted
- Restricted (approval of a specialist is required)
- Permitted for specific conditions (for example co-trimoxazole for *Pneumocystitis*)

8.4 Regimens for treatment of common infections

8.4.1 Treatment

- First-line recommendation
- Second-line recommendation
- Timing
- Dose
- Route of administration
- Duration of treatment
- Rules for intravenous to oral switch

8.4.2 Prophylaxis

- First-line recommendation for empirical therapy
- Second-line recommendation for empirical therapy
- Dose
- Timing of initial dose
- Route of administration
- Details of repeat dosing if required

Specialist Advisory Committee on Antimicrobial Resistance (SACAR) (2007). "Appendix 2.Specialist Advisory Committee on Antimicrobial Resistance (SACAR) Antimicrobial Framework " Journal of Antimicrobial Chemotherapy **60**(Suppl.1): i87-i90.

A2.2 Guidance on managing conflicts of interest and relationships with the pharmaceutical industry

The relationship between the pharmaceutical industry and South Australian public hospitals. South Australian Therapeutics Advisory Group, September 2008
www.dassa.sa.gov.au/webdata/resources/files/SATAG_Guidance_Doc__Relationship_with_Pharma_2008_9.pdf

Pharmaceutical company representatives — Queensland Health standards of interaction and behaviour. Queensland Health, September 2006
www.health.qld.gov.au/qhcss/mapsu/documents/health_prof/31722.pdf

Pharmaceutical industry and hospital staff liaison in public hospitals. NSW Therapeutic Advisory Group Inc, July 2008
www.ciap.health.nsw.gov.au/nswtag/publications/posstats/Pharmliaison0708.pdf

Liaison between public hospital staff and the pharmaceutical industry: guidance from the NSW Therapeutic Advisory Group. Medical Journal of Australia, April 2009
www.mja.com.au/public/issues/190_08_200409/shi11384_fm.pdf

Conflicts of interest and gifts and benefits. NSW Health 2010
www.health.nsw.gov.au/policies/pd/2010/pdf/PD2010_010.pdf

New physician guidelines on commercial relationships. *WHO Drug Information* 2004;18(4):296–297

Good medical practice: a code of conduct for doctors in Australia. Australian Medical Council, 2009
goodmedicalpractice.org.au

Guidelines for ethical relationships between physicians and industry. The Royal Australasian College of Physicians, 2006
www.racp.edu.au/index.cfm?objectid=CFE4807D-A18C-8144-DCAA3E43107218FB

Doctors' relationships with industry – 2010. Australian Medical Association
ama.com.au/node/5421

Code of professional conduct. Pharmaceutical Society of Australia, 1998
www.psa.org.au/site.php?id=628

Code of conduct. Medicines Australia (Edition 15, 2006; Edition 16, 2010)
www.medicinesaustralia.com.au/pages/page5.asp

A guide to relationships between health consumer organisations and pharmaceutical companies.
www.medicinesaustralia.com.au/pages/images/MA-WorkingTogether-TheGuide.pdf

A2.3 Antimicrobial stewardship web sites

Organisation/ site name	URL	Content and function
National organisations		
Healthcare Infection Control Special Interest Group	www.asid.net.au/hicsigwiki/index.php?title+Antibiotic-Stewardship-programs#guides	An Australian and New Zealand site. Provides a good example of multidisciplinary antimicrobial stewardship, including information such as guidelines, presentations, teaching materials and a large number of related links
Scottish Antimicrobial Prescribing Group	www.scottishmedicines.org.uk/smc/6616.html	Minutes of meetings, information about educational events, policies, guidance and other key documents relating to antimicrobial management in Scotland
Centers for Disease Control and Prevention	www.cdc.gov/drugresistance/healthcare/default.htm	Teaching materials and tools to download, including tools for clinicians, from the Centers' Campaign to Prevent Antimicrobial Resistance
Prudent Antibiotic User Website	www.pause-online.org.uk/	Standardised web-based learning resources and assessments on prudent antimicrobial prescribing. A collaborative web-based forum for sharing experiences and learning resources between providers of education
Australian Commission on Safety and Quality in Health Care	www.safetyandquality.gov.au/internet/safety/publishing.nsf/Content/PriorityProgram-03#five	Antimicrobial stewardship committee activities, seminar reports, presentations, program requirements and strategies
The Joint Commission	www.jcrinc.com/Antibiotic-Stewardship/	Online learning community on multiresistant organisms and antibiotic resistance. Includes antimicrobial stewardship educational material
Institutions		
The Nebraska Medical Center	www.nebraskamed.com/careers/education/asp/	Institutional antimicrobial stewardship program including information on antimicrobial restrictions, guidelines, clinical pathways and pharmacokinetics
Hospital of the University of Pennsylvania	www.uphs.upenn.edu/bugdrug	Institutional antimicrobial stewardship program including information on guidelines for antimicrobial therapy, issues relating to formulary restrictions and pharmacologic considerations for dose adjustments
University of Kentucky Chandler Medical Center	www.hosp.uky.edu/pharmacy/amt/default.html	Institutional antimicrobial stewardship program including information on policies and guidelines, clinical pathways, ordering procedures for restricted antimicrobials, antibiograms, and a text pager messaging tool for the antimicrobial team