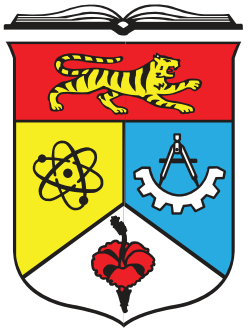
Pusat Perubatan UKM

ANTI-INFECTIVE GUIDELINE 2012



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PPUKM ANTI-INFECTIVE GUIDELINE 2012

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This guideline would not exist without the hard work from the Development Group who revised, checked, discuss, debated, designed, typed and reviewed as a team. We would like to thank the whole team for their effort and continuous commitment to help develop this Guideline.

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TABLE OF CONTENTS

A word from the Chairman...

Antimicrobial resistance is increasingly becoming a threat in our society. It causes increased morbidity, mortality and health care costs. The widespread resistance of anti-infectives are rapidly increasing whereas the development of newer anti-infectives are not able to cope with the rate of resistance. Therefore it is very crucial that we ensure judicious use of anti-infectives to control antimicrobial resistance.

This update of the PPUKM Anti-infective guideline has been developed by the Anti-Infective Review Panel which consists of Drugs and Therapeutics Committee, Infectious Disease Consultant, Head of Departments, Head of Units, Microbiologists and Pharmacists. These guidelines have been updated based on evidence based reference and a thorough inter-disciplinary discussion session.

As a result of this Anti-Infective Review meeting, the Antibiotic Stewardship Activity by Dr Petrick and Clinical Pharmacists has been initiated to promote the appropriate use of medications by ensuring optimal selection, dose and duration of antibiotic used.

It is hoped that this Anti-Infective Guideline will be widely used and enforced by all levels of Health Care Professionals to promote rasional use of antibiotics with better application of clinical knowledge and better adherence to good practice.

Lastly, I would like to commend the Infectious Disease Consultant Dr Petrick and the Review Panel for their hard work and effort in updating the guideline for the PPUKM healthcare community.

Prof Dr Jaafar Hj Md Zain
Drugs and Therapeutics Committee Chairman
Deputy Dean of Clinical Services

A word from
Our Infectious Disease Specialist

I would like to take this opportunity to introduce this new edition of the PPUKM Anti-Infective Guidelines. This edition sees some new and exciting changes done to the format and the content to make it more user friendly especially to the junior doctors.

There are some new exciting chapters which have been added and all the chapters have been updated to reflect the current time. Some of the significant changes made in this edition were division of chapters on treatment according to site of infections for easy search. Other new exciting chapters added are vaccines and management of post exposure prophylaxis for needle stick injury in PPUKM

The local strain of bacteria that infects our patients and their sensitivity (popularly called as local data) are presented clearly so that we can have a better understanding on what empirical antibiotics to use for our patients. It is also hoped that all of us will be prudent with the choices of antibiotics we make in order to reduce the occurrence of multidrug resistant organisms in our patients.

This guideline was reviewed by relevant specialists and checked with other international and national guidelines. I take this opportunity to thank all the various people who have come together and worked hard to update the guidelines.

Finally, this endeavour would not be possible without the tremendous sacrifices done by all of our hard working colleagues from the Pharmacy Department from organizing everything up to the final editing. I salute you!

Last but not least, we hope that all this effort will not be in vain and the end users (you and me) will find this edition extremely useful for our day to day management of infections.

It is truly a guideline by the 'people' for the 'people'.

Dr Petrick Periyasamy

Recommended Treatment according to DIFFERENT SITE
CARDIOVASCULAR INFECTIONS

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Infective Endocarditis			
Native valve **Empirical therapy (before culture results)** Viridan strep (35%) 'other' strep (20%,) enterococci (15%) staphylocci (30%)	Benzylpenicillin (Pen G) 3MU q4h IV x 4wks + Gentamicin 1mg/kg q8h IV x 2wks	Vancomycin 15mg/kg q 12h IV x 4wks + Gentamicin 1mg/kg q 8h IV x 2wks	For IVDU: Cloxacillin 2g q4h IV x 4wks + Gentamicin 1mg/kg q8h IV x 2wks Change antibiotic when culture result become available. 1 Mega Unit =0.6 grams Penicillin G
Native Valve: Culture +ve			
S. viridans, S. bovis (Pen G MIC ≤0.1ug/ml)	Benzylpenicillin (Pen G) 3MU q4h IV x 4 wks	Benzylpenicillin (Pen G) 3MU q4h IV x 2wks + Gentamicin 1mg/kg q8h IV x 2 wks	In penicillin hypersensitivity, use Ceftriaxone 2g q24h IV x 4wks
S. viridans, S. bovis (Pen G MIC > 0.1 to < 0.5ug/ml)	Benzylpenicillin (Pen G) 3 MU q4h IV x 4 wks + Gentamicin 1mg/kg q8h IV x 2 wks	Vancomycin 15mg/kg q12h IV x 4wks **OR** Teicoplanin 400 mg q12h for 3 doses then 400 mg q24h IV x 4wks	

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
	Maintenance : Isoniazid 15 mg/kg twice weekly + Rifampicin 10 mg/kg twice weekly x 10 mth		
No neurological deficit and CSF Culture Negative at 2 weeks	**Induction :** Ampho B (0.7–1.0 mg/kg per day IV) + Flucytosine (100mg/kg per day orally in 4 divided doses) for 4 weeks . **Consodilation :** Fluconazole 400 mg od for 8 weeks **Maintenance:** Fluconazole 200 mg od for 6–12 months		
Neurological complications and CSF Culture still Positive at 2 weeks	**Induction :** Ampho B (0.7–1.0 mg/kg per day IV) + Flucytosine (100mg/kg per day orally in 4 divided doses) for 6 weeks . **Consodilation :** Fluconazole 400 mg per day for 8 weeks **Maintenance:** Fluconazole 200 mg od for 6–12 months If flucytosine is not given or treatment is interrupted, consider lengthening conventional Ampho B or Liposomal AmB induction therapy for at least 2 weeks		

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
		+ Gentamicin 1mg/kg q8h IV x 2 wks	
S. viridans, S. bovis, (Pen G MIC ≥1.0ug/ml)	Pen G 4 MU q4h IV x 4-6 wks + Gentamicin 1mg/kg q8h IV x 4-6 wks	Vancomycin 15mg/kg q12h x 4-6 wks **OR** Teicoplanin 400 mg q12h for 3 doses then 400 mg q24h IV x 4-6 wks + **Gentamicin 1mg/kg q8h IV x 4-6 wks**	
Enterococci with no high-level Gentamicin resistance	Ampicillin 2 g q 4h IV x 4-6 wks + Gentamicin 1mg/kg q8h IV x 4-6 wks	Vancomycin 15mg/kg q12h x 4-6 wks **OR** Teicoplanin 400 mg q12h for 3 doses then 400 mg q24h IV x 4-6 wks + **Gentamicin 1mg/kg q8h IV x 4-6 wks**	
Enterococci (MIC Gentamicin > 500-2000ug/ml) - high level resistance	Ampicillin 2 g q4h IV x 4-6 wks + Streptomycin 15mg/kg in 2	Vancomycin 15mg/kg q12h IV x 4-6wks **OR** Teicoplanin 400 mg q12h	Cure rate 50%: consider surgical removal of infected valve in failure.

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	**Alternative**	
	equally divided doses IV/IM x 4-6 wks	**+ Streptomycin 15mg/kg in 2 equally divided doses IV/IM x 4-6 wks**	
Staph aureus: MSSA (methicillin – sensitive)	Cloxacillin 2 g q4h IV x 4-6 wks + Gentamicin 1mg/kg q8h IV x 3-5 days	Vancomycin 15mg/kg q12h IV **OR** Teicoplanin 400mg q12h for 3 doses then 400mg q24h Then Cloxacillin 500 mg q6h + Fusidic Acid 500 mg q8h	Most IVDU will fall into this category. Total therapy for 6 weeks.
Staph. Aureus: MRSA (methicillin – resistant)	Vancomycin 15mg/kg q12h IV x 4-6 wks	Teicoplanin 400 mg q12h for 3 doses then 400 mg q24h IV x 4-6 wks	
Pseudomonas aeruginosa	**Amikacin 15mg/kg q24h IV** + Pip/Tazo 4.5g q8h IV **OR** Ceftazidime 2g q8h IV **OR** Cefepime 2g q8h IV		Duration of treatment of at least 6 weeks

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Native Valve: Culture – ve			
HACEK group	Ampicillin 2 g q4h IV x 4wks + Gentamicin 1mg/kg q8h IV x 4 wks	Ceftriaxone 2g q24h IV x 4 wks	HACEK (acronym for H. parainfluenzae, H. aphrophilis, Actinobacillus, Cardiobacteruim, Eikenella, Kingella)
Q fever, psittacosis, brucellosis, bartonella	Emphasis is on diagnosis	AJM 1996; 100: 629. For Bartonella, refer Circulation 2005:111;394-434	
Prosthetic valve			
S. epidermidis, S. aureus, Enterobacteriaceae, diphtheroids, fungi (rare)	Vancomycin 15mg/kg q12h IV + Gentamicin 1mg/kg q8h IV	Teicoplanin 400 mg q12h for 3 doses then 400 mg q24h IV + Rifampicin	Early surgical consultation advisable. Change to appropriate antibiotics when culture results available.

Recommended Treatment according to DIFFERENT SITE
CENTRAL NERVOUS SYSTEM

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Brain Abscess			
Primary Streptococci (60-70%), Bacteroides (20-40%), Enterobacteriaceae (25-33%), S. aureus (10-50%)	Ceftriaxone 2 g q12h IV + Metronidazole 500mg q8h IV x 6 wks	Benzylpenicillin 4 MU q4h IV + Metronidazole 500mg q8h IV x 6 wks	Surgical drainage if: - size > 2.5cm - neurological deterioration
Valve: Culture +ve			
Post-surgical, post-trauma *S. aureus, Enterobacteriaceae*	Cloxacillin 2 g q4h IV + Ceftazidime 2 g q8h IV	Meropenem 2 g q8h IV + Cloxacillin 2 g q4h IV	Use Vancomycin for suspected/ proven MRSA.
Encephalitis			
Herpes simplex, arboviruses, rabies, rarely listeriosis (assume HSV-1 until exclusion)	*Acyclovir 10 mg/kg (infuse over 1h) q8h IV 14 - 21 days*		
Acute Meningitis (Aseptic- Pleocytosis of 100cells, CSF normal glucose, no organism on gram stain and/or culture)			
Leptospirosis	Benzylpenicillin 5MU q6h IV OR		

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
	Ampicillin 0.5 – 1 g q6h IV OR Doxycycline 100 mg q12h po		
HSV (2) and VZV Meningitis (severe cases)	Acyclovir 10 mg/kg q8hIV x 10 – 14 days		
Acute Meningitis (Septic) Goal is CSF exam in 30 min. and then empiric therapy. If focal neurologic deficit, give empiric therapy, do CT brain, then do LP.			
1) CSF Gram stain negative *Child-Adult < 50 yrs old* *S. pneumo, meningococci,* *H. influenzae*	Ceftriaxone 2 g q12h IV OR Cefotaxime 2 g q12h IV + Dexamethasone 0.15 mg/kg q6h IV x 2-4d with or just before antibiotic	Meropenem 2 g q8h IV	Ceftriaxone may be changed to q24hr after 48 hours if patient has responded well Treat for 10 – 14 days. Dexamethasone : 1st dose 15 -20 min before first antibiotic given.
> 50 yrs, alcoholism and other debilitating disease *S. pneumo, listeria, Gram–negative bacilli*	Ceftriaxone 2 g q12h IV **OR** Cefotaxime 1 g q12h IV + Dexamethasone 0.15mg/kg q6h IV x 2-4d with or just before antibiotic	Meropenem 2 g q8h IV + Dexamethasone 0.15mg/kg q6h IV x 2-4d with or just before antibiotic	To change to Ampicillin 2 g q6h IV if Listeria is a pathogen.

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Any age with impaired cellular immunity *Listeria, Gram-neg. baccilli*	Ampicillin 2 g q4h IV + Ceftriaxone 2 g q12h IV	Meropenem 1 g q8h IV	
Post neurosurgery or post-head-trauma *S. pneumo (most common if CFS leak),* *S. aureus, coliforms, P. aeruginosa*	Cloxacillin 2 g q6h IV + Cefepime 2g tds IV		Give Vancomycin 1 g q8h IV if MRSA suspected / proven

Recommended Treatment according to DIFFERENT SITE
CENTRAL NERVOUS SYSTEM

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Infected ventriculo-peritoneal shunt (for any age group) *S. epidermidis, S. aureus, coliforms, diphtheroids*	Cloxacillin 2 g q4h IV + Cefepime 2g tds IV	Cloxacillin 2 g q4h IV + Sulperazone 2 g q12h IV	Early shunt removal usually necessary. Give Vancomycin 1 g q8h IV if MRSA suspected / proven
2) CSF Gram stain positive, immuno-competent *Gram +ve cocci S. pneumonia*	Ceftriaxone 2 g q12h IV **OR** Cefotaxime 2g q4-6h IV + **Dexamethasone 0.15 mg/kg q6h IV x 2-4 days** with or just before antibiotic	Meropenem 2 g q8h IV	Treat for 10-14 days
Gram -ve cocci *N. meningitidis*	Ceftriaxone 2 g q12h IV **OR** Cefotaxime 2 g q4-6h IV + Dexamethasone 0.15mg/kg q6h IV x 2-4 days with or just before antibiotic	Benzylpenicillin (Pen G) 4 MU q4h IV OR Ampicillin 2 g q4h IV	Treat for 7 days. Dexamethasone : 1st dose to be given 15-20 minutes before 1st antibiotic given.

Recommended Treatment according to DIFFERENT SITE
CENTRAL NERVOUS SYSTEM

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	**Alternative**	
Gram -ve bacilli *H. influenza, coliforms, P. aeruginosa*	Ceftazidime 2 g q8h IV **OR** Cefepime 2 g q8h IV	Meropenem 2 g q8h IV **OR** Ciprofloxacin 400 mg q8-12h IV	Treat for 14 - 21 days
Primary Amoebic *Meningoencephalitis* *Free living amoeba* *(Naegleria, Acauthmoeba)*	Amphothericin B 1mg/kg/day		
Chronic Meningitis	Defined as symptoms + CSF pleocytosis for ≥ 4 wks		
Mycobacterium tuberculosis (Adult)	**Intensive 2 months treatment :** Isoniazid 5 -10mg/kg/day po + Rifampicin 10 mg/kg/day po + Pyrazinamide 25 mg/kg.day po + Streptomycin 0.5-0.75 g/kg/day IM		Medium dose steroid cover for MRC 2 and 3 patients : Dexamethasone : 12 – 16 mg /day x 2 – 3 weeks, then taper over 2 – 3 weeks (4 – 6 weeks total)

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
In patients at low risk for therapeutic failure (ie, they have an early diagnosis by history, no uncontrolled underlying disease or immunocompromised state,	**Induction :** combination of AmBd plus flucytosine for only 2 weeks, **Consolidation :** fluconazole 800 mg od for 8 weeks **Maintenance :** fluconazole 200 mg od for 6–12 months **Immunocompromised hosts:** • See Infections in HIV patients (chapter 3)		
Neurosyphilis			
	Benzylpenicillin (Pen G) 3-4 MU q4h IV x 2 wks **OR** Procaine penicillin 2.4 MU q24h IM + **Probenecid 500mg qid po x 2 wk**	Ceftriaxone 2g q24h IV x 2 wks	In HIV/AIDS, give higher doses & longer periods of therapy.

Recommended Treatment according to *DIFFERENT SITE*
EENT Infections (Eye, Ear, Nose, Throat)

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Conjunctivitis			
Non-gonococcal S. aureus S. pneumoniae H. influenzae S. pyogenes	G. Chloramphenicol 1-2 drops q4h (monitor for improvement)		Take conjunctival swab
Gonococcal ophthalmia neonatorum N. gonorrhaea	IV Cefuroxime 15mg/kg q12h x 10days + Gutt. Chloramphenicol 1-2 drops every 60 mins then q6h as infection improves	IV Ceftazidime Or IV Cefotaxime + Gutt. Ceftazidime 1-2 drops every q6h	Frequent saline irrigation of discharge. Refer to ophthalmologist.
Chlamydia ophthalmia neonatorum *Chlamydia trachomatis*	Erythromycin 25mg/kg BD PO for 14 days + Gutt. Chloramphenicol eye drops 1-2 drops every 30 mins then q6h as infection improves		Refer to Ophthalmologist
Keratitis			
Herpes simplex *H. simplex, types 1 &2*	Topical Occ. Acyclovir 5x/day		Refer all cases to Ophthalmologist

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Varicella-zoster ophthalmicus	Topical Occ. Acyclovir 5x/day T. Acyclovir 800mg PO 5X/ day for 1 week		Refer all cases to Ophthalmologist
Bacterial (contact lens user) *P. aeruginosa*	Gutt. Gentamicin 1.4% (14mg/ml) :loading dose then 2 hourly for 2-5 days and taper + Gutt. Ceftazidime (Fortum) 5% (50mg/ml): loading dose then hourly for 2-5 days then taper * (loading dose: 1-2 drops every 15 mins for the first 2 hrs.) **Subconj. dose:** Gentamicin 20mg in 0.5 mls Ceftazidime 100mg in 0.5 mls	Gutt. Moxifloxacin (Vigamox) 1-2 hourly	Refer all cases to Ophthalmologist. Cornea scrapping for C&S MUST be taken prior to starting Abx
Simple Bacterial *Gram positive organisms*	Gutt. Ciprofloxacin (Ciloxan) 1-2 drops q2-4h	Gutt. Chloramphenicol 1-2 drops q2-4h	Refer all cases to Ophthalmologist. Cornea scrapping for C&S MUST be taken prior to starting antibiotic

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Fungal Keratitis Yeast	Gutt. Amphotericin B 0.3% (3mg/ml) +/- T. Fluconazole 200-400mg/ day	Gutt. Fluconazole 0.2% (2mg/ml) and T. Ketoconazole 400-600mg/day	Refer all cases to Ophthalmologist. Cornea scrapping for KOH and C&S MUST be taken prior to starting antifungal
Filamentous	Gutt. Natamycin 5% hourly +/- T. Fluconazole 200-400mg/ day	Gutt. Amphotericin B 0.3% (3mg/ml) or Gutt. Fluconazole 0.2% (2mg/ml) and Ketoconazole 400-600mg/day	Refer all cases to Ophthalmologist. Cornea scrapping for KOH and C&S MUST be taken prior to starting antifungal
Endophthalmitis			
Bacterial Endophthalmitis **Gram-positive** • Staphylococcus epidermidis, • Staph. aureus, • Streptococcus pneumonia, • Strep. spp., etc.	**Ceftazidime:** - Intravitreal 2.25mg/0.1ml - Subconjunctival 100mg - Topical 50mg/ml (5%) **Vancomycin:** - Intravitreal 1mg/0.1ml - Subconjunctival 25mg Topical 50mg/ml (5%)		Common combination for intravitreal antibiotics: Vancomycin and Ceftazidime. May repeat after 48-72 hours May add intravitreal amphotericin B if fungal infection is suspected

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Gram-negative • Pseudomonas aeruginosa, • Bacteroids sp, • Enterococcus sp, **Others,** • Propionibacterium acnes, • Corynebacterium species.	**Amikacin:** - Intravitreal 400ug/0.1ml - Subconjunctival 40mg - Topical 20mg/ml **Gentamicin:** - Subconjunctival 20mg - Topical 10-20mg/ml **Ciprofloxacin:** - Topical 0.3% solution - Intravenous 200-400mg q12h - Oral 750mg q12h (x 14 days) **Moxifloxacin:** - Topical 0.5% solution - Oral 400mg od (x 10 days) **Clarithromycin:** - Oral 500mg q12h (x 14 days)		Risk of retinal toxicity with intravitreal administration Normal renal function Recommended for culture-negative endophthalmitis

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Fungal Endophthalmitis • Candida species, • Aspergillus sp. • Fusarium species, etc.	Amphotericin B: - Intravitreal 5-10ug/0.1ml - Subconjunctival 0.8–1mg - Topical 0.15-0.5% - Intravenous 0.8-1mg/kg/day Fluconazole: - Subconjunctival 2%/1.0ml - Topical 0.2% solution - Intravenous/oral 200-400mg od Voriconazole: - Intravitreal 100ug/0.1ml - Topical 1-2% solution - Oral 200mg q12h Miconazole: - Intravitreal 10ug/0.1ml - Subconjunctival 5mg - Topical 10mg/ml		Common/initial antifungals: Intravitreal , topical and systemic amphotericin B +/- Topical/oral Fluconazole May repeat intravitreal injection after 48-72 hours or may consider to give intravitreal voriconazole in unresponsive case

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Orbital cellulitis			
Strep pyogenes, Strep pneumonia, Staph aureus, Haemophilus influenza (children)	Amoxicillin/Clavunalate 1.2g q8h IV **or** Ceftazidime 50mg/kg 6h IV **or** Metronidazole 500mg 8h IV		1. Depends on culture & sensitivity results 2.Children dosage to adjust according to body weight 3.Surgical drainage is needed in severe cases with periosteal/orbital abcess
Preseptal cellulitis • Strep pyogenes, Strep pneumonia, Staph aureus, Haemophilus influenza (children)	**Mild :** Cloxacillin 500mg q6h po **Severe:** Amoxicillin/Clavunalate 1.2g q8h IV **and/or** Ceftazidime 50mg/kg 6h IV **and/or** Metronidazole 500mg 8h IV	Amoxicillin 500mg/ Clavunalate 125mg bd po	1.Antibiotic regime should cater to results of culture & sensitivity 2.Children dosage to adjust according to body weight

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Ear			
Otitis Externa (Swimmer's ear) (Tympanic membrane intact) Pseudomonas sp., Enterobacteriaceae, Proteus sp.	Sofradex Ear Drop q8h x 1wk	Ofloxacin Ear Drop q12h x 1wk	Treatment should include gentle cleaning. Add oral Cloxacillin 500mg q6h if there is furunculosis. Fungal element must be removed for ear drops to be effective. ENT referral is advised.
Candida albican Aspergillus niger	Clotrimazole Ear Drop q6-8h x 2 wk	(*Nystatin ear Drop q6-8h x 2 wk) *Not available anymore*	
Necrotizing otitis externa Pseudomonas sp.	Ciprofloxacin 400 mg q12h IV x 2wks followed by 500 mg q12h po x 3-4 wks	Cefoperazone/sulb 1 g q12h IV followed by Ciprofloxacin 500 mg q12h po x 3-4 wk	Referral to ENT is mandatory Surgical debridement required when not responding to antibiotic or involving the cranial nerves.

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Acute Otitis media OR Mastoiditis Pneumococci (20-25%), H. influenzae (15-30%), M. catarrhalis(3-20%), Group A Strep (20%), S. aureus (1%) Viral (35%)	Amox/Clav 1.2 g q8h IV x 10 days	Cefuroxime 250-500 mg q12h po x 10days	When ear drum is perforated, add ear drops. If persistent, prolonged or recurrent refer to ENT. If mastoiditis not responding to antibiotic, surgical debridement is advised
Chronic otitis media S. pneumoniae (22%), S. pyogenes (16%), S. aureus (7%), H. influenzae (4%), P. aeruginosa	Sofradex Ear Drops q8h x 2 - wk	Ofloxacin Ear Drop q12h x 2 – 3 wk	• Ear toilet must be performed before instillation of ear drops. • If severe requiring hospitalization, use Ceftriaxone 1 g q12h IV

Febrile neutropenia patients –Empirical and preemptive therapy

(For detailed information please refer to PTS Hematology / Chemotherapy Book)

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	**Alternative**	
Aerobic Gram positive & negative pathogens including CONS, S. aureus, P. aeruginosa, aspergillus, candida	*Pip/Tazo 4.5 g q6h IV **or** * Cefepime 2 g q8h IV **+** Amikacin 15-20 mg q24h IV **or** Netilmicin 4 – 6 mg/kg q24h IV	Ertapenem (if not at risk for pseudomonas),: Meropenem, Imipenem * Doripenem: (if nosocomial pneumonia) **±** #Vancomycin 1 g q12h IV(Dose adjusted according to Target Trough Level) **or** Teicoplanin 6 mg/kg q12h for 3 doses, then 6 mg/kg q24h IV)	***Third line:*** *Anti- fungal* **Subsequent Rx:** *If suspect resistant multidrug resistant bacteria, may need to initiate Polymyxin,* ***Or*** *Tigecycline* ***Or*** *Bactrim*

- Assessment of risk for complications of severe infection should be undertaken at presentation (A-II).
- Initial therapy include β-lactam agents plus aminoglycoside (A-I).
- Low risk patients: (anticipate neutropenia ≤ 7 days or no co-morbidities or pts with MASCC score > 21) may be conisered for monotherapy [A-I}.
- In combination Rx, use aminoglycoside for 5-7 days if no gram negative bacteremia & pt is stable
- #Vancomycin (or agents active against aerobic gram+ cocci) is not recommended as a standard part of the initial empiric Rx (A-I). Indications for addition of for specific clinical indications (suspect catheter- related infection, skin/soft tissue infection, pneumonia, hypotension, severe mucositis, colonization with MRSA)
- Metronidazole may be added in the presence of severe mucositis, intraabdominal infection, perrectal abscesses or pseudomembranous colitis

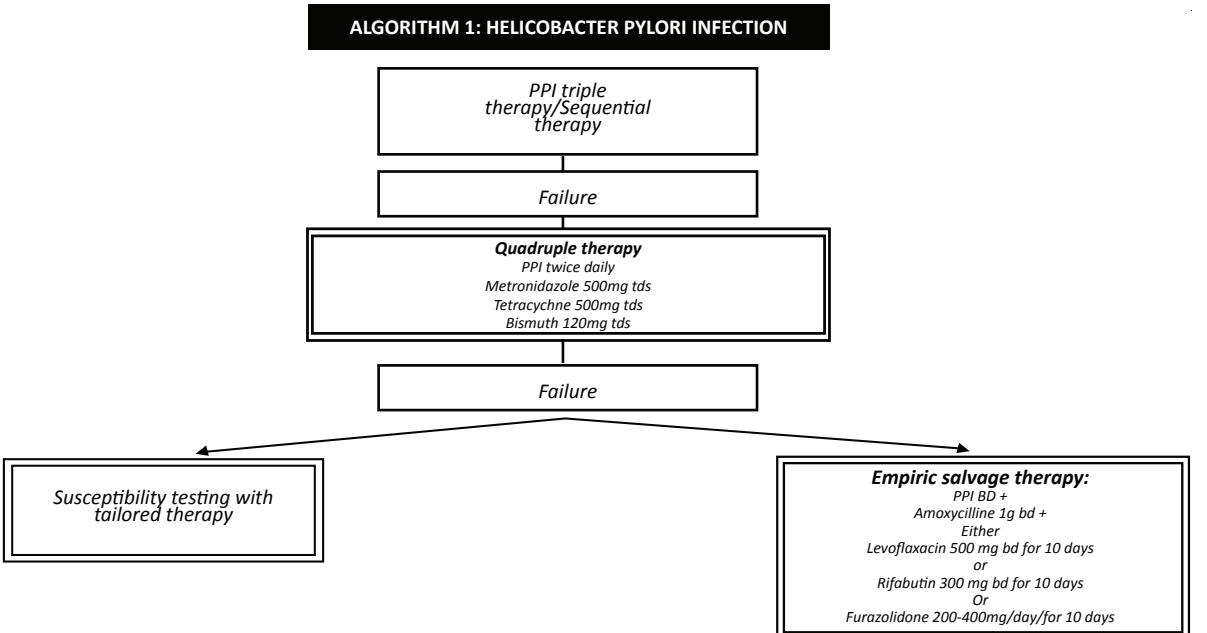
Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
• Modify initial empiric Rx for pts at risk for infection with resistant bacteria (previous infection or colonization with the organism and recent outbreaks e.g. MRSA, ESBL-orga) • Deescalate Rx according to susceptibility testing.			
Fungi (yeast: *candida, mold: aspergillus),*	**Low-risk of invasive mold infection:** Fluconazole 400 mg IV/PO, then 200mg [A-I] *Loading 400 – 800 mg (Sanford- 800mg loading then 400mg maintenance dose)* **High-risk of invasive mold infection** (empirical) #Lipid-Amphotericin B IV 3mg/kg/day [A-I] **or** Caspofungin IV 70mg D1 and 50mg daily [A-I] or Voriconazole 6mg/kg/day bd iv for 2 days then 3mg/kg/day bd iv **or** orally 200mg bd (B1)	Anidulofungin 200mg, then 100mg/d Conventional Amphotericin B 0.5-0.7mg/kg/day(B-I) **or** Itraconazole 200mg bd iv for 2 days then 200mg iv daily for 7 days followed by oral solution 200mg bd (A-I)	Empiric anti-fungal if persistent fever after 4-7 days of a broad-spectrum antibiotic + no identified fever source (A-II) #Lipid formulations are more expensive but have less renal toxicity and infusion side-effects. They have different efficacies and dose recommendations. Other echinocandins have not been studied specifically in empiric therapy but may be alternatives. Capsule itraconazole has unreliable absorption and is not recommended as empirical therapy Voriconazole as primary choice for preemptive and directed therapy for invasive aspergillosis. Amphotericin B as primary choice for mucomycosis. Preemptive therapy or directed therapy involves close monitoring of neutropaenic patients with sinus CT or chest/ abdominal CT and serial galactomannan tests Lipid formulation (if intolerant to conventional Amphotericin B , proven Invasive Fungal Infection or mucomycosis) or Caspofungin

Recommended Treatment according to DIFFERENT SITE
GASTROINTESTINAL INFECTION

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	**Alternative**	
Biliary System			
Gallbladder **Cholecystitis,cholangitis, biliary sepsis (stones)** *Enterobacteriaceae (68%),* *Enterococci (14%),* *Bacteroides (10%),* *Clostridium sp. (7%)*	Cefoperazone 1 g q12h IV x 5 - 7d + Metronidazole 400 mg q8h IV x 5 – 7d	Amox/Clav 1.2 g q8h IV	• In acute cholecystitis, switch to Cefuroxime 250 mg q12h po or Amox/Clav 625 mg q12h po depending on clinical recovery • Patients with acute cholangitis with stent, cover for multiply resistant hosp strains of Gm -ve bacilli including P. aeruginosa consider Pip/Tazo
Gastroenteritis			
EMPIRICAL THERAPY • **Mild to moderate** **Viral,** *parasite & bacterial*	Ab not indicated		• Usually self-limiting. • ORT mainstay of therapy. • Anti-motility agents contraindicated in children.
• ***Severe*** *(> 6 unformed stools and/or temp.,bloody stool)* *Shigella, salmonella, C. jejuni, E. coli 0157: H7, toxin +ve C. difficile, E. histolytica*	Ciprofloxacin 400 mg q12h IV **OR** 250 mg - 500 mg q12h po x 3-5d	TMP/SMX 2 tab q12h po x 3-5d	Most travelers' diarrhea falls into this category.
SPECIFIC THERAPY *Campylobacter jejuni*	Ciprofloxacin 500 mg q12h po x 3-5d	Azithromycin 500 mg q24h po x 3d **OR** EES 800 mg q12h po x 7d	

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Clostridium difficile toxin - positive antibiotic associated colitis	Metronidazole 400 mg q8h po x 7d	Vancomycin 125 mg q6h po x 7d	Avoid antimotility agents. Use Vancomycin 125mg q6h po x 10d if not responding.
E. coli 0157: H7	No antimicrobial therapy recommended		CID 1996; 22: 813. Therapy may increase risk of haemolytic ureamic syndrome.
Cryptosporidium parvum,	* Nitazoxanide 500 mg po q12h x 3d		Symptomatic treatment. Metronidazole NOT effective * Not registered in Malaysia
Entamoeba histolytica	Metronidazole 800 mg q8h po x 10d	Tinidazole 1 g q12h po x 3d	Liver abscess: look under LIVER.
Gardia lamblia	Metronidazole 250 mg q8h po x 5d	Tinidazole 2 g stat	Liver abscess: look under LIVER.
Isospora belli	TMP/SMX x 1 tab q12h po x 10d. If AIDS pt 1 tab q6h x 10 d then q12h x 3 wks		
Listeria monocytogenes	Ampicillin 50 mg/kg q6h IV	TMP/SMX 20 mg/kg/day IV divided by q6-8h	
Microsporidia	Albendazole 400 mg q12h po, then chronic suppression		
Salmonella (non-typhi/non paratyphi)	Supportive ONLY		Antibiotic may prolong carrion state.

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	**Alternative**	
Shigella	TMP/SMX 2 tabs q12h po x 3d	Ciprofloxacin 500 mg q12h po x 3d	Antibiotic may prolong carriage state.
Vibrio cholerae	Doxycycline 300 mg po stat Primary therapy is hydration	Ciprofloxacin 500 mg q12h po stat	Use Ciprofloxacin if there is doxycycline resistance.
Duodenal (Gastric Ulcer)			
Helicobacter pylori (For algorithm pls see next page)	Initial Therapy (7 days) **Amoxicillin 1 g q12h po** + Omeprazole 20 mg q12h po **OR** Esomeprazole 20 mg q12h po **OR** Pantoprazole 40 mg q12h po + **Clarithromycin 500 mg q12h po** *<u>*Sequential therapy*</u> PPI + Amoxycillin = 5 days Followed by PPI + Clarithromycin + Metronidazole= 5 days (total 10 days of treatment)	OBTM (14 days) Omeprazole (20 mg bid) Bismuth subsalicylate (120mg tds) Tetracycline HCl (500 mg tds) Metronidazole (500 mg tds) Meta-analyses show that a 14-day course of therapy is slightly superior to a 7-day course.	In areas where Clarithromycin resistance rate ↑: PPI + Amoxicillin + Metronidazole 400mg q12h po Cure rate 86 – 90% after therapy for 10 days. There are currently insufficient data to recommend *sequential therapy as alternative first-line for H. pylori therapy in Asia. (2nd Asian Pacific Meeting on H. Pylori 2012) Proton pump inhibitor to be taken half an hour before food Smoking adversely affects outcome of HP eradication therapy. If failed, to follow the algorithm below. Bismuth is not available in our center.


ALGORITHM 1: HELICOBACTER PYLORI INFECTION
PPI triple therapy/Sequential therapy
Failure
Quadruple therapy
PPI twice daily
Metronidazole 500mg tds
Tetracychne 500mg tds
Bismuth 120mg tds
Failure
Susceptibility testing with tailored therapy
Empiric salvage therapy:
PPI BD +
Amoxycilline 1g bd +
Either
Levoflaxacin 500 mg bd for 10 days
or
Rifabutin 300 mg bd for 10 days
Or
Furazolidone 200-400mg/day/for 10 days

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Diverticulitis			
No signs of bowel perforation Enterobacteriaceae, Bacteroides Enterococci	Cefoperazone 1 g q12h IV + Metronidazole 400 mg q8h po x 7d	Ertapenem 1 g q24h IV	Treat until afebrile 3-5d
Hepatic Abscess :			
Pyogenic Abscess *Enterobacteriaceae,bacteroides, enterococci* ***Amoebic abscess***	Ceftriaxone 2 g q24h IV + Metronidazole 500 mg q8h IV Metronidazole 500 mg q8h IV	Ertapenem 1 g q24h IV	If serology for amebiasis negative, consider drainage of abscess. Change to oral Metronidazole 800 mg q8h when pt improves. Treat for 10 days. Confirm sensitivities with culture.
Hepatitis			
Viral hepatitis *Hepatitis B* *Post-exposure prophylaxis (see Chapter 3b: Viral)*	Hepatitis B immune globulin (100iu/0.5ml or 100200iu/ml). Perinatal: 0.5ml IM. Percutaneous: 1ml IM. Sexual: 1ml IM		Give within 12hrs of exposure or within 48hr post-delivery for neonate prophylaxis. For sexual exposure, give within 14 days of sexual contact

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Chronic hepatitis B	Pegylated Interferon 2a/2b/weekly SC x 48 wks	Adefovir 10 mg q24h po Or Entecavir 0.5 mg q24h po Or Telbivudine 600mg q24h po Or Tenofovir 300mg q24h po	Indication :- Persistent high ALT > 2 ULN HBV DNA ≥ 20,000 iu/ml (For HBeAg Neg) Immediate treatment maybe required if jaundice or decompensated
Chronic Hepatitis C **Genotypes 1&4**	Ribavirin 400 mg am 600 mg pm po + Pegylated Interferon alfa 2a/2b/weekly SC x 48 wks		For ESRD (CrCL <10ml/min), Ribavirin is contraindicated, use Pegylated Interferon alfa 2a: 135mcg/week SC or alfa 2b weight-based
Genotypes 2-3	Ribavirin 400mg am 600mg pm po + Pegylated Interferon alfa 2a/2b weekly SC x 24 wks		
Pancreas			
Pancreatic Abscess, Infected Pseudocyst, Infected Necrosis *Enterobacteriaceae, enterococci, S. aureus, S. epidermidis, anaerobes, candida*	Imi/Cilas 500 mg q6h IV	Pip/Tazo 4.5 g q8h IV	Antibiotics NOT required in initial therapy of acute pancreatitis.

Infection/Possible Organisms	Suggested Treatment		Comments
Perirectal abscess	**Preferred**	**Alternative**	
Enterobacteriaceae, Bacteroides (Enterococci)	Cefoperazone 1 g q12h IV + Metronidazole 400 mg q8h po x 7d	Amox/Clav 1.2 g q8h IV OR Amox/Clav 625mg q12h po	Surgical drainage is most important
Peritonitis			
Primary (spontaneus) Enterobacteriaceae (63%), S. pneumo (15%), Enterococci (6-10%), Anaerobes (<1%)	Cefoperazone 1g q12h IV x 5-10d	Ertapenem 1 g q24h IV x 5-10d Or Ceftriaxone 1g IV q24h	30-40% are culture neg. if blood culture +ve, suggest treat 2 wks. Switch to Cefuroxime 250 mg q12h po for discharge.
Splenectomy			
S. pneumoniae, Haemophilus influenzae, N. meningitidis	Ceftriaxone 2 g q24h IV	Moxifloxacin 400mg q24 IV	Patient should have Pneumococcal, Meningococcal and H. Influenzae vaccination & receive prophylaxis with Penicillin V (Please see Chapter 5c Medical Prophylaxis) For patient with bleeding disorders and there is concern about giving vaccinations, vaccinations. Can be given subcutaneously including HiB vaccine.

Recommended Treatment according to DIFFERENT SITE
GENITOURINARY TRACT & GYNAECOLOGICAL INFECTIONS (By anatomic site)
Kidney/ Bladder/Urethra/Prostate/Epididymis/Testes/vagina

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Uncomplicated Cystitis			
E coli *Klebsiella* *Proteus* *Staphylococci*	TMP/SMX 160/800mg q12h PO x 3d **or** Nitrofurantoin 100mg q12h PO x 5d	Cefuroxime 250mg q12h PO x 3d	Avoid tetracyclines or fluoroquinolones in children Avoid Bactrim (TMP/SMX) in pregnancy
Uncomplicated Pyelonephritis			
E coli *Proteus* *Klebsiella* *Other enterobacteria* *Staphylococci*	Ciprofloxacin 500mg q12h PO x 7-10d	Amox/Clav 625mg q12h PO x 14d	Consider parenteral treatment if severe before switching to oral regimen

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Complicated UTI (with or without pyelonephritis)			
E coli *Proteus* *Klebsiella* *Enterococci* *Pseudomonas* *Staphylococci* *Enterobacter*	Ciprofloxacin 400mg q12h IV	Amox/Clav 1.2g q12h IV	Continue 3-5 days after fever settles or control/elimination of complicating factors
Gonococcal Urethritis			
N gonorrhea (50% has concomitant C trachomatis)	Ceftriaxone 250mg IM stat	Cefotaxime 500mg IM stat ***or*** Azithromycin 1g PO stat **or** Doxycycline 100mg q12h PO x 7d	Dilute Ceftriaxone in Lignocaine
Non Gonococcal Urethritis			
C trachomatis *M genitalium*	Azithromycin 1g PO x 1d **or** Doxycycline 100mg q12h PO x 7d	Erythromycin 500mg q6h PO x 7d **or** EES 800mg q6h PO x 7d	

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
E coli *Other enterobacteria* *Pseudomonas* *Enterococci* *Staphylococci*	Ciprofloxacin 500mg q12h PO	TMP/SMX 160/800mg q12h PO	Acute - Consider starting IV if severe before switching to oral - Total duration of 4 weeks Chronic -Total duration of 4-6 weeks or longer
Ureaplasma	Ceftriaxone 1g IV stat + Doxycycline 100mg q12h PO x 7d	Erythromycin 500mg q6h PO x 7d **or** EES 800mg q6h PO x 7d	
Epididymitis/Epididymoorchitis			
Suspected STD due to Gonococcal or Chlamydial infection	Ceftriaxone 250mg IM stat + Doxycycline 100mg 12h PO x 10d		Dilute Ceftriaxone in Lignocaine
Related to UTI (Enteric organism)	Ciprofloxacin 500mg q12h PO x 14d	TMP/SMX 160/800mg q12h PO x 10d **or** Amox/Clav 625mg q12h PO x 10d	

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Pelvic Inflammatory Disease			
Mild to moderate PID (no tubo-ovarian abscess): Outpatient management *Chlamydia trachomatis* *Neisseria gonorrhea* *Mycoplasma genitalium* *Anaerobes*	IM ceftriaxone 250mg stat, followed by doxycycline PO 100mg BD + Metronidazole po 400mg BD (14 days)	IM ceftriaxone 250mg stat followed by Azithromycin PO 1g/week for 2 weeks	
Severe PID/tubo-ovarian abscess/intolerance or not responding to oral therapy: *(Intravenous antibiotic should be continued until 24 hours after clinical improvement)*	IV ceftriaxone 2g daily + Doxycycline PO 100mg BD + metronidazole 400mg BD PO (14 days)	1)IV clindamycin 900mg OD plus 2)IV gentamicin (2mg/kg loading followed by 1.5mg/kg TDS), followed by clindamycin 450 mg QID PO (14 days) **OR** 1) Doxycycline po 100mg BD plus 2)metronidazole 400mg BD po (14 days)	Though PID in pregnancy is rare, if found to be pregnant, tetracycline should be avoided. A combination of cefotaxime, azithromycin and metronidazole for 14 days can be used.

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Vaginitis			
anaerobic or microaerophiles organisms (Gardnerella vaginalis, Prevotella species, Mycoplasma hominis, Mobiluncus species)	Metronidazole po 500 mg bd for 7 day, **or** • Metronidazole 2 g single dose po • Neo-Penotran 1 suppository at night for 14 days, **or** 1 suppository bd for 7 days	Neo-Penotran 1 suppository bd for 14 days, or Neo-Penotran Forte 1 suppository OD for 14 days.	If allergic to Metronidazole, Clindamycin 300 mg twice daily po for 7 days
VAGINAL CANDIDIASIS *Candida species, commonest – candida albican*	Nystatin pessary 100,000 units for 14 days OR Clotrimazole pessary 100mg daily for 7 days **or** 200mg for 3 days	Miconazole pessary 100mg daily for 7 days • Fluconazole 150 mg stat • Itraconazole 200mg BD for 1 day **or** 3 days	

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
UTI in Pregnancy			
UNCOMPLICATED UTI (cystitis, urethritis) *Escherichia coli (E. coli)* *Proteus mirabilis* *Klebsiella pneumoniae* *enterococci including Gardnerella vaginalis and Ureaplasma ureolyticum* *Gram-positive organisms -Group B streptococcus,Staphylococcus saprophyticus and Staphylococcus haemolyticus*	Cefuroxime 250 mg q12h po x 7-10d	Amox/Clav 625 mg q12h po x 7-10d	Cystitis in pregnancy, do not use tetracycline and quinolones. Nitrofurantoin, TMP/SMX avoid at third trimester
ACUTE PYELONEPHRITIS (in pregnancy)	Cefuroxime 1.5 g stat then 750 mg q8h IV		

(Society of Obstetricians and Gynaecologists Canada clinical practice guidelines. J Obstet Gynaecol Can 2008;30(8):702–708) ,
CDC Vaginal discharge - STD Treatment Guideline 2006

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Chorioamnionitis/Septic Miscarriage/Endomyometritis			
Bacteroides *Gp B & A Streptococcal* *Escherichia coli* *Mycoplasma hominis* *Gram-negative anaerobes* *Ureaplasma urealyticum* *Gardnerella vaginalis* *Trichomonas vaginalis*	IV Ampicillin 2 g stat and every 6 hours plus IV Gentamicin 1.5 mg/kg every 8 hours plus Metronidazole 500 mg IV every 8 hours	IV Ampicillin 2 g stat and every 6 hours plus IV Gentamicin 1.5 mg/kg every 8 hours plus IV Clindamycin 900 mg every 8 hours	In penicillin-allergic patients, IV Vancomycin 1 g every 12 hours to substitute the IV Ampicillin. *ACOG educational bulletin. Antimicrobial therapy for obstetric patients. Number 245, March 1998.* Int J *Gynaecol Obstet. 1998; 61:299-308*

INTRAVASCULAR CATHETER-RELATED INFECTION

Short lines (SL) include Short-term Central Venous Catheter or arterial catheter-related Blood Stream Infection;
Long lines (LL) include CVC & ports = LL

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Complicated – suppurative thrombophlebitis, endocarditis, osteomyelitis etc	-	-	Remove catheter & treat with systemic antibiotics for 4-6 weeks, , 6-8 weeks for OM in adults
Uncomplicated bloodstream infection & fever resolves within 72 hours in a patient who has no evidence of suppurative thrombophlebitis & endocarditis Coagulase-negative Staph aureus i) Methicillin susceptible ii) Methicillin resistant	Cloxacillin 2 g q4H Vancomycin 15 mg/kg q12H	First generation cephalosporin or vancomycin Daptomycin 6mg/kg/day or linezolid	May retain CVC or P & use systemic antibiotics for 10-14 days & antibiotic lock therapy for 10-14 days. Remove if there is clinical deterioration → systemic antibiotics min 7 days
Staph aureus *i) Methicillin susceptible* *ii) Methicillin resistant*	Cloxacillin 2 g q4H Vancomycin 15 mg/kg q12H	Vancomycin 15 mg/kg q12H Daptomycin 6-8 mg/kg/day Linezolid Vancomycin (plus rifampicin or gentamycin) Bactrim (TMP/SMX) alone if susceptible	Remove catheter Systemic antibiotics for ≥ 14 days for Short Line; 4-6 weeks for Long Line
Enterococcus i) Amp susceptible	Ampicillin 2g q4H or q6H± gentamicin 1 mg/kg q8H		For Short Line: Remove catheter & Systemic antibiotics for 7 - 14 days

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
ii) Amp resistant, vancomycin susceptible iii) Amp resistant, vancomycin resistant	Vancomycin 15mg/kg q12H ± Gentamicin 1 mg/kg q8H Linezolid 600mg q12H **or** Daptomycin 6mg/kg/day		For Long Line: May retain Central Venous Catheter or Port & use systemic antibiotics for 7-14 days & antibiotic lock therapy for 7-14 days. Remove CVC or P if there is clinical deterioration
E.coli & Klebsiella sp i) ESBL-ve ii) ESBL +ve	3rd gen cephalosporin eg Ceftriaxone 1-2 g/day Ertapenem 1 g/day Imipenem 500mg g6H Meropenem 1g q8H	Ciprofloxacin **or** Aztreonam Ciprofloxacin **or** Aztreonam	For SL: Remove catheter Systemic antibiotics for 7 - 14 days For LL: Remove catheter& systemic antibiotics for 7 - 14 days. If need to salvage LL, systemic & antibiotic lock therapy for 10-14 days. If no response, remove CVC/P & rule out endocarditis or suppurative thrombophlebitis, & if not present, treat with antibiotics for 10-14 days
Acinetobacter sp	Amp/Sulb 3g q6H **or**, Imipenem 500mg g6H Meropenem 1g q8H	Polymyxin B, Tigecycline	

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Stenotrophomonas maltophilia	TMP-SMX 3-5 mg/kg (trimethoprim component) q8H	Ticarcillin & Clavulanic acid	
Pseudomonas aeruginosa	Cefepime 2g q8H **or** Imipenem 500mg g6H **or** Meropenem 1g q8H **or** Pip/Tazo 4.5g q6H, Amikacin 15mg/kg q24H	Sulperazone, Doripenem	
Burkholderia cepacia	TMP-SMX 3-5 mg/kg (trimethoprim component) q8H **or** Imipenem 500mg g6H **or** Meropenem 1g q8H		

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Candida albicans or other Candida sp	Caspofungin 70mg loading dose then 50 mg/day **or** Anidulafungin 200mg loading dose then 100 mg daily **or** fluconazole 400- 600mg/day	Lipid Amp B	Remove catheter Antifungal therapy for 14 days after the first negative blood culture

Notes:
1. When denoting the duration of antimicrobial therapy, day 1 is the first day on which negative blood culture results are obtained (C-III).
2. Linezolid should not be used for empirical therapy (i.e.,in patients suspected but not proven to have CRBSI) (A-I).Catheter Related Blood stream infection
3. Empirical combination antibiotic coverage for MDR gram-negative bacilli, such as P. aeruginosa, should be used when CRBSI is suspected among neutropenic patients, severely ill patients with sepsis, or patients known to be colonized with such pathogens
4. Empirical therapy for suspected catheter-related candidemia should be used for septic patients with any of the following risk factors: total parenteral nutrition, prolonged use of broad-spectrum antibiotics, hematologic malignancy, receipt of bone marrow or solid-organ transplant, femoral catheterization, or colonization due to Candida species at multiple sites (B-II).
5. Antibiotic lock therapy should be used for catheter salvage (B-II); however, if antibiotic lock therapy cannot be used in this situation, systemic antibiotics should be administered through the colonized catheter (C-III).

Source: Mermel LA et al. CPG for the Diagnosis and Management of IV Catheter-Related Infection: 2009 Update by the IDSA. Clinical Infectious Diseases 2009; 49:1-45

Recommended Treatment According to DIFFERENT SITE

ODONTOGENIC

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
ODONTOGENIC INFECTION			
Oral microflora: *spirochaetal org., streptococci, anaerobes*	Amox/Clav 625mg q12h po x 5d + Metronidazole 400 mg q8h po x 5d (mild infection)	Amox/Clav 1.2 g q8h IV x 5d + Metronidazole 500 mg q8h IV x 5d (severe, spreading infection)	Oral surgery consultation highly advised to rule out odontogenic in origin _Mainstay of treatment in abscess cases are drainage and aggressive therapeutic
Streptococcus species (95%), *Peptostreptococcus,* *Peptococcus,* *Actinomyces,* *Lactobacillus (gram + anaerobes)* • *Bacteroides,* *Veillonella, and Fusobacterium.* *(anaerobic gram-neg)*	Mild to moderate infection Pen V PO 500 mg q6h po ± Metronidazole PO 400 mg q8h x 5-7 days	*Amox/Clav PO 625mg q8h x 5-7 days* **OR** *Cephalexin PO500 mg q6h* **OR** **erythromycin* **OR** ** Clindamycin* **For Penicillin allergy patients*	Amox/Clav for pts who have previously been treated with a β-lactam antibiotic & still have an unresolved infection or infected with β-lactamase-producing organisms include *Bacteroides, Prevotella sp.*

Recommended Treatment According to DIFFERENT SITE

ODONTOGENIC

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
	Severe infection Clindamycin PO 150-300 mg q6h-8h x 5-7 days		Clindamycin is a good alternative to penicillin in mild to moderate OI where β-lactamase producing organisms may be present, and its broad spectrum makes it the drug of choice for empiric therapy of severe OI. Appropriate dental procedures should always be the first line of care, with antibiotics serving as adjunctive therapy Antibiotic therapy is indicated primarily when drainage cannot be adequately established, when the infection has spread

Recommended Treatment According to DIFFERENT SITE

ODONTOGENIC

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
ODONTOGENIC INFECTION			
			to the surrounding soft tissue, or when systemic symptoms are evident. Early and aggressive treatment with both surgery and antibiotics is indicated in immunocompromised patients in order to prevent progression of disease. Source: CPJ/RPC • DECEMBER 2004/JANUARY 2005, VOL. 137, NO. 10: 25-29

Recommended Treatment according to DIFFERENT SITE
Respiratory Tract Infection

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
UPPER RESPIRATORY TRACT			
Acute pharyngitis/ Laryngitis/Tonsilitis *Strep. pyogenes virus (laryngitis)*	Amox/Clav 625 mg q12h po x 1 wk	Cefuroxime 500 mg q12h po x 1 wk	If severe, it may be necessary to start with parenteral antibiotic. If recurrent, surgery is mandatory.
Diphtheria *Corynebacterium diphtheriae*	Benzylpenicillin (Pen G) 1 MU /kg/day in divided q6h IV x 7d		Antitoxin is critical in management 1 Mega unit Pen G = 0.6g
Acute epiglottitis H. infuenzae *S. pneumoniae*	Cefuroxime 1.5 g stat then 750mg q8h IV x 10d		
Acute otitis media/sinusitis *Strep. pneumoniae, H. influenzae, Moraxella catarrhalis, Clamydia*	Amox/Clav 675mg q12h po x 10d		Cefuroxime 500 mg q12h po x 10d
Acute tracheobronchitis *Viral, M. pneumoniae, C. pneumoniae, B. pertussis*	Erythromycin ES 800 mg q12h po x 5d		Most are of viral origin

Recommended Treatment according to DIFFERENT SITE
Respiratory Tract Infection

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
UPPER RESPIRATORY TRACT			
Acute bacterial exacerbation of chronic bronchitis *Viral,* *S. pneumoniae,* *H. influenzae, Moraxella catarrhalis*	**Azithromycin 250 – 500 mg q24h po x 3d** + Amox/Clav 625 mg q12h po **OR** Cefuroxime 250 – 500 mg q12h po	Erythromycin ES 800 mg q12h po x 5d **OR** Azithromycin 250-500 mg q24h po x 3d **OR** Moxifloxacin 400 mg q24h po/iv x 5d	Value of antibiotic in mild exacerbations controversial
LOWER RESPIRATORY TRACT (Pneumonia)			
Community – acquired **Adults** *(out-patient Rx, no co-mobidity)* *S. pneumoniae,* *K. pneumoniae,* *M. pneumoniae* *C. pneumoniae* *Resp. viruses,* *H. influenzae* *Legionella sp.* *C. psittaci* *For all patients, consider tuberculosis.*	Erythromycin ES 800 mg q12h po x 5d **OR** Azithromycin 500 mg q24h po x 3d **OR** Amoxycillin 500mg tds	Clarithromycin 500 mg q12h po x 5d	*Treat M. pneumoniae for 14-21 days with macrolide or fluoroquinolone.*

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Adults **(out-patient Rx, with co-morbidity)**	Amox/Clav 625 mg q12h po **OR** Cefuroxime 500 mg q12h po + Erythromycin ES 800 mg q12h po **OR** Azithromycin 500 mg q24h po x 3d	Moxifloxacin 400 mg q24h x 5d	
Adults (hospitalized) *As above plus anaerobes (if aspiration risk is high), Moraxella, coliforms, resp. viruses, Coxiella burnetti* Community-acquired MRSA (CA-MRSA) Influenza A (seasonal)	Amox/Clav 1.2 g q8h IV + Azithromycin 500 mg q24h IV/ po x 5d • TMP-SMX Double Strength /Clindamycin /doxycycline • Oseltamivir 75mg bid po for 5 days	Ceftriaxone 1-2 g q24h IV + Azithromycin 500 mg q24h IV x 3-5d OR Moxifloxacin 400 mg q24h IV (MONOTherapy)	Consider different antibiotic class if patient had received previous antibiotic treatment in the preceding 3 months. In suspected melioidosis, use Ceftazidime 2 g q8h IV Switch antibiotic according to sensitivity. Switch to po when the pt's condition has improved. For severe cases, use alternative regimes. If risk factors* for pseudomonas aeruginosa use anti-pseudomonal beta-lactam (pip-tazo, cefepime, ceftazidime) * Use of broad-spectrum antibiotic in past month, bronchiectasis, malnutrition , steroid use. May occur with or post -influenza

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	**Alternative**	
Aspiration pneumonia ± lung abscess, empyema Bacteroides (*15% B. fragilis*), *peptostreptococci, Fusobacterium sp., S. milleri group, nocardia S. pneumoniae, Grp A Strep, S. aureus, H.influenzae, K. pneumoniae* Anaerobic strep, Enterobactericeae	Amox/Clav 1.2 g q8h IV	Clindamycin 450-900 mg q8h IV OR **Ceftriaxone 2 g q24h IV** **+** **Metronidazole 500 mg q8h IV x 2wks (dual therapy)** **OR** Moxifloxacin 400 mg q24h IV/po	Clindamycin 600 mg q6h po maybe used in lung abscess after initial IV therapy. Prolonged Rx up to 4 months may be necessary. Empyemas should be drained.
Hospital-acquired Pneumonia			
Early onset hospital-acquired pneumonia (2-4 days) and no risk for multidrug-resistant organisms *S. pneumoniae, H.influenzae, Methicillin-sensitive S. aureus. Antibiotic-sensitive enteric Gram-negative bacilli: E. coli K. pneumoniae, Enterobacter sp, Proteus sp, Serratia marcescens.*	Ceftriaxone 1- 2 g q24h IV **or** Amox/Clav 1.2 g q8h IV **or** Cefoperazone/Sulb 1-2 g q12H IV	Ertapenem 1 g q24H IV **OR** Moxifloxacin 400 mg q24h iv	Organisms in early HAP mirror that in the community; the regimes do not cover Pseudomonas. Choices of oral therapy for de-escalation: Cefuroxime 500 mg q12H Moxifloxacin 400 mg q24H Amox/Clav 625 mg q12H

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Late onset hospital-acquired pneumonia (≥5 days) **Healthcare-associated pneumonia** Aerobic Gram-negative bacilli Enterobacter, *Klebsiella, Acinetobacter, Pseudomonas sp., Legionella sp., S. aureus,* MRSA	Pip/Tazo 4.5 g q8h IV **OR** Cefepime 1-2 g q12h IV	Imipenem/Cilastatin 500 mg q6h IV **OR** Meropenem 1 g q8h IV (Reserve carbapenems for ESBL-producing strains)	Organisms in HCAP and late-onset HAP are more likely to be multidrug resistant organisms. Reserve polymyxin B in Acinetobacter infection proven to be multidrug-resistant. Consider combining anti-pseudomonal agents and quinolone or aminoglycoside in neutropenic sepsis and confirmed Gram-negative bacteraemic patients who are unwell or not improving. Duration of aminoglycoside is 5-7 days. For MRSA, treat with vancomycin, alternative is linezolid. Add Erythromycin / Azithromycin if Legionellosis suspected. In culture-negative patients, 7-10 days duration is as effective as 14 days. Culture-negative patients who have significant clinical improvement in 48-72H, consider antibitotic discontinuation.De-escalate to oral therapy in culture positive patients with significant response (except MRSA). In less severe HCAP patients, consider treating as outpatient using ciprofloxacin to cover Pseudomonas and adding azithromycin to cover atypical organisms. Suggested duration is 5 -7 days.

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Health Care Associated Pneumonia			
HCAP is used to designate patients with many co-morbidities who reside in nursing homes, other long-term care facilities, require home IV therapy or are dialysis pts. Normally resembles hospital-acquired pneumonia.			
Ventilator Associated Pneumonia (VAP)			
Lung infection in patient mechanically ventilated for more than 48 hours. Ventilator associated pneumonia (VAP) occurring less than 5 days of hospitalisation is less likely to be due to multidrug resistant (MDR) organism and has a better prognosis as compared to VAP occurring after 5 days of ventilation			
Less than 5 days hospitalised and without risk of MDR *S.pneumonia* *H.influenza* *S.aureus* *E.coli* *K.pneumoniae* *Enterobacter spp.* *Proteus spp.* *Serratia marcescens*	Ceftriaxone IV 1-2g q24h	Amoxycillin/Clavulanate IV 1.2g q8h	VAP bundle to reduce the incidence. 1. Daily interrupted sedation 2. Head up 30 degree positioning 3. Peptic ulcer prophylaxis 4. Deep vein thrombosis prophylaxis 5. Daily assessment for extubation Monotherapy is favoured over combination therapy. Duration of therapy 7-10 days
More than 5 days hospitalised and with risk of MDR *P.aeruginosa*	Piperacillin/tazobactam IV 4.5g q6h **OR** Cefepime IV 2g q12h	Imi/Cilas 500 mg IV q6h OR Meropenem IV 1 g q8h	Monotherapy is favoured over combination therapy Duration of therapy 7 -10 days. Aminoglycoside may be added in selective case. Amikacin 15-20 mg/kg q24h IV

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
[1]*Acinetobacter spp.* [2]K.pneumoniae (ESBL)	[1] Sulbactam/cefoperazone 2g q6h or Amoxycillin/ sulbactam 3g q6h for Acinetobacter spp. (non multi resistant organism (nMRO) [2]Use carbapenem for ESBL organisms. Consider ertapenem in clinically improving patient.		OR Netilmicin 4-6 mg/kg q24h IV No clear evidence to suggest superiority of combination therapy against monotherapy. Always consider the risk and benefit.
Acinetobacter MDR (multidrug resistant organism	Polymyxin B 25,000 u/kg/day in two divided dose		Duration of therapy 14 days. *Polymyxin: 1mg base = 10,000units* *100mg = 1 million units = 1 mega units*
Stenotrophomonas maltophilia	TMP/SMX 15-20 mg/kg q24h IV (in divided doses)	Doxycycline 100 mg q12h po	
MRSA	Vancomycin 15mg/kg bd (actual body weight) (Target trough level: 10-15µmol/L)	Linezolid 600 mg q12h IV/ po	For serious infection, give vancomycin loading dose 25-30mg/kg.

Recommended Treatment According to DIFFERENT SITE
SEXUALLY TRANSMITTED DISEASES (STDs)

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
GENITAL TRACT			
BOTH SEXES Anogenital warts *Human papillomavirus 6, 11*	Doctor- administered: Trichloroacetic Acid (TCA) : Consult Dermatologist	Patient-administered: Imiquimod 5% sachets [Aldara®] (non formulary) 3 times/wk	Cryotherapy or electrocautery also effective Consider HPV vaccination.
GONORRHEA (urethritis, proctitis, prostatitis			
N. gonorrhoeae *(50% has concomitant C. trachomatis)*	Ceftriaxone 1g IM/IV q24h x 1d + Doxycycline 100mg q12h po x 14d	Ofloxacin 400 mg q24h po x 1d + Doxycycline 100 mg q12h x 14 d	Azithromycin 1 g stat may replace Doxycycline
Disseminated Gonococcal Infection			
N. gonorrhoeae	Ceftriaxone 1 g q24h IV	Cefotaxime 1 g q8h IV	Treat for 7-10 days
Non-gonococcal (urethritis/cervicitis)			
Chlamydia (50%), Mycoplasma hominis (25%)	Doxycycline 100 mg q12h po **OR** Erythromycin ES 800 mg q12h po x 7 – 14d	Azithromycin 1g stat po	

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Herpes Simplex			
Herpes simplex virus - 2	Acyclovir 200 mg 5x/day po x 5days	Famciclovir 250 mg q8h x 5d	For chronic suppression (frequent recurrence) give either drug q12h po x 6 mths.
Syphilis (Early primary, Secondary			
T. pallidum (< 2 year)	Benzathine Penicillin 2.4 MU IM wkly x 2 wks **OR** Procaine penicillin 1.2 MU q24h IM x 10day	Doxycycline 100 mg q12h po x 3 wks **OR** Ceftriaxone 1 g q24h IM x 4d	Contact tracing of sex partners
T. pallidum Late: Syphillis infection of more than > 2 year)	Benzathine 2.4 MU IM weekly x 3 wk		If allergic to Penicillin: Doxycycline 100 mg q12h po for 28 days
Congenital	Pen G 50,000u/kg q12h IV x 10-14d		
Chancroid			
Haemophilus ducreyi	Ceftriaxone 250 mg IM x 1day	Azithromycin 1g po x 1d	

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Lymphogranuloma venereum			
Chlamydia trachomatis	Doxycycline 100 mg q12h x 2 wk	Erythromycin ES 800 mg q12h po 2 wk	Doxycycline contraindicated in pregnancy + breast feeding
Granuloma inguinale			
Calymmatobacterium granulomatis	Doxycycline 100 mg q12h 2 –3 wks	Erythromycin ES 800 mg q12h po 2-3 wk	

Recommended Treatment according to DIFFERENT SITE
BONE & JOINT INFECTIONS

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Osteomyelitis			
Haematogenous Adult (>21 yrs) *S. aureus most common + wide variety other aerobic/anaerobic cocci and bacilli*	Cloxacillin 2 g q6h IV **OR** Cefazolin 2 g IV q8h	Vancomycin 1.0g q12h IV (in proven MRSA infection)	A microbiologic diagnosis is essential as it is difficult to predict the **offending organism** based on epidemiology. Also take blood culture and culture from affected site. Choice of antibiotic based on blood and bone culture report.
Special circumstances **Sickle cell anaemia** *Salmonella sp*	Ciprofloxacin 400 mg q12h IV	Ceftriaxone 2 g q24h IV	
ACUTE Osteomyelitis with good vascular supply			
Post open reduction internal fixation (ORIF), Open fractures Grade I & II fractures Staphylococcus sp. Gm-ve bacilli;Pseudomonas aeroginusa MSSA	Cloxacillin 2 g q6h IV **OR** Cloxacillin 500 mg q6h po	Clindamycin 300 mg q6h IV/po	

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
MRSA	Vancomycin 1.0 g IVq12h + Ceftazidime 2g q8h as primary until culture report available.	Teicoplanin 400 mg q24h IV + Rifampicin 450 mg q12h po + Fusidic acid 500 mg q8h po	Choice of antibiotic is based on culture sensitivity.
Post-op prosthetic joint or post-op sternotomy Staph. epidermidis (CONS) Pseudomonas aeruginosa	Cloxacillin 2g q4h IV + Rifampicin 450 mg q12h po Ceftazidime 2.0g q8h + Ciprofloxacin 750mg q12h po.	Vancomycin 1g bd + Rifampicin 450 mg q12h po	No empiric therapy until culture and sensitivity results is available Surgical options ; refer to AAOS recommendation for the diagnosis of periprosthetic joint infections of the hip and knee: Guideline and evidence report . DO NOT initiate antibiotic treatment in patients with suspected peri-prosthetic joint infection until after cultures from the joint have been obtained.

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Acute Osteomyelitis With Vascular Insufficiency			
Pts with neurologi c deficit & decubitius; atherosclerotic peripheral vascular dis; diabetic neuropathy Polymicrobic organisms (aerobic & anaerobic pathologens)	Cefuroxime 1.5g stat then 750 mg q8h IV + Metronidazole 500 mg q8h IV	Amp/Sulb 1.5g q6h IV **OR** Cloxacillin 2 g q6h IV + Gentamicin 4-6mg/kg q24h IV + Metronidazole 500mg q8h IV	Surgical debridement is often mainstay of therapy. Duration of treatment depends on respond.(until ESR or CRP normalize) Need bone culture and sensitivity. No empiric therapy unless acutely ill.
CHRONIC Osteomyelitis (implies presence of dead bone)			
S. aureus, Enterobacteriaceae, P. aeruginosa	Empiric treatment not indicated. Choice of antibiotic should be based on culture results.		Debridement is necessary for optimal respond to antibiotics. (not beyond 6 weeks)

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Diabetic Foot Infection			
Acute, mild, no osteomyelitis Gm +ve cocci	Cefuroxime 750 mg q8h IV	Amox/Clav 1.2g q8h IV	
Chronic, recurrent, limb threatening Polymicrobic: aerobic cocci, bacilli and anaerobes	Cloxacillin 1g q6h IV + Gentamicin 4-6mg/kg q24h IV + Metronidazole 400 mg q8h po x 7-10d		Surgical debridement important aspect of management.
Ulcer without inflammation	Coloniser(skin flora) – No antibacterial therapy		
Ulcer with < 2cm of superficial inflammation Stap.aureus, S.agalactiae,S.pyogenes	TMP-SMX-DS 1-2 tabs po bid + Cefuroxime Axetil 500mg po q12h		
Ulcer > 2cm of inflammation with extension to fascia Stap.aureus, S.agalactiae,S.pyogenes, coliforms –	Oral Amox/Clav + TMP-SMX-Double Strength (980mg) IV Ampi/Sulbactam 3gm IV q6h	IV PIP-Tazo or Ertapenem 1 gm IV q12h	

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Joints: Septic Arthritis			
S. aureus.	Cloxacillin 2 g q6h IV x 1wk **OR** Cefuroxime 750 mg q8h IV	Ceftriaxone 1g q24h IV	MRSA suspected / proven give Rifampicin 600 mg po q24h + Fusidic acid 500 mg q8h po.
N. gonorrhoea *Streptococci*	Ceftriaxone 1g q24h IV/ IM x 1d + Doxycycline 100 mg bid po x 14d Cefuroxime 750 mg q8h IV	Ceftriaxone 1g q24h IV	• Arthrotomy may be required to drain pus. • 1 week of parenteral followed by 4-5 weeks oral antibiotic. • Gram negative cocci are rare. • Gram Stain as guide for empirical therapy
PROSTHETIC JOINT, POST-OPERATION, POST-INTRAARTICULAR INJECTION			
Staph. epidermidis(CONS), MRSA	Vancomycin 1 g q12h IV **OR** Teicoplanin 400 mg q24h IV + Rifampicin 450 mg q12h po	Linezolid 600 mg q12h po	Retention of prosthesis associated with high Rx failure rate. Removal of loose prosthesis is recommended.

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
MUSCLE			
"GAS GANGRENE" **(contaminated traumatic wound)** Cl. perfringens, other histotoxic Clostridium sp	Penicillin G 4 MU q4h IV + Clindamycin IV 900 mg q8h	Ceftriaxone 2gm IV q12h	Surgical debridement is primary therapy
Necrotising Myofascitis Mixed infection with coliforms + anaerobes Type 1 – Strep sp Gp A,C and G Type 2 – Clostridial sp. Type 3 – polymicrobiol (aerobic + anaerobic strep) Type 4 – Community associated MRSA	Imipenem 1 g q6h IV **OR** Meropenem 1 g q8h IV + Clindamycin 600 mg q8h IV	Clindamycin 600 mg q8h IV + Ciprofloxacin 400 mg q12h IV + Amp/Sulb 1.5 – 3 g q6h IV **OR** Pip/Tazo 4.5 g q6h IV	To consider IVIG 0.4 – 2 g/kg (1-2 doses) for first 72 hours for severe Strep A infection. **Pen G** if strep or clostridia **Imipenem or Meropenem** if polymicrobial **Vanco** if *MRSA* suspected. If strep necrotizing fasciitis, reasonable to treat with **penicillin & clindamycin** If clostridia +/- gas gangrene, add **clinda** to **penicillin**
PYOMYOSITIS S. aureus, Group A streptococci, Gm-neg bacilli (rare)	Cloxacillin 1g q6h IV	Cefazolin 2.0g IV q8h in MSSA	Surgical drainage important therapy. Add Vanco if MRSA

Recommended Treatment according to DIFFERENT SITE
SKIN & SOFT TISSUE INFECTIONS

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
BITE			
General Principle The goal of initial therapy is to cover staphylococci, streptococci, anaerobes, and *Pasteurella* species. ▪ High risk bite wound: ▪ Cat/human ▪ Livestock ▪ Monkey bites ▪ Deep puncture wounds ▪ Hand/foot wounds Bites in immunosuppressed patients	Prophylactic antibiotics may be given for a 3- to 5-day course. For treatment, antibiotics may be given for a 5- to 7-day course. The first-line oral therapy is amoxicillin-clavulanate. For higher risk infections, a first dose of intravenous antibiotic may be given (ie, ampicillin-sulbactam, ticarcillin-clavulanate, piperacillin-tazobactam, or a carbapenem).		**Treatment aims:** Meticulous wound care Selective wound closure Selective use of prophylactic antibiotics Doxycycline not recommended for children < 8 years and pregnant woman To treat all infected wounds and to prescribe antibiotics for high-risk uninfected wounds
Bat *Streptococcus spp. especially S. anginosus* *Staphylococcus aureus* *Anaerobes, especially Prevotella spp.*	Amox/Clav 625 mg q12h po x 5d	Doxycycline 100 mg q12h po x 5d	

Recommended Treatment according to DIFFERENT SITE
SKIN & SOFT TISSUE INFECTIONS

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Cat S. aureus, *Pasteurella multocida (prevalence ~75%)*	Amox/Clav 625 mg q12h po x 5d	Doxycycline 100 mg q12h po x 5d **Or** TMP/SMX 160/800 mg q12h x 5d **Or** Clarithromycin 500 mg po q12h x 7d-10d	80% cat bites become infected. Doxycycline not recommended in children
Bartonella henselae	Azithromycin 500mg stat then 250mg q24h x 4d	TMP/SMX 160/800 mg q12h x 5d	Treat immunodeficient patient with 7- to 10-day course. Cat-scratch fever/disease
Dog *Viridans strep. P. multocida, S. aureus, Bacteroides sp., Fusobacterium*	Amox/Clav 625 mg q12h po x 5d	Doxycycline 100 mg q12h po x 5d Plus Metronidazole 500mg q8h x 5d	Only 5% dog bites become infected <u>If severe :</u> Imipenem 500 mg q6h IV + Clindamycin 900 mg q6h x 2 weeks Note: Rarely by Capnocytophaga canimorsus present in dog bites. (consider in asplenic /immunosuppressed patient)

Recommended Treatment according to DIFFERENT SITE
SKIN & SOFT TISSUE INFECTIONS

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Human *Viridan strep (100%), S. epidermidis (53%), Corynebacterium (41%), S. aureus (29%), Eikenella (15%), Bacteroides (82%), Peptostrep (26%*	Amox/Clav 625 mg q12h po x 5d	Penicillin allergy: TMP/SMX 160/800 mg q12h x 5d Inpatient: IV TMP/SMX plus IV clindamycin 150 to 300 mg q6h.	Cleaning, irrigation and debridement most important. If severe : Amp/Sulb 1.5g- 3g q6h
Mice, Rat, Squirrels or Gerbils *Spirillum minus (Asia)* *Streptobacillus moniliformis (North America)*	Amox/Clav 625 mg q12h po x 5d	Doxycycline 100 mg q12h po x 5d	Wound injury is usually trivial Untreated infection carries significant mortality Anti rabies treatment IS NOT indicated
Monkeys Herpes B virus -Cercopithecine hespesvirus 1	Acyclovir 800mg q5h (5 times daily) x 5d	Valaciclovir (dose)	In South Asia, monkeys are presumed to be at high risk for carriage and transmission of rabies, consider anti rabies treatment Case fatality rate 70% with myelitis and hemorrhagic encephalitis
Freshwater fish *Aeromonas, streptococci, staphylococci*	TMP/SMX 160/800 mg q12h x 5d	Ciprofloxacin 500mg q12h x5d	
Saltwater fish *Vibrio,* *Erysipelothrix rhusiopathiae*	Ciprofloxacin 500mg q12h x5d		

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
BOILS/ CARBUNCLES			
S. aureus	Cloxacillin 500mg q6h po x 5d	Erythromycin 500 mg q6h po x 5d **OR** Cephalexin 500mg q6h po	Add fucidic acid 500mg tds in severe cases.
BURN WOUND SEPSIS			
Enterobacter sp. S. aureus, S. epidermidis,E. coli, P. aeruginosa	Treat according to culture result		Important to be guided by culture result. Initial burn wound care may not require antibiotics except local silver sulfadiazine cream 1%.
CELLULITIS/ ERYSIPELAS			
Strep pyogenes, S. aureus (uncommon but difficult to exclude)	Benzylpenicillin (Pen G) 1-2 MU q6h IV + Cloxacillin 500 mg q6h IV	Pen G 1-2 MU q6h or cefazolin 1 g q8h	Change to oral therapy once pt's condition improves.
DECUBITIS ULCERS			
Polymicrobic	Cefuroxime 750 mg q8h IV + Metronidazole 500 mg q8h IV	Amox/Clav 1.2 g q8h IV x 10d **OR** Amp/Sulb 1.5 g q8h IV	• Debridement important. • Consider MRSA if pt comes from nursing home. • Rule out osteomyelitis • Rx for 7 days

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
HERPES ZOSTER			
Varicella – zoster virus	Acyclovir 800 mg 5x/d po x 10d	Valacyclovir 1000 mg q8h po x 7d	IDCP 1995; 4: 293 In immunocompromised host, give Acyclovir 10-12mg/kg IV (infused 1 hr) q 8h x 7-14
IMPETIGO			
Group A streptococci, S. aureus	Pen V 500mg q6h po + Cloxacillin 500 mg q6h po x 5d	Cefuroxime 250 mg q12h po5d	AAC 1992; 36 : 1614
INFECTED WOUNDS (Post trauma with sepsis)			
Polymicrobic: S. aureus, gp A and anaerobic strep, Enterobacteriaceae, Cl. perfringens, Cl. tetan, Pseudomonas (if water exposure)	Amox/Clav 1.2 g q8h IV x10d	Amp/Sulb 1.5 g q6h IV	• Wound debridement is important.Change to oral drugs as soon as possible.
Necrotising fasciitis			
Mixed infections with coliforms, anaerobes	Imipenem 1 g q6h IV OR Meropenem 1 g q8h IV + Clindamycin 600 mg q8h IV	Amp/sulb 1.5 – 3 g q6h IV OR Pip/Tazo 4.5 g q6h IV + Clindamycin 600 mg q8h IV + Ciprofloxacin 400 mg q12h IV	• Antimicrobials are usually continued until surgical debridement is no longer needed.

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Group A Strep	Clindamycin 600 mg q8h IV + Benzylpenicillin 4 MU q4h IV		• To consider IVIG 0.4-2g/kg (1-2) doses for first 72 hours for severe Strep A Infection

Recommended Treatment According to DIFFERENT SITE
VASCULAR

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
CAVERNOUS SINUS THROMBOSIS (P)			
S. aureus, *Gp A strep,* *H. influenzae, Aspergilius/* *Mucor/ Rhizopus*	Cloxacillin 2 g q6h IV + Gentamicin 4.5mg/kg q24h IV	Cefuroxime 750mg q8h IV + Gentamicin 4.5mg/kg q24h IV	• Use drugs with good CSF penetration. • In diabetics with neutropenic, consider fungus.
IV LINE INFECTION (P)			
Heparin lock, peripheral lines CIP *S. epidermidis,* *S. aureus Gram negative org*	Cloxacillin 2 g q6h IV AND Ceftazidime 1g 24h IV (in renal failure)	Vancomycin 1 g q12h IV **OR** Teicoplanin 6mg/kg/d IV	Remove catheter & culture, Change antibiotic according to sensitivity. Please refer to page 36 for more information on Intravascular catheter - Related Infection

1C. Recommended Treatment – different site : Tropical

Recommended Treatment According to *DIFFERENT SITE*
COMMON TROPICAL BACTERIAL INFECTIONS

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	**Alternative**	
Meliodosis			
Burkholderia pseudomallei	**INITIAL:** Ceftazidime 2 g (120 mg/kg/d) IV q8h x 14d with clinical improvement **MAINTENANCE:** TMP-SMX 5mg per kg (TMP component of Bactrim) bd	**INITIAL:** Imipenem 500 mg q6h IV **OR** Meropenem 1 g q8h IV **MAINTENANCE:** Amox/Clav 625 mg q12h x 4-6 wk + Doxycyline 100 mg q12h x 20 wk (for patients allergic to TMP/SMX only)	Initial therapy should be given until there is definite clinical evidence of improvement. Longer treatment duration in critically ill, deep seated abcess, osteomyelitis etc. Fever persisting for more than 1 week is common and does not imply treatment failure. Note : 1 TABLET Bactrim 80mg trimethoprim/ 400mg sulfamethoxazole) Ex :60 kg Dose : 5mg/kg Trimethoprim 5X60kg=300mg then 300mg/ (80mg TMP of 1 tablet bactrim

1C. Recommended Treatment – different site : Tropical

Recommended Treatment According to *DIFFERENT SITE*
COMMON TROPICAL BACTERIAL INFECTIONS

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
			(=4 tab bd Bacrtim) Guide : Bactrim Dose < 40kg= 2 tab bd 40-60kg = 3 tab bd >60kg = 4 tab bd Treatment should be modified according culture and sensitivity results. Surgical drainage of abscesses should be performed as appropriate

1C. Recommended Treatment – different site : Tropical

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	**Alternative**	
Rickettsial disease			
Scrub typhus, Murine typhus Louse-borne, typhus, *Q fever* *R. tsutsugamushi* *R. typhi, R. Prowazekii, Coxiella burnetii*	Doxycycline 100 mg q12h po x 7d	Chloramphenicol 500 mg q6h po or IV x 7d	Chloramphenicol is recommended for pregnancy
Typhoid Fever			
S. typhi S. paratyphi A+B+C	Ciprofloxacin 400 mg q12h IV x 14 d (switch to po 500 mg q12h as soon as possible) **OR** Chloramphenicol 500 mg q6h x 14 d	Ceftriaxone 2 g q24h IV x 14 d	Use Dexamethasone 3 mg/kg per kg then 1 mg/kg qid for 8 doses afew minutes before antibiotic in septic shock Use alternative if suspected or proven resistance Most S. typhi strains in Malaysia remain sensitive to Ciprofloxacin, Ceftriaxone & Chloramphenicol
Non-Typhoid Fever			
Salmonella sp.	Ciprofloxacin 500 mg q12h po x 10-14 days		

1C. Recommended Treatment – different site : Tropical

Infection/Possible Organisms	Suggested Treatment		Comments
	Preferred	Alternative	
Leptospirosis			
L. icterohaemorrhagiae *L. canicola*	Benzylpenicillin 1.5 MU q6h IV x 7d	Ceftriaxone 1 g q12h IV x 7d	
Lyme Disease			
Borrelia burgdorferi	Doxycycline 100 mg q12h po x 2 wk	Amoxicillin 500 mg q6h po x2 wk	In CNS & cardiac involvement, use Ceftriaxone 2 g q24h IV for 2-3 weeks
Brucellosis			
Brucella sp.	Doxycycline 100 mg q12h po x 6 wk + Gentamicin 4-6 mg /kg q24h IV x 2 wk	Doxycycline + Rifampicin 600 mg q24h po	Duration of treatment is unclear

BACTERIAL SPECIES	ANTIMICROBIAL AGENT		ALSO EFFECTIVE (CENTS)
	RECOMMENDED	ALTERNATIVE	
Acinetobacter calcoaceticus-baumannii complex	Polymyxin B	—	Up to 70% isolates resistant to Imipenem, Meropenem, PIP/TZ
Actinomyces israeli	Pen G **OR** Ampicillin	Doxycycline	Clindamycin, Erythromycin
Aeromonas hydrophila	Ciprofloxacin	TMP/SMX	APAG, imipenem, meropenem, ertapenem, Ceph 2, 3, 4, tetracycline Some resistant to carbapenems
Bacillus anthracis (anthrax)	Ciprofloxacin	Doxycycline	If susceptible to penicillin, switch to amoxicillin
Bacteroides fragilis	Metronidazole	Amox/Clav **OR** Clindamycin	
Bartonella (Rochalimaea) henselae, quintana	Azithromycin **OR** Ciprofloxacin	Erythromycin **OR** Doxycycline	Clarithromycin, azithromycin, ciprofloxacin
Bordetella pertussis	***Erythromycin***	TMP/SMX	
Brucella species (Brucellosis)	Doxycycline + **Either** Gentamicin **OR** Streptomycin	Doxycycline + Rifampicin **OR** TMP/SMX + Gentamicin	
Burkholderia pseudomallei	Initially IV Ceftazidime **OR** Imipenem	Then PO Amox/Clav **OR** TMP/SMX + Doxy	In Thailand, 12-80% strains resistant to TMP/SMX
Campylobacter jejuni	Erythromycin	Fluoroquinolones	Clindamycin, Doxycycline, Azithromycin, Clarithromycin

Citrobacter species	Cefepime	Carbapenem	For UTI, can use fluroquinolones.
Chlamydia pneumoniae	Erythromycin **OR** Azithromycin	Doxycycline **OR** Tetracycline	Moxifloxacin
Chlamydia trachomatis	Doxycycline **OR** Azithromycin	Erythromycin **OR** Ofloxacin	
Chryseobacterium (Elizabethkingia) meningosepticum	Vancomycin +/- Rifampicin	Ciprofloxacin	55% Ciprofloxacin -resistant In vitro susceptibility may not correlate with clinical efficacy
Clostridium difficile	Metronidazole (po)	Vancomycin (po)	
Clostridium perfringens	Pen G + Clindamycin	Doxycycline	Erythromycin, Chloramphenicol
Clostridium tetani	Metronidazole **OR** Pen G	Doxycycline	
C. Diphtheriae	Erythromycin	Pen G	Rifampicin, Clindamycin
Coxiella burnetii (Q fever) acute disease	Doxycycline	Erythromycin	
Coxiella burnetii (Q fever) chronic disease	(Cipro **OR** Doxy) + Rifampicin	Cipro + Doxy x 3 years	
Enterobacter species (aerogenes, cloacae)	Cefepime	Ciprofloxacin **OR** Imipenem	
Enterococcus faecalis	Ampicillin + Gentamicin	Vancomycin	For uncomplicated UTI, Nitrofurantoin is effective. High level Gentamicin and Vancomycin resistance increasing

Enterococcus faecium,* β *-lactamase +, high-level aminoglycoside resistance, vancomycin resistance	Linezolid	Tygecycline **OR** Streptomycin	More than 60% strains are susceptible to ampicillin & gentamicin.
Escherichia coli	Sensitive to Cephalosporins, APAG, Nitrofurantoin, Amox/Clav		37% resistant to Ciprofloxacin; 55% resistant to TMP/SMX.
Francisella *tularensis* *(tularemia)*	Streptomycin OR Gentamicin	Doxycycline	Chloramphenicol, Ciprofloxacin, Rifampicin
Gardnerella vaginalis **(bacterial vaginosis)**	Metronidazole	Clindamycin	
Helicobacter pylori	Amoxicillin + Clarithromycin	Metronidazole	Prevalence pre-treatment resistance increasing.
***Hemophilus ducreyi* (chancroid)**	Azithromycin	Ceftriaxone **OR** Amox/Clav **OR** Erythromycin	Most strains resistant to Tetracycline, Amoxycillin, TMP/SMX
Haemophilus influenzae Meningitis, Epiglotitis & other life- threatening illness Non-life threatening	Cefotaxime **OR** Ceftriaxone Amox/Clav **OR** Ceph 2		30% resistant to Ampicillin Azithromycin, Clarithromycin
Klebsiella pneumoniae	Cephalosporin 1,2 **OR** Ciprofloxacin	APAG **OR** Amp/Sulb **OR** Amox/Clav	Antipseudomonal Penicillin, Carbapenems
***Klebsiella* pneumoniae (ESBL +)**	Ertapenem Imipenem Meropenem		Aminoglycoside as adjunct therapy
Legionella species	Fluoroquinolones **OR** Azithromycin **OR** Erythromycin ± Rifampicin	Clarithromycin	TMP/SMX, Doxycycline

Leptospira interrogans	Pen G	Doxycycline	
Neisseria gonorrhoeae (gonococcus)	Ceftriaxone **OR** Amox/Clav	Spectinomycin **OR** Azithromycin	High prevalence of fluoroquinolone -resistant in Asia. In US, fluoroquinolone is no longer recommended.
Neisseria meningitis (meningococcus	Pen G	Ceftriaxone	Cefotaxime
Nocardia species	TMP/SMX	Amox/Clav	Amikacin + (Imipenem or Ceftriaxone or Cefuroxime) for brain abscess
Pasteurella multocida	Pen G	Doxycycline **OR** Amox/Clav **OR** Ceph 2 **OR** TMP/SMX	Ceftriaxone
Proteus mirabilis (indole -)	Amox/Clav	TMP/SMX	Ciprofloxacin
Proteus vulgaris (indole +)	Cefepime **OR** Ciprofloxacin	APAG	
Providencia species	Amikacin **OR** Ceph 3 OR Fluoroquinolones	TMP/SMX	Antipseudomonal Penicillin + Amikacin, Imipenem
Pseudomonas aeruginosa	Pip/Tazo **OR** Cefepime +/- Aminoglycoside	Ceftazidime +/- Aminoglycoside, Ciprofloxacin, Imipenem, Meropenem	40% resistant to carbapenems and 47% resistant to ciprofloxacin.
Rickettsiae species	Doxycycline	Chloramphenicol	Fluoroquinolones

Salmonella typhi	Ampicillin **OR** Ciprofloxacin **OR** TMP/SMX	Ceftriaxone OR Chloramphenicol	Multi drug resistant strains (Chloramphenicol, Ampicillin, TMP/SMX) common in many developing countries Fluoroquinolones not recommended in children
Serratia marcescens	Cefepime	Gentamicin **OR** Imipenem **OR** Fluoroquinolones	
Shigella species	TMP/SMX **OR** Ampicillin	Fluoroquinolones **OR** Azithromycin	Ampicillin and TMP/SMX resistant common in middle east and Latin America
Staph. Aureus, methicillin-susceptible (MSSA)	Cloxacillin **OR** Flucloxacillin	Erythromycin **OR** Cephalosporin generation 1	Penicillin (if susceptible) Clindamycin Clarithromycin
Health-care associated MRSA	Vancomycin	Fucidic acid **OR** Rifampicin (as adjunct therapy)	Teicoplanin **OR** Linezolid (preferable in renal failure)
Community-associated MRSA	Cotrimoxazole **OR** Doxycycline +/- Rifampicin	Clindamycin	Vancomycin OR Teicoplanin Or Linezolid is idndicated for severe infection
Coagulase Neg. Staphylococci	Vancomycin +/- Fucidic acid OR Rifampicin (as adjunct therapy)		Teicoplanin **OR** Linezolid (preferable in renal failure)
Staphylococcus saprophyticus	Oral cephalosporins **or** Amox-clav		

Stenotrophomonas (Xanthomonas, Pseudomonas) maltophilia	TMP/SMX	Cefepime	
Streptococcus, anaerobic (Peptostreptococcus)	Pen G **OR** AM/CL	Erythromycin	Doxycycline
Strep. Pneumoniae Penicillin-susceptible Penicillin-resistant (MIC ≥ 2.0)	Pen G Vancomycin +/- Rifampicin	Multiple agents effective e.g. Amoxycillin	Erythromycin For non-meningeal infection Ceph 3, 4
Streptococcus pyogenes, Group A, B, C, G, F, Strep. Milleri (constellatus, intermedius, anginosus)	Pen G **OR** Penicillin V (some add Gentamicin for serious Group B strep infections)	All βlactams, Erythromycin	
Vibrio cholerae	Doxycycline **OR** Fluoroquinolones	TMP/SMX	Strain 0139 is resistant to TMP/SMX
Yersinia enterocolitica	TMP/SMX **OR** Fluoroquinolones	Ceph 3 or APAG	
Yersinia pestis (plague)	Streptomycin **OR** Gentamicin	Chloramphenicol **OR** Doxycycline	

B) RECOMMENDED ANTIFUNGAL AGENTS BASED ON SELECTED ORGANISMS

FUNGAL SPECIES	ANTIFUNGAL AGENT		ALSO EFFECTIVE (COMMENTS)
	RECOMMENDED	ALTERNATIVE	
Aspergillus species	Voriconazole Amphotericin B	Echinocandins Itraconazole	A. terreus is resistant to amphotericin B
Candida species (azole-naïve patient)	Fluconazole	Amphotericin B Echinocandins	Voriconazole
Candida species (azole-exposed patient)	Amphotericin B	Echinocandins	Azoles can still be used if organism is found to be susceptible
C. albicans	fluconazole	Amphotericin B Echinocandins	Voriconazole
C. glabrata	Amphotericin B	Echinocandins Voriconazole	High-dose fluconazole
C. krusei	Amphotericin B	Echinocandins Voriconazole	C. krusei is inherently resistant to fluconazole
C. parapsilosis	High-dose fluconazole	Amphotericin B Voriconazole	C. parapsilosis has reduced susceptibility to echinocandins
C. tropicalis	Amphotericin B	High-dose fluconazole	Echinocandins Voriconazole
Other non-albicans Candida species	High-dose fluconazole	Amphotericin B Echinocandins	Voriconazole
Cryptococcus species	Amphotericin B +/- flucytosine	Fluconazole	Itraconazole is less effective than fluconazole
Dermatophytes – e.g. Trichophyton, Microsporum & Epidermophyton spp.	Terbinafine	Griseofulvin	Itraconazole Fluconazole
Fusarium species	Amphotericin B	Voriconazole	Posaconazole

B) RECOMMENDED ANTIFUNGAL AGENTS BASED ON SELECTED ORGANISMS

Histoplasma species	Amphotericin B	Itraconazole	
Penicillium marneffei	Amphotericin B	Itraconazole	
Scedosporium species	Voriconazole +/- Terbinafine	Posaconazole	Resistant to many drugs including amphotericinb
Sporothrix species	Amphotericin B	Itraconazole	
Zygomycetes – e.g. Rhizopus, Mucor & Absidia spp.	Amphotericin B	Posaconazole	

C: COMPARISON OF ANTIMICROBIAL SPECTRA AMONG COMMON CLINICAL ISOLATES

Abbreviations:

+ **> 60% susceptible**

V **30-60% antibiotic susceptible**

0 **<30% susceptible**

S **synergistic when used with a beta-lactam**

	Ciprofloxacin	Erythromycin	Fusidic Acid	Gentamicin	Cloxacillin	Penicillin	Chloramphenicol	Clindamycin	Mupirocin	Teicoplanin	Rifampicin	Vancomycin	Cotrimoxazole	Nitrofurantoin
Methicillin Susceptible S. aureus	+	+	+	+	+	0	+	+	+		+		+	+
Methicillin Resistant S. aureus			+		0	0			+	+	+	+	0	+
Coagulase-negative staphylococci	+	v	v	v	v	0	+	+	+	+	+	+	+	+

Streptococcus species	Ampicillin	Gentamicin	Penicillin	Vancomycin	Teicoplanin	Piperacillin /Tazobactam	Nitrofurantoin	Bacitracin	Cefuroxime	Erytromycin	Augmentin	Cefotaxime	Chloramphenicol
Streptococcus species	+	S	+						+	+			
Streptococcus agalactiae (Group B Strep)	+	S	+						+	+			
Streptococcus pneumoniae			v						+	+	+		+
Enterococcus faecalis	+	+	+	+	+	+							
Enterococcus faecium	+	+	+	+	+	+							
Enterococcus species	+	+	+	+	+	+	+						

C: COMPARISON OF ANTIMICROBIAL SPECTRA AMONG COMMON CLINICAL ISOLATES

	Ceftazidime	Augmentin	Cefuroxime	Gentamicin	Ciprofloxacin	Ampicillin	Imipenem	Cefotaxime	Meropenem	Cefepime	Piperacillin / Tazobactam	Amikacin	Ampicillin Sulbactam	Cefoperazone/ Sulbactam	Polymyxin B	Netimicin	Cephalexin	Cotrimoxazole
Acinetobacter		0	0	V	V	0	V	0	V	V	V	V	V	V	+		0	V
Enterobacter		V	V	+	+	0				+							0	+
Escherichia coli		+	+	+	+	V											V	V
Klebsiella		+	+		+	0											+	+
Proteus		+	+	+	+	V											V	V
ESBL		0	0	0	0	0	+	0	+	0	0	+					0	0
Amp-C Producer				+	+					+		+						

	Amikacin	Piperacillin/ Tazobactam	Ceftazidime	Ciprofloxacin	Gentamicin	Imipenem	Cefepime	Meropenem	Polymyxin B	Cefoperazone/ Sulbactam	Cotrimoxazole
Pseudomonas species	+	+	+	+	V	+	+	+	+	+	+
Pseudomonas aeruginosa	+	+	V	V	V	+	+	+	+	+	0
Burkholderia cepacia			+					+			+
Stenotrophomonas maltophilia			+					0			+

CHAPTER 3a: TREATMENT OF HIV INFECTIONS

SELECTION OF ANTIRETROVIRAL TREATMENT The guiding principle for selecting antiretroviral therapy is the need for treatment regimens that provide maximum potency and a sustained, durable antiviral response.

However, the panel strongly advocates against the usage of any suboptimal antiretroviral regimens (including monotherapies and dual nucleoside regimens) as research data unequivocally demonstrates the selection of resistant viral strains with these regimens, which in turn, leads to treatment failure.

At present the antiretroviral drugs that are available in Malaysia include:

I. Nucleoside reverse transcriptase inhibitors (NRTI)

■ Zidovudine (AZT/ Retrovir)	300 mg q12h
■ Didanosine (ddI/ Videx)	200 mg q12h or 400 mg q24h (>60 kg) OR
	300 mg q24h od (<60kg) OR
	Videx EC 400 mg OM (if >60 kg) OR
	250 mg q24h (<60 kg)
■ Lamivudine (3TC/ Epivir	150 mg q12h
■ Stavudine (d4T/ Zerit)	30 mg q12h
■ Combivir (AZT + 3TC)	1 tab q12h
■ Tenofovir-Emtricitabine (Tenvir-Em) (300mg-200mg) 1 tab od	

II. Non – nucleoside reverse transcriptase inhibitors (NNRTI)

■ Efavirenz (Stocrin)	600 mg ON po
■ Nevirapine (Viramune)	200 mg q24h po x 2wks then 200 mg q12h

III. Protease inhibitors (PI)

■ Indinavir (Crixivan)	400 - 800 mg q12h + Ritonavir 100 mg q12h
■ Ritonavir (Norvir)	600 mg q12h or 100 mg q12h when in combination with Indinavir
■ Kaletra (Lopinavir 133 mg+ Ritonavir 33 mg)	3 tab q12h
■ Kaletra (400mg lopinavir + 100mg ritonavir)	2 tab q12h
■ Combination drugs	
- SLN (30 mg) (d4T/3TC/Nevirapine)	1 tab q12h

COMMENCING ANTIRETROVIRAL THERAPY – WHEN TO START

Summary of recommendations on when antiretroviral therapy should be started

Clinical Category	CD4 Count	Viral Load	Viral Load
Symptomatic AIDS defining illness Severe symptoms*	Any value	Any value	Treat
Asymptomatic	<200/mm3	Any value	Treat
Asymptomatic	>200 but <350/mm3	Any value	Treatment recommended
Asymptomatic	>350/mm3	>50,000** copies/ml	Hepatitis B-C coinfection, HIVAN, Pregnant,Cardiovascular disease

*Examples include but not limited to

- Candidiasis, vulvovaginal: persistent > 1 month, poorly responsive to treatment
- Candidiasis, oropharyngeal
- Herpes Zoster: more than 1 episode, or involving more than 1 dermatome
- Cervical dysplasia, severe or Carcinoma in situ
- Constitutional symptoms e.g., fever (> 38.5°C) or diarrhoea more than 1 month

The above must be attributed to HIV infection or have clinical course or management complicated by HIV ** WHO recommendation is in MIU/ml – 2 million copies/ml = 800,000MIU/ml

Some experts recommend initiating treatment since the 3-year risk of developing AIDS in untreated patients is > 30%.

COMMENCING ANTIRETROVIRAL THERAPY – WHAT TO START WITH

Antiretroviral therapy comprises of one choice each from Column A and B. Drugs are listed in a priority order		
Strongly recommended	***COLUMN A (NRTI)***	***COLUMN B(NNRTI)***
	• Zidovudine + Lamivudine • Stavudine + Lamivudine • Combivir 1 tab q12h • Tenofovir + emtricitabine	• Efavirenz • Nevirapine • Raltegravir
Recommended as alternative	• Lamivudine + Didanosine • Zidovudine + Didanosine	• Efavirenz • Nevirapine
If failure of the above regime	(New NRTI or NNRTI not used before)	PI Based Regime Indinavir 800 mg q12h + Ritonavir 100 mg q12h **OR** Kaletra 2 tab q12h or Kaletra 4 tab q12h if Efavirenz used
Not recommended	Stavudine + Zidovudine Didanosine + Stavudine	

CHAPTER 3b: VIRAL INFECTIONS

INFECTING ORGANISM	SUGGESTED REGIMEN		COMMENTS / REFERENCE
Strongly recommended	PRIMARY	ALTERNATIVE	
CytoMegaloVirus (CMV) infection in immunocompromised host (HSCT, SOT recipients, HIV patients)	I. Prophylaxis Valganciclovir PO 450 - 900 mg q24h x from engraftment to 3-6 months for HSCT; 900 mg q24h (initiate within 10 days) for 100-200 days post renal transplant. (Modification of the dose needed for impaired renal allograft function)	IV Acyclovir 500mg/m2 q8h, then Acyclovir PO 800mg 6h x 6 months ; or Valacyclovir 1.5 q12h alternative: Ganciclovir *Foscarnet 90 -180 mg/kg/d in BD (For pts with GCV intolerant , failure/resistance cases or pts with cytopenia)	The efficacy of high dose Acyclovir and Valacyclovir in preventing CMV infection has not been conclusive. Preemptive approach is well established for high risk HSCT recipients and preferred over prophylaxis. Preemptive approach has also been used in SOT recipients Close CMV surveillance (by PCR or Ag) is essential in ensuring a successful Rx outcome Main adverse effect of Ganciclovir is myelotoxicity; Foscarnet: nephrotoxicity * Foscarnet : Non Formulary

CHAPTER 3b: VIRAL INFECTIONS

Infecting Organism	Suggested Regimen		Comments / Reference
	Primary	Alternative	
	II. Preemptive Rx(CMV PCR +): **A. Induction therapy:** Valganciclovir PO 450 - 900 mg q12h; or Ganciclovir IV: 5 -10 mg/kg in BD (1h inf) . Review & Adjust dose weekly according to viral load until viral load declines **B. Maintenance therapy** Valganciclovir PO 450 - 900 mg q24h; or Ganciclovir IV: 5 mg/kg q24h until CMV PCR negative III. Targeted Rx (Active CMV disease): **A. Induction Rx**: IV Ganciclovir: 5 mg/kg q12h until 2-3 wks and or clinical improvement **B. Maintenance** Rx: Ganciclovir IV: 5 mg/kg	Valganciclovir PO 900 mg q12 or *Foscarnet 90 mg/kg q12	Dose modification for ganciclovir, foscarnet and acyclovir for renal impaired patients based on Creatinine clearance Renal impairment *Seminar in Hematology 2009;46: 230-47 Int J Hematol; 2010; 91: 588-95.*

Infecting Organism	Suggested Regimen		Comments / Reference
	Primary	Alternative	
Varicella Zoster Virus infection (VZV) in immunocompromised host (HSCT, SOT recipients, HIV patients)	*I. Prophylaxis Acyclovir* PO 400mg q8h x3-6 mo in post -HSCT, Acyclovir PO 200mg q12h x 6 mo post-renal transplant *Human VZIG IM 1.25 ml (1 vial or 125 IU) for every 10 kg body wt. Max dose = 6 ml *II. Targeted Rx* Acyclovir IV 10-12mg/kg (1h inf) q8h or 500 mg/m2 q8h x 7-14d; CNS infection: 14-21d Or Acyclovir PO 800mg 5x/day x 10 days	Valacyclovir PO 500mg q12h Valacyclovir PO 1g q8h *Famciclovir PO 500mg q8h	For patients with with hematological malignancies and bone marrow failures and patients with severe infection, IV acyclovir is preferred for Rx of VZV * For immunocompromised patient who had significant exposure and no previous history of varicella Duration: Immunocompetent: 5-5-10d; ophtalmicus: 10d Seminar in Hematology 2009;46: 230-47
Herpes Simplex Virus infection in immunocompromised host (HSCT, SOT recipients, HIV patients)	*I. Prophylaxis Acyclovir* PO 400mg q8h x3-6 mo in post -HSCT, Acyclovir PO 200mg q12h x 6 mo post-renal transplant *II. Targeted Rx Acyclovir* IV 10mg/kg q8h or 500 mg/m2 q8h x 7-14d; CNS infection: 14-21d Or Acyclovir PO 400mg 5x/day x 10 days	PO Valacyclovir 500mg q12h PO Valacyclovir 500 q8h *Famciclovir PO 250mg q8h	For patients with with hematological malignancies and bone marrow failures and patients with severe infection, IV Acyclovir is preferred for Rx of VZV *Duration: keratitis, stomatitis: 7 days, vaginitis: 5 days* Topical acyclovir is of no benefit for Herpetic stomatitis Seminar in Hematology 2009;46: 230-47

Infecting Organism	Suggested Regimen		Comments / Reference
	Primary	Alternative	
HAEMORRHAGIC VIRAL FEVER **Hantavirus**	Ribavirin 2 g IV stat then 1 g q6h x 4d then 0.5g q8h x 6d		IV formulation is not registered in Malaysia
HEPATITIS VIRUS • Post-exposure prophylaxis	Hepatitis B immune globulin (200iu/ml) *Perinatal : 0.5ml* *IM Percutaneous : 1.0ml IM* Sexual : 1.0ml IM		Give within 12hrs of exposure or within 48hr post-delivery for neonate prophylaxis
• Chronic hepatitis	Interferon alfa 5 million units q24h SC x 4-6 mths	Lamivudine (3TC) 100 mg q24h po Fanciclovir 500 mg q8h po	Indication: - persistent high ALT - detectable HBs Ag & HBV DNA - hepatitis on liver bx
• Hepatitis C	Ribavirin 400mg am ; 600mg pm po + Interferon alfa x 3 MIU sc x 3 wks x 24 wks (If on Peg Interferon : a) **Alfa-2a** (Pegasys ® 180 mcg SC 1x/week OR b) **Alfa-2b** (Peg-Intron ®) 1.5 mcg/kg SC 1x/week		

Infecting Organism	Suggested Regimen		Comments / Reference
	Primary	**Alternative**	
• PAPILLOMA VIRUS (WARTS)	*Doctor- administered: Trichloroacetic Acid (TCA) : Consult Dermatologist*	*Patient-administered: Imiquimod 5% sachets [Aldara®] (non formulary) 3 times/wk*	*Cryotherapy or electrocautery also effective Consider HPV vaccination.*
HUMAN HERPES VIRUSES • Herpes simplex • Bell's palsy	*Acyclovir 400 mg 5x/d po x 10d + Prednisolone 30 mg q12h po x 5d then taper to 5 mg q12h for total 10 days.*	*Acyclovir 400 mg q8h 7 – 10 days*	
Encephalitis *Genital* *Gingivostomatitis*	*Acyclovir 10 mg/kg q8h (slow 1 hr infusion) IV x 14-21d Acyclovir 200 mg/5x/d po x 10d Acyclovir 200 mg/5x/d po x 7d*	*Acyclovir 10 – 12 mg/kg q8h IV x 10d*	• *For chronic suppression use Acyclovir 400 mg q12h po*
• ***Varicella (chicken pox)*** *Young adults, pneumonia, 3rd trimester, immunocompromised*	*Acyclovir 800 mg 5x/d po x 5d*	*Acyclovir 10 – 12 mg/kg q8h IV x 10d*	• *Use IV in ill and/or and immuno-compromised pts. Start within 24hrs of rash*

Infecting Organism	Suggested Regimen		Comments / Reference
	Primary	Alternative	
• **Zoster**	*Acyclovir 800 mg 5x/d po x 5-7d*	*Acyclovir 10 – 12 mg/kg q8h IV x 7-10d*	*Use IV in immunocompromised pts and treat for 7-14 days*
INFLUENZA VIRUS A&B	*Oseltamivir 75 mg q12h po x 5days*	*Zanamivir 10 mg q12h by inhalation x 5days*	
AVIAN (H5N1) INFLUENZA	*Oseltamivir 75 mg q12h po x 5days*		
NIPAH VIRUS Encephalitis	*Ribavirin 2 g IV stat then 1g q6h x 4d then 0.5g q8h x 6d*		• *IV formulation is not registered in Malaysia*
SARS CoV	*Therapy remains predominantly supportive care.*		

CHAPTER 3c: MYCOBACTERIAL INFECTIONS

Causative Agent/disease	Modifying Circumstances	Suggested Regimens		Comments
		Primary	Continuation Phase Of Therapy	
Mycobacterium tuberculosis Pulmonary TB		Adult INH 5 mg/kg (max 300 mg) q24h + RIF 10 mg/kg (max 600 mg) q24h + PZA 20-30 mg/kg (max 2 g) q24h + ETB 15-20 mg/kg (max 1.2g) q24h OR SM 15 mg/kg/day IM (max 1 g) q24h *initial therapy to be given for 2 months	INH + RIF q24h or 2-3x /wk * maintenance therapy to be given for 4 months.	Add Pyridoxine 10 mg q24h po AKURIT-4 and AKURIT is available for maintenance therapy Indications : Treatment of maintenance phase for pulmonary and extrapulmonary tuberculosis. Akurit-4 (Isoniazid 75mg + Rifampicin 150mg + Pyrazinamide 400mg + Ethambutol 275mg Tab): Intensive phase for 2 months. Akurit (Isoniazid 75mg + Rifampicin 150mg Tab) : Maintenance phase for 4 months. Dose : 1 tab / 15kg body weight

CHAPTER 3c: MYCOBACTERIAL INFECTIONS

Causative Agent/disease	Modifying Circumstances	Suggested Regimens		Comments
		Primary	Continuation Phase Of Therapy	
Extrapulmonary TB	TB meningitis	Adult INH + RIF + PZA + ETB q24h x 2 months	INH + RIF q24h or 2-3x /wk * maintenance therapy to be given for 4 months.	Add Pyridoxine 10 mg q24h po Rx for 12 months. Dexamethasone 0.2 mg/kg IV/po x 1 month ETB not recommended for children
TB during pregnancy		INH + RIF + PZA +ETB q24h x 2 months	INH + RIF q24h or 2-3 x/week for 4 months or	Refer to dosage above Streptomycin contraindicated in pregnancy
TB & AIDS	Pulmonary	INH + RIF + PZA +ETB q24h x 2 months	INH + RIF q24h or 2-3x/ week x 4 months or more	Standard TB treatment applies.
Other Mycobacterial Diseases **M. bovis**		INH + RIF + ETB q24h x 2 months		Add Pyridoxine 10 mg q24h ATS Consensus: AJRCCM 1997; 152: 5 Durations of treatment unknown

CHAPTER 3c: MYCOBACTERIAL INFECTIONS

Causative Agent/disease	Modifying Circumstances	Suggested Regimens		Comments
		Primary	Continuation Phase Of Therapy	
MAI	Immunocompetent	Adult ETB (15 mg/kg po) + Clarithromycin 500 mg q12h po + Rifampicin 10 mg/kg/day (max 600 mg)	Continue treatment for up to 24 months.	May add Streptomycin or Amikacin 15 mg/kg 3 times/week for 2-6 months in severe cases. Treatment also involves excision of affected lymph nodes Rx with INH + RIF + PZA is usually unhelpful even if sensitive in vitro testing
	HIV / AIDs	Clarithromycin 500 mg q12h po + ETB 15-25 mg/kg/d + Rifabutin 300 mg od po + one or more of Ciprofloxacin 750 mg q12h po, Amikacin 7.5 – 15 mg/kg q24h po	Clarithromycin + ETB (15 mg/kg/d) for life long	

CHAPTER 3c: MYCOBACTERIAL INFECTIONS

Causative Agent/disease	Modifying Circumstances	Suggested Regimens		Comments
		Primary	Continuation Phase Of Therapy	
M. chelonae		Clarithromycin 500 mg q12h po x 6 months		Surgical excision useful
M. kansasii		INH (300 mg) + RIF (600 mg) + ETB (15 mg/ kg q24h)		Treat for at least 12 months of negative sputum culture or up to 18 months.
M. scrofulaceum		Surgical excision.	INH 300 mg + RIF 600 mg q24h + Strep 15 mg /kg/day + Cycloserine 250 mg q12h	In children use same regimen as for MAI above.
M. ulcerans		Surgery	Rif 600 mg q24h + Amikacin 7.5 mg/kg IM q12h **OR** ETB 15 mg/kg q24h + TMP/SMX q8h po **OR** Rif 600 mg q24h + Strep 15 mg/kg/d	Treat for 4-6 wks
Mycobacterium leprae	Tuberculoid/ indeterminate (smear negative)	Dapsone 100 mg q24h Clofazimine 50 mg q24h x 1 year	Rifampicin 600 mg monthly	

CHAPTER 3c: MYCOBACTERIAL INFECTIONS

Causative Agent/disease	Modifying Circumstances	Suggested Regimens		Comments
		Primary	Continuation Phase Of Therapy	
	Lepromatous /borderline (smear positive)	*INTENSIVE PHASE* Dapsone 100 mg q24h po + Clofazimine 50 mg q24h po + RIF 600 mg q24h po x 3 wks	*MAINTENANCE* *RIfampicin 600 mg* *+* *Clofazimine 300 mg monthly* *Dapsone 100 mg q24h* *Clofazimine 50 mg q24h x 3 years*	

CHAPTER 3d: PARASITE INFECTIONS

Anatomic Site / Diagnosis	Suggested Regimen		Comments / Reference
	Primary	Alternative	
PROTOZOA – INTESTINAL			
Balantidium coli	Doxycycline 100 mg q12h po x 10d Paediatric dose • 2 mg/kg/dose (max. 2 g) q12h x 10d	Metronidazole 750 mg q8h po x 5d Paediatric dose • 15 mg/kg stat then 7.5 mg/kg in 3 doses x 5d	Metronidazole: Contraindicated in 1st trimester
Blastocystis infection	Metronidazole 1.5g po once daily X 10days or 750mg tds for 10 days Paediatric dose • 15 mg/kg stat then 7.5 mg/kg in 3 doses x 5d	TMP-SMX – dapsone One bd for 7 days	
Cyclospora	TMP/SMX (160/800) mg q12h x 7-10d		

CHAPTER 3d: PARASITE INFECTIONS

Anatomic Site / Diagnosis	Suggested Regimen		Comments / Reference
	Primary	Alternative	
Cryptosporidium parvum	Azithromycin 1250 mg q12h po x 1d, then 1250 mg/d x 27d	Spiramycin 50-100 mg/kg in 3 doses x 12d	It is self-limiting, in severe cases consider medications
Dientamoebiasis (Dientamoea fragilis infection)	*Metronidazole 400-800 mg q8h po x 10d*	*Tetracycline 500 mg q6h x 10d*	
Entamoeba histolytica Dysenteric/ diarrhoea	**Mild to moderate:** Metronidazole 400-800 mg q8h po x 7-10d **Severe:** Metronidazole 800 mg q8h po x 7-10d Paediatric dose 35-50 mg/kg/d in 3 doses x 7-10d	*****Tinidazole 1g q12h po x 3d *Tinidazole 1g q12h po x 5d	Metronidazole NOT effective in cysts passer (use #Diloxanide 500 mg q8h x 10 d)
Hepatic abscess	*Metronidazole 800 mg q8h po x 10d*		

CHAPTER 3d: PARASITE INFECTIONS

Anatomic Site / Diagnosis	Suggested Regimen		Comments / Reference
	Primary	Alternative	
Cyst passers (carriers)	#Diloxanide 500 mg q8h x 10d	#Di-iodohydroxyquinoline 650 mg q8h x 21d #Paromomycin 25-35 mg/kg/d in 3 doses x 7d	Consider drainage for abscess Recommended to add Chloroquine 250 mg q12h x 2wk # Drug not available in Malaysia
Giardia lamblia	Metronidazole 200mg q8h po x 5d Paediatric dose 15 mg/kg stat then •7.5 mg/kg q8h po x 5d	*Tinidazole 2 g once po Paediatric dose 50 mg/kg once • OR Albendazole 400mg q24h po x 5d	*NF item
Isospora belli	TMP-SMX –DS 1 bd X 7-10 days, if AIDS pt; TMP-SMX –DS qid up to 4 weeks	Pyrimethamine 50-75 mg/day q6h po x 10d 14 d + Folinic acid 10-25mg/day, then 25 mg q6h po as maintenance dosage	Chronic suppression required in AIDS 2 tab 3x/wk

Anatomic Site / Diagnosis	Suggested Regimen		Comments / Reference
	Primary	Alternative	
Microsporidium	Albendazole 400mg q12h po x wk	Metronidazole 400 mg q8h po x 2wk	Co-trimoxazole may have some beneficial effects
PROTOZOA - EXTRAINTESTINAL			
Acanthamoeba keratitis	Topical application: Miconazole nitrate 1%, 0.1% Propamidine isethionate and Neosporin x 3-4wk		Topical corticosteroids are contraindicated For ophthalmologist review
Amoebic meningoencephalitis (Naegleria sp, Acanthamoeba sp)	Amphotericin B 1 mg/kg/d IV, uncertain duration		Highly toxic If IV response is poor, give intrathecal Amphotericin B 0.1 mg, gradually increased to 0.5 mg until CSF is clear
Babesia sp	Clindamycin 1.2 g q12h IV or 600 mg q8h po x 7-10d + Quinine 650 mg q8h po x 7d		
Leishmania donovani	Amphotericin B 0.5mg /kg q24h IV x 14 doses up 20 days	Pentamidine 4 mg/kg 3x/wk IV or IM x 15-25 doses + Liposomal Ampho B 2 mg/kg od	Antimony stibogluconate (the choice) is NOT available in Malaysia

Anatomic Site / Diagnosis	Suggested Regimen		Comments / Reference
	Primary	Alternative	
Toxoplasmosis			
	Pyrimethamine 25-100 mg/d x 3-4wk + Sulfadiazine 1-1.5 g q6h x 3-4wk + Folinic acid 10 mg/d x 3-4wk	Spiramycin 3-4 g/d x 3wk Paediatric dose: 50-100 mg/kg/d x 3-4wk	Spiramycin is suitable for pregnant mothers, it is not teratogenic.
Pneumocystis jiroveci (Pneumocystis carinii) pneumonia	*Please refer to Chapter 4 Treatment of Opportunistic Infections*		
Toxoplasma gondii (Encephalitis)			
Trichomonas vaginalis	*Metronidazole 2 g po once or 500 mg q12h x 7d*	**Tinidazole 2 g stat po OR 500 mg q12h*	• *Treat male sexual partner with same drug* • *Metronidazole is contraindicated in 1st trimester*
NEMATODES - INTESTINAL			
Ascaris lumbricoides	*Albendazole 400 mg po x 3d (<2years: Pyrantel pamoate 11mg/kg po x 1d)*	**Mebendazole 100 mg q12h po x 3d*	• *< 2 years; do not administer Albendazole and Mebendazole*

Anatomic Site / Diagnosis	Suggested Regimen		Comments / Reference
	Primary	Alternative	
Enterobius vermicularis	*Metronidazole 2 g po once or 500 mg q12h x 7d*	*Albendazole 400mg once po; repeat in 2wk* **Mebendazole 100 mg once po x 3d; repeat in 2wk*	• *Treat the whole family* • **NF item*
Hookworm infection (Necator americanus, Ancylostoma duodenale)	*Albendazole 400mg po x 1d*	**Mebendazole 100 mg q12h po x 3d* ***OR*** **Pyrantel pamoate 11 mg/kg once po*	
Strongyloides stercoralis	*Albendazole 400 mg q24h bd po x 3d*	**Mebendazole 100 mg q12h po x 3d Ivermectin 200mcg/kg per day X2 days*	
Trichuris trichiura	**Mebendazole 100 mg q12h po x 3d*	*Albendazole 400 mg po x 3d*	
NEMATODES EXTRAINTESTINAL			
Ancylostoma braziliense (cutaneous larva migrans)	*Albendazole 400 mg po x 3d*	*#Ivermectin 200 ug/kg daily x 1-2d* *#Thiabendazole (topical)*	*Mebendazole in vanishing cream*
Dracunculiasis (Dracunculus medinensis)	Metronidazole 250 mg q8h X 10d	*#Tiabendazole 50-100 mg/kg/d x 3d*	

Anatomic Site / Diagnosis	Suggested Regimen		Comments / Reference
	Primary	Alternative	
Filariasis (Elephantiasis)	*Microfilaremia #Ivermectin 200-400 mcg/kg po single dose + Albendazole 400 mg single dose*	*Diethylcarbamazine : D1 & D2 : 50 mg q8h D3 : 100 mg q8h D4 – D14 : 2 mg/kg q8h*	Drug will clear only microfilaria but NOT adult worms In pregnancy use Ivermectin Adult worm : Doxycycline 100 mg q12h x 6 weeks
Toxocariasis (visceral larva migrans)	*Albendazole 400mg q12h po x 5d*	**Mebendazole 100-200 mg q12h x 5d*	*Severe lung, heart & CNS disease may require current adjunctive steroid*
Trichinellosis (Trichinella spiralis)	*Albendazole 400mg q12h po x 8-14d Paediatric dose: Same as adult dose*	**Mebendazole 100-200 mg q12h x 5d*	*Concomitant prednisolone 10 mg q8h po x 5d*
TREMATODES (FLUKES)			
Clonorchis sinensis Fasciola hepatica Fasciolopsis buski Opisthorchis viverrini **Paragonimus wastermani**	*#Praziquantel 25mg/kg q8h po x 1d* *Paediatric dose: Same as adult dose*		

Anatomic Site / Diagnosis	Suggested Regimen		Comments / Reference
	Primary	Alternative	
NEMATODES EXTRAINTESTINAL			
Ancylostoma braziliense (cutaneous larva migrans)	*Albendazole 400 mg po x 3d*	*#Ivermectin 200 ug/kg daily x 1-2d #Thiabendazole (topical)*	*Mebendazole in vanishing cream*
Dracunculiasis (Dracunculus medinensis)	*Metronidazole 250 mg q8h X 10d*	*#Tiabendazole 50-100 mg/kg/d x 3d*	
Filariasis (Elephantiasis)	*Microfilaremia #Ivermectin 200-400 mcg/kg po single dose + Albendazole 400 mg single dose*	*Diethylcarbamazine : D1 & D2 : 50 mg q8h D3 : 100 mg q8h D4 – D14 : 2 mg/kg q8h*	*Drug will clear only microfilaria but NOT adult worms In pregnancy use Ivermectin Adult worm : Doxycycline 100 mg q12h x 6 weeks*
Toxocariasis (visceral larva migrans)	*Albendazole 400mg q12h po x 5d*	**Mebendazole 100-200 mg q12h x 5d*	*Severe lung, heart & CNS disease may require current adjunctive steroid*
Trichinellosis (Trichinella spiralis)	*Albendazole 400mg q12h po x 8-14d Paediatric dose: Same as adult dose*	**Mebendazole 100-200 mg q12h x 5d*	*Concomitant prednisolone 10 mg q8h po x 5d*

Anatomic Site / Diagnosis	Suggested Regimen		Comments / Reference
	Primary	Alternative	
TREMATODES (FLUKES)			
Clonorchis sinensis *Fasciola hepatica* *Fasciolopsis buski* *Opisthorchis viverrini* **Paragonimus wastermani**	*#Praziquantel 25mg/kg q8h po x 1d* *Paediatric dose: Same as adult dose*		
Schistosomiasis haematobium *Schistosomiasis mansoni*	*#Praziquantel 40 mg/kg/d in 2 doses x 1d*		
Schistosomiasis japonicum	*#Praziquantel 60 mg/kg/d in 3 doses x 1d*		
CESTODES			
Echinococcus granulosus (hydatid disease)	*Albendazole 400mg q12h po x 28d* *+* *Surgical drainage of cyst*		• *Repeat Albendazole for 3 cycles with 14days rest between cycles.*
Intestinal tapeworms *D. latum* *T. saginata* *T. solium* *D. caninum*	*#Praziquantel 10mg/kg po once*		

Anatomic Site / Diagnosis	Suggested Regimen		Comments / Reference
	Primary	Alternative	
Hymenolepiasis	*#Praziquantel 25 mg/kg po once*		
Cerebral cysticercosis	*Albendazole 400mg q12h po x 8-30d*		• *Dexamethasone 0.1 mg/kg/per day may be needed to control therapy -induced cerebral oedema.*
ECTOPARASITES			
Pediculus corporis **(body lice)**	*No drugs. Organism lives in and deposits eggs in seams of clothing. Discard clothing.*		*Treat the clothing with 1% malathion powder or 0.5% permethrin powder. (not available)*
Pediculus capitis **(head lice)** *Phthirus pubis* **(pubic lice)**	*Malathion lotion 0.5% (A-lice ®), Apply to dry hair for 8- 12 hrs, then shampoo. 2 doses 7-9 days apart.*	*Gamma Benzene 1% lotion (Lindane ®)*	*Permethrin: success in 78%. Extra combing of no benefit. Resistance increasing. Sanford recommended permethrin 1% lotion. PPUKM has only 5%. But can be used if first line or second line failed.*

Anatomic Site / Diagnosis	Suggested Regimen		Comments / Reference
	Primary	Alternative	
Sarcoptes scabiei **(scabies)** *Immunocompetent patients*	Permethrin lotion 5% (A-Scabs ®). Apply entire skin from chin down including toes. Leave on 8-14 hrs. Repeat if itching persists > 2-4 wks after treatment or new papules or vesicles occur. Safe for children > 2 months old. Infant: Crotamiton cream 10% or sulphur in calamine daily for 3-5days	Gamma benzene 1% wash off after 24 hrs. May repeat once or twice.	Pruritus may be treated with Crotamiton cream 10% or moderate potency topical steroid Trim fingernails. Reapply to hands after handwashing. Pruritus may persist for 2 wks after mites gone. Less effective: Crotamiton 10% cream, apply x 24 hr, rinse off, then reapply x 24 hrs. Treat the whole family Wash all cloth and linen in hot water

CHAPTER 3e: TREATMENT OF FUNGAL, ACTINOMYCOTIC AND NOCARDIAL INFECTIONS

Anatomic Site / Diagnosis	Suggested Regimen		Comments / Reference
	Primary	Alternative	
Actinomyocosis			
A. israelii *A. naeslundil,* *A. viscosus*	Benzylpenicillin (Pen G) 4MU q6h x 6 wks then Pen V 500mg q6h po. Total duration : 6-12mths	Ampicillin 50 mg/kg/d in 4 divided doses IV x 4-6 wk, then Amoxycillin 500 mg q8h po x 6 mth. **OR** Doxycycline **OR** Ceftriaxone	With abscesses, inflammatory mass or fistulae, surgery is required.
Aspergillosis (invasive			
A. fumigatus *A. flavus*	* Voriconazole 6mg/kg q12h IV on Day 1, then 4mg/kg q12h IV **OR** 200 mg q12h po (>40kg) **OR** 100 mg q12h po (<40kg)	Amphotericin B 0.8-1 mg/kg/d IV, to total dose of 2 g x 2-3 wk **OR** Ampho B Lipid Complex (ABLC) 5mg/kg/d IV * Lipid Amphotericin B 1 mg/kg/d increase gradually to 3-4 mg/kg/d based on clinical response and tolerance **OR** Caspofungin 70 mg on Day 1 then 50 mg thereafter	Voriconazole has shown to be highly effective than Amphotericin B in *Aspergillos* infection. *Aspergilloma* (fungal ball) – efficacy of chemotherapy NOT proven. Suggest surgery. Suggest removing catheter if catheter related infection. Consider combination therapy in refractory cases in treatment failure.

Anatomic Site / Diagnosis	Suggested Regimens		Comments
	Primary	Alternative	
Candidiasis			
C. albicans C. tropicalis C. parapsilosis <u>NON-INVASIVE (CLINICALLY STABLE WITH OR WITHOUT CENTRAL CATHETER)</u> <u>INVASIVE CANDIDA/CANDIDAEMIA</u>	Fluconazole 800mg (12mg/kg) loading dose, then 400mg od IV/PO **OR** Amphotericin B 0.7 mg/kg q24h IV for 2 weeks until last negative blood cultures	If fail to response or deteriorating : Suggest higher Amphotericin B 0.8 – 1 mg/kg q24h IV **OR** Fluconazole 800 mg q24h IV/po **OR** Caspofungin 70 mg loading dose followed by 50 mg q24h IV Or Anidulafungin 200mg IV loading dose, then 100mg IV Or Voriconazole 400mg (6mg/kg) bd for 2 doses, then 200mg bd	*C.lusitaniae & C. guilliermonti* are resistant to Ampho B, *C. cruzei & C. tropicalis* resistant to Fluconazole Remove & replace venous catheters Duration of treatment 14 d after last negative blood culture and resolution of sign & symptoms of infection. *Echinocandins* has been shown to be superior to Amphotericin B, especially in immunocompromised patients. *C. glabrata* may require Fluconazole 800 mg or IV Amphotericin

Anatomic Site / Diagnosis	Suggested Regimens		Comments
	Primary	Alternative	
	Non neutropenic patient Fluconazole 800mg (12mg/kg) loading dose, then 400mg od OR Amphotericin B 0.7mg/kg IV daily	Caspofungin 70 mg loading dose followed by 50 mg q24h IV	For endocarditis, Ampho B 0.6 mg – 1 mg/kg/day, and continue 6 – 8 weeks after surgery
	Neutropenic Caspofungin 70 mg loading dose followed by 50 mg q24h IV Or Anidulafungin 200mg IV loading dose ,then 100mg IV od	Amphotericin B 0.8 – 1 mg/kg/d IV Or Fluconazole 800mg (12mg/kg) loading dose, then 400mg od Or Voriconazole 400mg (6mg/kg) bd for 2 doses, then 200mg bd (3mg/kg)	
LOCALISED CANDIDIASIS			
Chronic mucocutaneus Otitis externa Cutaneoues (including paronychia)	Fluconazole 100mg po		If unsuccessful, use Ketoconazole 400mg q24H po x 2 wks Surgery may be required
	Clotrimazole Ear Drop q 6-8h x 2 wk	* Nystatin Ear Drop q6-8h x 2 wk	* unavailable

Anatomic Site / Diagnosis	Suggested Regimens		Comments
	Primary	Alternative	
	Apply Nystatin 100,000u/g ointment q8h x 2 wk	Apply Clotrimazole cream 1% q8h x 2 wks	If unsuccessful, use Itraconazole 200mg q24h po x 2 wk
Oropharyngeal Candidiasis	Nystatin suspension 400,000-600,000 Units q6h	Fluconazole 100 mg q24h po	In patients with extensive oropharyngeal candidiasis should start with fluconazole IV
oesophageal candidiasis	Fluconazole 200 mg IV/po q24h then 100mg/d po x 14-21 d	Amphotericin B 0.3 – 0.7 mg/kg/d IV	Use Ampho B in suspected resistant to triazole drugs.

Anatomic Site / Diagnosis	Suggested Regimens		Comments
	Primary	Alternative	
Meningitis (HIV)	Amphotericin B 0.7 – 1 mg/kg/d IV + 5-Flucytosine 25 mg/kg q6h IV x 2 wk then start Fluconazole 400 mg q24h po x 10 wk then maintenance : 200 mg q24h	Fluconazole (800 mg per day orally; 1200 mg per day is favored) plus flucytosine (100 mg/kg per day orally) for 6 weeks . OR Fluconazole (1200–2000 mg per day orally) for 10–12 weeks	To stop Fluconazole once CD4>200. Repeat LP after 2 weeks of Amphotericin B
Onychomycosis (Tinea unguium) Ringworm (Tinea capitis) Athelete's Foot (Tinea corporis) Jock itch (Tinea cruris)	Fingernail : Terbinafine 250 mg q24h x 6 wk (79% effective) OR Itraconazole po 200 mg q12h x 1 wk (Pulse dosing - 1 wk each month for 3 – 4 mth)	Toenail: Terbinafine 250mg po 24 h x 12 wks (76% effective) OR Itraconazole 200mg bd x 1 week/month x 3-4 months (63% effective)	• Most nail infection/ hair infection/ widespread infection must use oral agent.
Tinea versicolor (Malassezia furfur)	Selenium sulphide 2.5% lotion, leave on for 10 mins then wash q24h x 7d OR Clotrimazole cream 1%	Ketoconazole 200mg q24h po x 7d OR Itraconazole 200 mg q24h x 7d OR Fluconazole 400 mg single dose po	• Add topical ketocon azole or selenium sulfate shampoo to reduce transmissibility

Anatomic Site / Diagnosis	Suggested Regimens		Comments
	Primary	Alternative	
	OR Miconazole cream 2% OR Ketoconazole cream 2% q24h x 7d		
	Ketoconazole (400mg po single dose) OR 200mg q24h x 7 days) or cream 1 x q24h x 2wks	Fluconazole 400mg po single dose or Itraconazole 400mg po q24h x 3-7 days	Keto (po) 1 stat dose was 97% effective in 1 study. Selenium sulfide (Selsun) 2.5% lotion, applied as lather, leave on 10 min then wash off, 1/day or 3-5x/wk. Use for 2-4 wks

Anatomic Site / Diagnosis	Suggested Regimens		Comments
	Primary	Alternative	
Histoplasmosis			
H. capsulatum IMMUNOCOMPETENT IMMUNOCOMPROMISED (AIDS)	Moderate disease: Itraconazole 200 mg solution q12h po x 9 mth Severe disease: Amphotericin B 0.7 – 1 mg/kg/d IV x (2 g total dose) for 2 weeks then itraconazole 200 mg q12 po x 12 weeks, then 200 mg q24h for 9 months. Severe disseminated : Acute phase : Amphotericin B 0.7 mg/kg/d IV OR Lipid Amphotericin B 5mg/kg/d IV for 2 weeks or until clinical improvement Continuation phase (12 wk) : Itraconazole 200 mg q12h po for 12 months Less severe disseminated : Itraconazole 200 mg q8h po x 3d then 100 mg q12h po x 12 wk Meningitis : Amphotericin B 0.7 mg/kg/d IV OR Lipid Amphotericin B 4 mg/kg/d IV x 12 wk Or Flucanazole 800mg od for 12 weeks		In AIDS, continue lifelong suppresion with Itraconazole 200mg q12h

Anatomic Site / Diagnosis	Suggested Regimens		Comments
	Primary	Alternative	
Nocardiosis, N. asteroids **CUTANEOUS & LYMPHOCUTANEOUS**	TMP/SMX : 5 – 10 mg/kg/D OF TMP + 25-50 mg/kg/d of SMX IV/PO divided in 2 – 4 doses x 4 – 6 mth		
PULMONARY DISSEMINATED BRAIN ABSCESS	TMP/SMX : Initially 15 mg/kg/d of TMP + 75 mg/kg/d of SMX IV/po in 2 – 4 divided doses x 3 – 4 wk then 10 mg/kg/d of TMP in 2 – 4 doses. Duration : 3 mth (immunocompetent) or 6 mth (immunocompromised)	Imipenem 500 mg q6h IV + Amikacin 7.5 mg/kg q12h IV x 3 – 4 wk then oral regimen + TMP-SMX	Switch from alternative (for acutely ill patients ONLY) to primary as soon as possible. Maintain with TMP/SMX 800 mg x 6 – 12 mth.
Penicilliosis P. marneffei	Ampho B 0.5 – 1.0mg/kg/d x 2wks then Itraconazole 200mg q24h x 10 wks followed by 200mg/d po for AIDS indefinitely	Itraconazole 200mg q8h po x 3d then 200 mg q12h po x 12 wks then 200 mg po	3rd most common OI in AIDS in S.E. Asia
Sporotrichosis S.schenckeii	Itraconazole or Ampho B 200 mg q24h po x 6 mths	Depends on clinical site affected	

Infecting Organism	Preferred Regimen (S)	Alternative Regimen (S)
FUNGAL INFECTION		
Pneumocystis jiroveci (Pneumocystis carinii) • Acute infection **Prophylaxis** • Initiation and discontinuation	Trimethoprim 15 mg/kg/d + Sulfamethoxazole 75 mg/kg/d po or IV x 21 days in 3-4 div. Patients with severe PO2 < 70mmHg should receive steroids 15-30 min before TMP/SMX: Dose: Prednisolone 40 mg bd X 5/7, then 40 mg od X 5/7 , then 20 mg od X 11/7 **OR** Hydrocortisone 100 mg q8h IV (if unable to tolerate orally) TMP/SMX (1 Double Strength/day, 2 Single Strength/day) po	Trimethoprim 15 mg/kg/d po + Dapsone 100 mg q24h po x 21 days OR Pentamidine 4 mg/kg/d IV x 21 days (usually reserved for severe cases) OR Clindamycin 600 mg IV q8h or 300 – 450 mg po q6h + primaquine 30 mg base po/day x 21 day Or Atovaquone 750mg bd Dapsone 200mg po + Pyrimethamine 75mg po + Folinic Acid 25mg po/per week or Aerosolized Pentamidine 300 mg every mth via Respigard II nebulizer 2 agonist (Salbutamol, 2 puffs) or TMP/SMX, 1 Double Strength 3x/wk or TMP/SMX X 1 Single Strength od Or Atovaquone 1500mg od

Infecting Organism	Preferred Regimen (S)	Alternative Regimen (S)
Aspergillosis • Invasive pulmonary infection	*Voriconazole 6 mg/kg q12h D1, then 4 mg/kg q12h or 200 mg q12h for > 40kg or 100 mg q12h for < 40 kg	Ampho B Lipid complex 5mg/kg/d iv OR Ampho B 0.7 – 1.4 mg/kg/day OR Itraconazole 200 mg q8h po x 3d, then 400 mg/d Or Salvage Therapy : Caspofungin 70mg/day then 50mg/day Or Posaconazole 200mg qid ,then 400mg/day after disease stable Surgery for localized disease
Candida • Oropharyngeal (Thrush)	Nystatin 500,000 unit gargle 4-5X /day	Fluconazole 100-200 mg q24h po 7-14 days **OR** Itraconazole 200 mg/day (caps) or 100 mg/day oral suspension
• **Vaginitis**	Intravaginal miconazole pessaries 500 mg stat or 200 mg x 3d or cream (2%) x 7d	Fluconazole 150 mg po stat

Infecting Organism	Preferred Regimen (S)	Alternative Regimen (S)
• **Esophagitis**	Fluconazole 200-400 mg/d po x 2-3 wks	Itraconazole 200 mg/day po (caps) or 100 mg/day oral solution
Cryptococcal meningitis • **Initial treatment**	Ampho B 0.7 – 1.0 mg/kg/day IV Flucytosine 100 mg/kg/d x 10 – 14 days po then Fluconazole 400 mg/day x 8 – 10 wks	Fluconazole 400 – 800 mg/d Flucytosine 100 mg/kg/d po x 6 – 10 wks
• **Maintenance therapy**	Fluconazole 200 mg/d po till CD4> 200 cells/ul for 2 readings 3-6 months apart	
Cryptococcosis without meningitis • Pulmonary, disseminated or anti – genemia	Fluconazole 200 – 400 mg/d po until immune reconstitution achieved	Itraconazole 200 mg q12h po or 100 mg oral suspension/day until immune reconstitution achieved
Histoplasmosis • Disseminated initial treatment	Severe: Ampho B 0.7 – 1.0 mg/kg/day IV for 14 days. Or Ampho B Lipid Complex 5mg/kg/IV d Then Itraconazole 200mg bd for 12 months Mild to moderate: Itraconazole 200 mg q8h po x 3d, then 200 mg q12h po for 12 months or 100 mg oral suspension q12h x 12 wks.	Itraconazole 400 mg q24h IV for 2 weeks ,then Itraconazole 200 mg q12h or Fluconazole 800 mg/day for 12 weeks

Infecting Organism	Preferred Regimen (S)	Alternative Regimen (S)
• Maintenance	Itraconazole 200 mg q24h until CD4 > 200 cells/ul	
Penicillium marneffei (Penicilliosis) • Initial treatment	Ampho B 0.7 – 1.0 mg/kg/d for 2 weeks , then Itraconazole 400 mg po/d for 10 weeks	Itraconazole 200 mg q8h po x 3d, then 200 mg q12h x 12weeks,then 200mg od
• Maintenance	Itraconazole 200 mg po/day until CD4 > 200cells/ul for 6 months apart	
P**ARASITIC INFECTIONS** **Toxoplasma gondii encephalitis** • Acute infection	Pyrimethamine 100-200 mg loading dose (Fansidar 4 tab stat), then 50 –100 mg/day po + sulfadiazine (Fansidar 1 tab bd) + folinic acid 10-25 mg/day po for at least 6 wks	Pyrimethamine + folinic acid (see preferred regimen) + Clindamycin 600 mg q6h IV/po for at least 6 wks. Pyrimethamine and folinic acid (see preferred regimen) plus one of the following: Azithromycin 1200-1500 mg/day, Atovaquone 750mg qid , Clarithromycin 1 g po q12h. Azithromycin 900 mg q12h po x 1st day, then 1200 mg/day x 6 wks, then 600 mg/day (patients < 50 kg receive half dose) (salvage therapy).
Suppressive therapy	Pyrimethamine 25- 50mg q24h po + folinic acid 10-25mg q24h + Sulfadiazine 0.5-1 g q6h po or Fansidar 1 tab biweekly	Pyrimethamine 25-50 mg/d po + folinic acid 10-25 mg q24h + clindamycin 300-450 mg q6-8h po.

Infecting Organism	Preferred Regimen (S)	Alternative Regimen (S)
		Pyrimethamine 25-75 mg/d po + folinic acid 10-25mg q24h, dapsone 100 mg/d po or Azithromycin 600 mg/d po. Discontinue when on HAART if CD4 > 200/mm3 for 2 readings 3-6 months apart
• Prophylaxis	TMP/SMX 1 DS po qd	Dapsone 50 mg/d + pyrimethamine 50 mg/wk + folinic acid 25 mg/wk or Atovaquone 750mg bd
Cryptosporidia	Treat underlying disease with HAART; treat diarrhoea symptomatically	
Isospora • Acute Infection	TMP/SMX q12h po (2 DS q12h po or 1 DS qid) X 10 days, then 1 bd for 3 weeks	Pyrimethamine 75 mg/day po + folinic acid 10 mg/day x 2 weeks
• Suppressive treatment	TMP/SMX 1-2 Double Strength 3x/wk po	Pyrimethamine 25 mg + folinic acid 5 mg/day.
Microsporidiosis	Albendazole 400 mg q12h po x 3 weeks	Metronidazole 400 mg q8h po x 1-2 weeks

CHAPTER 5A: ANTIBIOTIC PROPHYLAXIS & IMMUNIZATION
Surgical Antibiotic Prophylaxis

Type of Surgery	Prophylaxis	Comments
HEAD & NECK SURGERY	Cefuroxime 1.5g IV + Metronidazole 500mg IV OR AM/CL 1.2g IV stat at induction/ within 1 hour prior to surgery	Antimicrobial prophylaxis in head & neck surgery appears efficacious only for procedures involving oral/pharyngeal mucosa (eg laryngeal or pharyngeal tumor) but even with prophylaxis, wound infection rate can be high. Uncontaminated head & surgery does not require prophylaxis.
OBSTETRIC / GYNAECOLOGY SURGERY • Caesarean section	AM/CL 1.2g IV or Ceftriaxone 1 g	Upon cord clamping
• Hysterectomy (vaginal or abdominal)	AM/CL 1.2g IV or Ceftriaxone 1 g	For prolonged procedures, give antibiotic q8h
ABDOMINAL SURGERY & PROCEDURES • ERCP • Gastroduodenal/ Biliary	AM/CL 1.2g IV stat OR	Clean surgery not indicated for antibiotic prophylaxis unless with implant Clean contaminated and beyond should consider prophylactic antibiotic

Type of Surgery	Prophylaxis	Comments
• Colorectal / Appendicectomy • Herniaplasty/implant	Cefuroxime 1.5 g IV + Metronidazole 500 mg IV stat OR Cefoperazone 1 g IV + Metronidazole 500 mg IV stat	Consider empirical therapy if consider cross contamination procedure or peritonitis Consider additional dose if prolonged surgery
INTERVENTIONAL RADIOLOGY PROCEDURES	3rd generation cephalosporin	
CARDIOVASCULAR & THORACIC SURGERY • Empyema	*Valve implant or diabetic patients:* Cefotaxime 1 g IV + Cloxacillin 1 g IV OR IV Ceftriaxone 1.2g stat + Cloxacillin for 48 hours post op (cardiac by pass) IV Ceftriaxone 1.2g stat	• 48 hours after surgery • Add Vancomycin 1 g IV in (where the rate of post-op MRSA is high), give 2 more doses q8h for cardiac surgery • Add vancomycin if patient is penicillin allergy
ORTHOPAEDIC SURGERY • *Spine surgery* • *Arthroplasty/ Replacement* • *Open reduction of closed fracture with internal fixation*	Ceftriaxone 2 g IV at induction	• 48 hours after surgery • Consider additional dose of antibiotic if prolonged surgery (more than 6-8 hours) • Sanford guideline suggested Cefazolin 1-2g IV stat as an alternative for non-implant related procedures at induction

Type of Surgery	Prophylaxis	Comments
Open fracture awaiting surgery	Co-amoxiclav or cephalosporin to combine with genta (genta only stat dose)	• Gentamicin and vanco or teico to be given during induction(once). • Vanco or Teico not to be continued after surgery
UROLOGIC SURGERY/ PROCEDURES • **Non-obstructed** • **Obstructed**	Amox/Clav 1.2 g IV OR Ciprofloxacin 400mg IV As above but extended up to 5 days	
NEUROSURGICAL PROCEDURES • Craniotomy (simple) shunt surgery • Craniotomy (cross sinuses or naso/ oropharynx) • EVD	Ceftriaxone 2 g IV Add Metronidazole 500mg IV **Apuzzo Operative Neurosurgery** IV Ceftriaxone 2g OD x duration of EVD Neurosurgery. 68(4):996-1005, April 2011	• Cefotaxime for neonates • Add Vancomycin 1 g IV in units with high incidence of MRSA
Post Renal Transplant Prophylaxis 1.General	1. TMP/SMX 1 tab ON po x 6 months	Consider longer prophylaxis if patient had

Type of Surgery	Prophylaxis	Comments
	2. Acyclovir 200 mg q8h po (adjust according to GFR) x 6 months 3. Nystatin syrup 500,000ü q6h x 6 months	induction treatment or had treatment for acute rejection
2. CMV prophylaxis for high risk patients	Valganciclovir 900mg q24h po start within 10 days post transplant and for 100 days.	Consider longer prophylaxis if patient had induction treatment or had treatment for acute rejection

CHAPTER 5B : ANTIBIOTIC PROPHYLAXIS & IMMUNIZATION

ANTIMICROBIAL PROPHYLAXIS FOR THE PREVENTION OF BACTERIAL ENDOCARDITIS IN PATIENTS WITH UNDERLYING CARDIAC CONDITIONS

The latest guidelines/updated guidelines from both the European Society of Cardiology and American Heart Association advocated the following:

1. Infective endocarditis **prophylaxis for dental procedures** is reasonable only for patients with underlying cardiac conditions associated with the **highest risk of adverse outcome from infective endocarditis.**

2. Apart from indication 1 above, there is limited role of antibiotic prophylaxis against IE in patients undergoing other invasive procedures. However, consideration of antibiotic prophylaxis in high risk groups (as listed in table 1) may be considered in patients undergoing cardiac valve prosthesis surgery, invasive respiratory, gastrointestinal or genitourinary procedures

3. Due to high morbidity and mortality associated with infection, it is reasonable to **consider antibiotic prophylaxis in patients undergoing implantation of cardiac pacemakers and defibrillators. (Staph. Aereus being the commonest and most serious pathogen)**

4. There is no conclusive data to support widespread use of antibiotic prophylaxis against endocarditis as was previously thought.

5. Widespread use of antibiotic use may be associated with a small but significant risk of anaphylaxis, increased incidence of antimicrobial resistant microorganisms, and unnecessary inconvenience and cost to patients.

Chapter 5 B: Bacterial Endocarditis Prophylaxis

Patients with the highest risk of bacterial endocarditis

- o Patients with prosthetic cardiac valve
- o Patients with history of infective endocarditis
- o Patients with Congenital heart disease (CHD) [Except for the conditions listed below, antibiotic prophylaxis is no longer recommended for any other form of CHD]
  - Unrepaired cyanotic CHD, including palliative shunts and conduits
  - Completely repaired congenital heart defect with prosthetic material or device, whether placed by surgery or by catheter intervention, during the first 6 months after the procedure - Repaired CHD with residual defects at the site or adjacent to the site of a prosthetic patch or prosthetic device (which inhibit endothelialization)

- o Cardiac transplantation recipients who develop cardiac valvulopathy (recommended in AHA guidelines, but not in ESC guidelines)-ESC did not mention this in the recommenda tion

Negligible-risk (no greater than general population):

- o MVP w/o murmur or regurge or myxomatous leaflets
- o Physiologic murmurs
- o Isolated secondum ASD
- o Surgically repaired ASD/VSD/PDA
- o Previous CABG
- o H/O rheumatic fever or Kawasaki's Disease without valvular dysfunction

Conditions for which prophylaxis is no longer recommended (1997 moderate risk conditions)

- o Mitral Valve Prolapse with regurgitation
- o Hypertrophic Cardiomyopathy
- o Rheumatic heart disease and other types of acquired valvular heart disease (eg SLE)
- o Ventricular septal defect
- o Atrial septal defect

PROCEDURES IN WHICH PROPHYLAXIS IS RECOMMENDED (IN HIGH RISK PATIENTS ONLY)

PROCEDURES RECOMMENDED PROPHYLAXIS	PROCEDURES NOT RECOMMENDED PROPHYLAXIS
Tonsillectomy or adenoidectomy	Tympanostomy tube insertion
Surgical operations involving intestinal and respiratory mucosa (infected)	Flexible bronchoscopy + biopsy
Cystoscopy or urethral dilation	Endotracheal intubation
Urethral catheterization or urinary tract surgery if UTI present	Endoscopy + biopsy, Colonoscopy
Prostate surgery	Elective Caesarean section, D+C, IUD insertion/removal or therapeutic abortion
I&D infected tissue	PTCA, Cardiac catheterization, TOE Emergency Caesarean
Emergency Caesarean	

Dental Procedures for Which Endocarditis Prophylaxis Is Recommended

Antibiotic prophylaxis should be considered in all dental procedures that involve manipulation of gingival tissue or the periapical region of teeth or perforation of the oral mucosa,

Antibiotic prophylaxis is not recommended in the following:

o routine anesthetic injectons through noninfected tissue
o taking dental radiographs
o placement of removable prosthodontic or orthodontic appliances
o adjustment of orthodontic appliances
o placement of orthodontic brackets
o shedding of deciduous teeth, and bleeding from trauma to the lips or oral mucosa.

Regimens for a Dental Procedure

Situation	Agent	Regimen: Single Dose 30 to 60 min Before Procedure	
		Adults	Children
Oral	Amoxicillin	2 g	50 mg/kg
Unable to take oral medication	Ampicillin OR Cephazolin OR Ceftriaxone	2 g IM/ IV	50 mg/kg IM/ IV
Allergic to penicillin or ampicillin (ORAL)	Cephalexin*# OR Clindamycin OR Azithromycin OR Clarithromycin	2 g 600 mg 500 mg 500 mg	50 mg/kg 20 mg/kg 15 mg/kg 15 mg/kg
Allergic to penicillin/ ampicillin & unable to take oral medication	Cephazolin OR Ceftriaxone# OR Clindamycin phosphate	1 g IM/IV 600 mg IM/IV	50 mg/kg IM/ IV 20 mg/kg IM/ IV
	Or other first- or second-generation oral cephalosporin in equivalent adult or pediatric dosage. # Cephalosporins should not be used in an individual with a history of anaphylaxis, angioedema, or urticaria with penicillins or ampicillin		

Agent/ Disease/ Condition	Situation	Agent	Regimen
PROPHYLAXIS AGAINST BACTERIAL ENDOCARDITIS (when appropriate indications arise as discussed above) • Prophylactic regimens for dental, oral, respira tory tract, or esophageal procedures • Prophylactic regimens for genitourinary/ gastrointestinal (Excluding esophageal) procedures	Standard general prophylaxis	Amoxicillin	• Adults 2g • children 50mg/kg orally 1 hr before procedure
	Unable to take oral medications	Ampicillin	• Adults 2g IM/IV • Children 50mg/kg IM/IV within 30 min. before procedure
	Allergic to penicillin	Cephalexin 2g po OR Azithromycin 500mg po OR Clindamycin 600mg po	
	High-risk patients	Ampicillin + Gentamicin	Adults: Ampicillin 2g IM/IV + Gentamicin 1.5mg/kg (not to exceed 120mg) within 30 min. of starting the procedure; 6 hr later, Ampicillin 1g IM/IV or Amoxicillin 1g po. Children: Ampicillin 50mg/kg IM/IV (not exceed 2.0gm) + Gentamicin 1.5mg/kg within 30 min. of starting the procedure; 6 hrs later, Ampicillin 25mg/kg po.

Agent/ Disease/ Condition	Situation	Agent	Regimen
	High-risk patients allergic to Ampicillin/ Amoxicillin	Vancomycin + Gentamicin	• Adults: Vancomycin 1g IV over 1-2 hrs + Gentamicin 1.5mg/kg IV/IM (not exceed 120mg) complete injection/infusion within 30 min. of starting procedure. • Children: Vancomycin 1g IV over 1-2 hrs + Gentamicin 1.5mg/kg IV/IM (not exceed 120mg) complete injection/infusion within 30 min. of starting the procedure
	Moderate-risk patients	Amoxicillin or Ampicillin	• Adults: Amoxicillin 2g orally 1 hr before procedure, or Ampicillin 2g IM/IV within 30 min. of starting the procedure • Children: Amoxicillin 50mg/kg po 1 hr before procedure, or Ampicillin 50mg/kg IM/IV within 30 min. of starting the procedure.

AGENT/ DISEASE/ CONDITION	SITUATION	AGENT	REGIMEN
	Moderate-risk patients allergic to Ampicillin / Amoxicillin	Vancomycin	● Adults: Vancomycin 1g IV over 1-2 hrs; complete infusion within 30 min. of starting the procedure ● Children: Vancomycin 20mg/kg IV over 1-2 hrs; complete infusion within 30 min. of starting the procedure

CHAPTER 5C : MEDICAL PROPHYLAXIS & POST EXPOSURE PROPHYLAXIS

Agent/ Disease/ Condition	Situation	Agent	Regimen
URINARY TRACT INFECTION (reflux grade 3-4) (recurrent infection, vesico uteric reflux, pyelonephritis in pregnancy)	Trimethoprim 1-2mg/kg q24h po nocte **OR** Nitrofurantoin 1-2mg/kg q24h po nocte **OR** Cephalexin 125-250mg q24h po		
NEONATAL GP B STREPTOCOCCAL DISEASE Treat during labour if previously delivered infant with invasive GBS. GBS bacteriuria **or screening swabs positive OR if -preterm <37 weeks -PROM > 18 hours -intrapartum temp >38**	Ampicillin 2g loading dose then 1g IV q4h until delivery OR Pen G (Benzylpenicillin) 5mu IV (loading dose) followed by 2.5 MU q4h until delivery		Commence during labour till delivery Rx of infected mother reduced risk of neonatal GBS. Pregnancy : eradicate carriage with oral bacampicillin 400mg q12h x 1 wk Consider Erythromycin 500mg q4h until delivery in penicillin-allergic patients
CHICKEN POX (NEONATAL)	Acyclovir 20mg/kg q8h x 7 d OR Varicella Zoster Immunoglobulin*		Babies born to mothers who develop chicken pox 5 days before or 3 days after delivery.

Agent/ Disease/ Condition	Situation	Agent	Regimen
PPM & DEFIBRILLATOR PROPHYLAXIS	During induction, flucloxacillin 1gm stat IV followed by PO flucloxacillin 1gm at 8h, 16h and 24h		Recommended by NICE 2008 and Circulation 1998
POST-SPLENECTOMY/SICKLE-CELL DISEASE	**Antibiotic Prophylaxis:** Antimicrobial prophylaxis < 5 y.o : Penicillin V 125-250mg q12h po for life OR Amoxycillin 20mg/kg/day or 500mg PO q12h (adult) >5 y.o : Pen V 250mg q12h PO for at least 2 year in children post splenectomy or up to 16 y.o Lifelong not recommended. Indefinitely for patients with an underlying immunocompromised state and asplenia. Penicillin allergy – EES 400mg PO q 12 h or Azithromycin 250mg PO q 24h		**Vaccine:** 1) Pneumococcal vaccine 0.5mL SC or IM ➢ 2 weeks before surgery. 7-14 days after emergency splenectomy or prior to discharge. ➢ Booster every 5 years 2) Meningococcal Vaccines polysaccharide (quadrivalent) 0.5mL SC. ➢ Schedule as above. ➢ Booster every 5 years 3) Haemophilus Influenzae Type B (HIB) 0.5mL IM thigh/upper arm (In patients with bleeding disorders, this can be given SC) ➢ Schedule as above ➢ No booster required 4) Influenza 0.5mL deep SC ANNUALLY
RHEUMATIC FEVER (secondary prophylaxis)	Penicillin V 250mg q12h po **OR** Erythromycin 250mg q12h po **OR** Benzathine 250mg/kg IM every 3-4 weeks		With carditis: life-long treatment Without carditis: continue for 5yrs

Agent/ Disease/ Condition	Situation	Agent	Regimen
SEXUAL ASSAULT / CONTACTS	Ceftriaxone 125mg IM single dose + Metronidazole 2g single dose + Doxycycline 100mg q12h x 7d **OR** Azithromycin 1g po single dose		Repeat HIV serology in 12 wks
MALARIA	Non-immune individuals entering malaria endemic areas, sensitive to chloroquine.	Chloroquine **Should start 2 wks before entry, continue while in and for 4 wks after leaving the area**	Chloroquine phosphate 500 mg (300 mg base) po once /wk Paediatric dose: Chloroquine 5 mg/kg base/wk, up to 300 mg base
	Chloroquine-resistant areas (refer to CDC yellow book)	Mefloquine 5mg/kg PO once a week (begin 1 week before travel until 4 weeks post travel)	250 mg po once /wk Paediatric dose: <15 kg: 5 mg/kg 15-19 kg: ¼ tablet 20-30 kg: ½ tablet 31-45 kg: ¾ tablet >45 kg: 1 tablet
		Doxycycline Commence few days before departure, continue while in and for 4 wks after leaving the area.	• 100 mg po q24h • Paediatric dose: 2 mg/kg/d up to 100 mg/d

Agent/ Disease/ Condition	Situation	Agent	Regimen
		Alternative: Primaquine	• Primaquine contraindicated in pregnancy • 30 mg base daily • Paediatric dose: 0.5 mg/kg base daily
		Chloroquine phosphate + Proguanil	• Chloroquine phosphate 500 mg (300 mg base)po once /wk • Paediatric dose: Chloroquine5 mg/kg base/wk, up to 300 mg base Proguanil 200 mg once/d • Peadiatric dose : • < 2 yrs : 50 mg once /d 2-6 yrs : 100 mg once /d 7-10 yrs : 150 mg once /d >10 yrs : 200 mg once /d
PNEUMOCYSTIS CARINII PNEUMONIA	Prophylaxis is indicated if the CD4 count is <200 x 106/L or after the 1st attack.	TMP/SMX 480mg po q24h (1 SS tab od) OR TMP/SMX 480-960mg po q24h (1 DS tab od) OR TMP/SMX 960mg po 3x/wk	Pentamidine 300mg in 6ml water by aerosol OR Dapsone 100mg OD

Agent/ Disease/ Condition	Situation	Agent	Regimen
TOXOPLASMOSIS	Following an acute therapy, a prophylactic regimen should be continued for the duration of functional immunosuppression.	Pyrimethamine Folinic acid Sulfadiazine	Pyrimethamine 25-75mg po q24h + folinic acid 10 mg/d + sulfadiazine 0.5-1g po q6h

Post-Exposure Prophylaxis

Some infectious diseases can be prevented by post-exposure prophylaxis (PEP). **For maximum effectiveness, administered within 24 hours of exposure. PEP usually for persons with close face-to-face/intimate contact with infected individual.** Casual contact usually does not warrant PEP. (essentials)

Agent/ Disease/ Condition	Situation	Agent	Regimen
MENINGITIS (N. MENINGITIDIS)	Any quinolone (PO) x 1 dose OR Rifampin 600mg (PO) q 12 h x 2 days		Avoid tetracycline in children < 8 yrs. (essentials)
MENINGITIS (HAEMOPHILUS INFLUENZAE)	Children: Rifampicin 20mg/kg po (not to exceed 600mg) q24h x 3doses Adult: Rifampicin 600mg q24h x 3day Must be administered within 24 hours of close face-to-face exposure to be effective. Otherwise observe and treat if infection develops.		● Household: If there is one unvaccinated contact ≤4 yrs in the household, Rifampicin is recommended for all household contacts except pregnant women. ● Childcare Facilities: With 1 case, if attended by unvaccinated children ≤ 2 yrs: no prophylaxis. If ≥ 2 cases in 60 days & unvaccinated children attend, prophylaxis recommended for children & personnel.

Agent/ Disease/ Condition	Agent	Regimen
VIRAL INFLUENZA **Influenza virus type A or B**	Oseltamivir (Tamiflu) 75mg (PO) q 24 h for duration of outbreak or at least 7 days after close contact to an infected person. For CrCl 10-30mL/min, give 75mg (PO) 48 h	Give to non immunized contacts and high risk contacts even if immunized. Begin at onset of outbreak or within 2 days of close contact to infected person. Oseltamivir is active agst both Influenza A & B. Rimantadine and Amantadine only active agst Infl A
DIPHTERIA	Erythromycin 500mg PO q6h x 1 week OR Benzathine penicillin 1.2mu (IM) x 1 dose	Administer ASAP after exposure. Effectiveness is greatly reduced after 24 hours.
TB **M. TUBERCULOSIS**	INH 300mg (PO) q 24 h x 9 months (5mg/kg/24 h for 6 months) NAG OR Rifampin 600mg (PO) q 24 h x 4 months	For INH, monitor SGOT, SGPT weekly x 4, then monthly. Mild elevations are common and resolve spontaneously. INH should be stopped if SGOT/SGPT levels > 5 x normal.
Gonorrhea	Ceftriaxone 125mg (IM) x 1 dose OR Any oral quinolone x 1 dose	Administer ASAP after sexual exposure. Ceftriaxone also treats incubating syphilis.

Agent/ Disease/ Condition	Agent	Regimen
Syphilis	Benzathine penicillin 2.4 MU (IM) x 1 dose OR Doxycycline 100mg PO q 12 h x 1 week	Obtain HIV serology
Varicella (Chicken pox)	For exposure < 72 hours, give VZIG- Varicella Zoster Immunoglobulin 625mcg (IM) and 1 dose to immunocompromised hosts and pregnant women (esp with respi conditions) 1.25ml (1 vial or 125 iu) for each 10kg. Maximum dosage of 6 ml. For other exposure > 72 hours, consider Acyclovir Alternative: Varicella vaccine 0.5mL (SC) x 1 dose. Repeat in 4 weeks	Administer ASAP after exposure (< 72 hours) Varicella vaccine is a live attenuated vaccine and should not be given to immunocompromised or pregnant patients. If varicella develops, start acyclovir treatment VZIG prophylaxis is recommended for individuals who fulfill all of the following three criteria: 1. A clinical condition which increases the risk of severe varicella: includes immunosuppressed patients, neonates where maternal varicella develops 5 days before and 2 days after delivery, and pregnant women. 2. No antibodies to varicella-zoster virus. Significant exposure to chickenpox or herpes zoster

Agent/ Disease/ Condition	Agent	Regimen
Hepatitis B	Unvaccinated: Hep B Immune globulin (HBIG) 0.06mL/kg (IM) x 1 dose + HBV vaccine (40mcg HBsAg/mL) deep deltoid (IM) at 0, 1, 6 months (can use 10mcg dose in healthy adults < 40 years) Hepatitis B specific immunoglobulin (HBIG) Newborn: 200iu within 24h of birth 1M Adults and children > 10 years: 500iu IM	Previously vaccinated Known responder (anti HBsAg antibody levels > 10IU/mL) : no treatment Known non responder (anti-HBsAg antibody levels < 10IU/mL) Treat as if unvaccinated Antibody status unknown: Obtain HBsAg antibody levels. If testing not possible and results unavailable in 24 hours of exposure, give HBIG + 1 dose of HBV Vaccine (booster) 1. All babies born to HbsAg positive mothers and who had acute hepatitis B during pregnancy. 2. Health workers who have been successfully immunized should be given a booster dose of vaccine unless they are known to have adequate protective level of antibody

Agent/ Disease/ Condition	Agent	Regimen
Hepatitis A	HAV Vaccine 1mL (IM) x 1 dose	
Rabies (virus)	Pre-Exposure Prophylaxis Intramuscular Inj : Three 1.0 mL Human Diploid Cell Vaccine (HDCV) on days 0, 7, 28.	Post-Exposure Prophylaxis (WHO, CPG- adult vaccination) 1. Wound toilet by scrubbing with soap and water for 5 mins 2. (a) Previously unimmunized individual: 1 ml HDCV (vaccine) by IM followed by 5 further doses at days 3,7,14, 30, 90 plus RIG 20 iu/kg. Treatment may be stopped if the animal is found conclusively to be free of rabies. (b) Previously fully immunized individuals: - 2 doses of HDCV 1.0 ml 1M on days 0 and 3-7. RIG treatment not needed. For adults the vaccine is given in the deltoid area, right and left arm; for children, it may be given in the anterolateral aspect of the thigh. An immunized person is anyone who has received a complete series of vaccine, or a person who has received a pre-exposure or post-exposure series of any rabies vaccine who has an adequate rabies antibody level

Agent/ Disease/ Condition	Agent	Regimen
Measles	Human Normal Immunoglobulin HNIG, 1M < 1 yr 250mg 1-2 yrs 500mg 3 yrs 750mg	Immunocompromised children and adults
Tetanus	Human Tetanus Specific Immunoglobulin (TIG) 250 iu or 500 iu if more than 24h have lapsed since injury (Paeds: 150u/kg IM near to sites of exposure or injury).	Tetanus Prone Wound** i) In previously immunized patient + booster >10 years previously: a booster dose of tetanus vaccine ii) In unimmunized or immunization status not known with certainty: a full 3 dose course of tetanus vaccine plus a dose of TIG in a different site.

AGENT/ DISEASE/ CONDITION	AGENT	REGIMEN

	Dirt Tetanus Prone Wound	Dirt Tetanus Prone Wound	Clean , Non Tetanus Prone Wound	Clean , Non Tetanus Prone Wound
Criteria	Age of wound : > 6 hours Configuration: Stellate,avulsion Depth: > 1 cm Mechanism of injury : Missile,crush,burn,frostbite Devitalised tissue: Present Contamination (dirt,saliva) : Present		Age of wound : < 6 hours Configuration: Linear Depth: < 1 cm Mechanism of injury : Sharp surface, glass, injury Devitalised tissue: Absent Contamination (dirt,saliva) : Absent	
	Td [1,2]	TIG	Td	TIG
Unknown or < 3 doses	Yes	Yes	Yes	No
3 or more doses	No 3	No	No 4	No

1= Td= Tetanus & Diptheria toxoids adsorbed (adult), TIG=Tetanus immune globulin
2= yes if wound > 24 hours old
3= Yes if > 5 years since last booster
4= yes if > 10 years since last booster

Baseline testing of all exposed Health Care Workerss should be performed for **ALL** exposures.
HBV PEP should be initiated **immediately** (within 24 hours) according to the following table from CDC MMWR 2001 Vol 50 No. RR-11, Table 3:

Recommended Post Exposure Prophylaxis for exposure to hepatitis B virus

Vaccination and antibody response status of exposed workers*	Treatment		
	Source HBsAg† positive	Source HBsAg† negative	Source unknown or not available for testing
Unvaccinated	HBIG§ x 1 and initiate HB vaccine series	Initiate HB vaccine series	Initiate HB vaccine series
Previously vaccinated			
Known responder**	No treatment	No treatment	No treatment
Known nonresponder††	HBIG x 1 and initiate revaccination or HBIG x 2 §§	No treatment	If known high risk source, treat as if source were HBsAg positive
Antibody response unknown	Test exposed person for anti-HBs 1. If adequate,** no treatment is necessary 2. If inadequate,†† administer HBIG x 1 and vaccine booster	No treatment	Test exposed person for anti-HBs 1. If adequate, no treatment is necessary 2. If inadequate, administer vaccine booster and recheck titer in 1–2 months

* Those previously infected with H are immune to re-infection and do not require PEP.
† Hepatitis B surface antigen
§ Hepatitis B immune globulin; dose is 0.06 mL/kg intramuscularly. When indicated, HBIG should be administered as soon as possible (preferably within 24 hours). Its effectiveness >7 days after exposure is unknown.
** A responder has adequate levels of serum antibody to HBsAg (anti-HBs ≥ 10 mlU/mL).
†† A nonresponder has inadequate response to vaccination (anti-HBs < 10 mlU/mL).
§§ The option of giving one dose of HBIG and reinitiating the vaccine series is preferred for nonresponders who have not completed a second 3-dose vaccine series. For persons who previously completed a second vaccine series but failed to respond, two doses of HBIG one month apart are preferred.

CHAPTER 6a : TRAVEL VACCINES

Infection/Possible Organisms	Prophylaxis Regimens	Comments
Meningococcal meningitis		
N. meningitidis (Menveo) *FREE Only for staff going for haj and umrah. To be supplied through the Infection Control Unit.	Meningococcal conjugate vaccine 0.5mL (IM) > 1 month prior to travel to outbreak area	Acquired via close face to face contact (airborne aerosol/ droplet exposure) Protective against > meningitides serotypes A, C, Y, and W, but misses B serotype.
Typhoid Fever		
S. typhi Availability : Typhoid vaccine 20 doses /vial.	Typhoid vaccine 0.5mL (IM). Booster every 2 years for repeat travellers	Contraindicated in immunocompromised hosts and children < 6 years old.
Yellow fever		
Yellow fever virus Availability : If government servant going for official visit, can obtain free vaccination from IMR Virology Unit (03-26162671) http://www.imr.gov.my/org/viro.htm#3	Yellow fever vaccine 0.5mL (SC). Booster every 10 years for repeat travellers	

If going for a holiday, patient to pay and get vaccination + certificate from one of these: -Twin Tower Medical City (03-23822000) -Kita Clinic, Dayabumi Complex (03-26989740) -Klinik Berkat, Ampang Point (03-42515450		
Influenza		
Inactivated viral influenza vaccine (Vaxigrip/Fluarix)	Single 0.5mL dose (IM)	Annual vaccine. For healthy persons > 50 years, health care personnel, adults with high risk conditions, (heart disease, lung disease, diabetes, renal dysfunction, hemoglobinopathies, immunosuppression)

CHAPTER 6 b : VACCINES IN PPUKM

Indication	Vaccine	Manuf act'R	Preparation	Availability	Dosage and Administration	Notes
Hepatitis B	**Engerix-B** (Adsorbed purified surface antigen protein of hepatitis B virus – thiomersal preservative-free)	GSK	Adult: 20 g/1 ml Paed: 10 g /0.5 ml		**Adult 20 yo:** 20 mcg IM deltoid region at 0,1,6 mth. **Paed 19 yo:** 10 mcg IM deltoid region or IM anterolateral thigh in neonates, infants and young children at 0,1,6 mth.	• The 20 mcg vaccine may be given to subjects 11 yo and 15 yo at 0,6 mth. • Should **not** be administered in the buttock, intradermally or intravascularly.
	Euvax B (Hepatitis B recombinant vaccine)	LG Life Sciences	10 mcg/0.5ml	Kedai Farmasi/ Ward supply (Formulary) *Adult vaccine FOC for staff only	**Adult & children 15 yo:** A dose of 20 mcg. **Neonates & children 15 yo:** A dose of 10 mcg. **Schedule:** 1st dose: at elected date 2nd dose: 1 month after 1st dose 3rd dose: 6 months after 1st dose	• Booster dose is not required. • Infection for staff

CHAPTER 6 b : VACCINES IN PPUKM

Indication	Vaccine	Manuf act'R	Preparation	Availability	Dosage and Administration	Notes
Invasive Haemophilus influenzae type b (Hib) disease	**Hiberix** [Haemophilus influenza type b (Hib) vaccine]	GSK	1 dose/0.5 ml	Kedai farmasi/ Ward supply (Formulary)	**Primary vaccination:** 3 doses in the 1st 6 mths of life and may be started from 6 wks of age. **Booster dose:** 2nd yr of life (recommended). **Previously unvaccinated infant 6-12 mth:** 2 inj at 1 mth-interval, followed by a booster in the 2nd yr of life. **Previously unvaccinated child 1-5 yo:** 1 dose.	• Vaccine is for IM inj. But, may be given as SC in pt with thrombocytopenia or bleeding disorder. • Hiberix may be mixed in the same syringe with GSK vaccines Infanrix, or Tritanrix HB. Other injectable vaccines should always be given at different inj sites.
Chicken pox	**Varilrix** (Live attenuated Oka strain of varicella-zoster virus)	GSK	1 dose/0.5 ml	Kedai farmasi (NF)	Children ≥12 mth and ≤12 yo: 1 dose. Adult and children ≥13 yo: 2 doses with an interval of 6-10 wks.	• For SC use only. • Should not be mixed with other vaccines in the same syringe. • After reconstitution, in should be administered immediately.

Indication	Vaccine	Manuf act'R	Preparation	Availability	Dosage and Administration	Notes
Measles, mumps and rubella (MMR)	**Priorix** [Live attenuated Schwarz measles, RIT 4385 mumps (derived from Jeryl Lynn strain) and Wistar RA 27/3 rubella strains of viruses]	GSK	1 dose/0.5 ml	Kedai farmasi/ Ward supply (Formulary)	**Children 12-15 mth:** 0.5 ml. **Booster dose:** At 4-6 yo.	• For SC/IM use.
Tetanus	**TT Vaccine** (Adsorbed tetanus vaccine)	Bio Farma	Inj 0.5ml	Ward supply (Formulary)	**Tetanus prevention (≥7 yo):** IM: 0.5 ml followed after 4-8 wks by a 2nd dose and after a further 6-12 mths by a 3rd dose. **Booster dose:** IM: 0.5 ml every 10 yrs (recommended).	• Maintain immunization of woman against Tetanus through childbearing period: Two 0.5 mL injections given 2 months apart from 6th months of pregnancy onwards, 3rd dose 1 year later. Thereafter 1 dose of 0.5mL injection for every subsequent pregnancy & followed by a booster every 10 years.

Indication	Vaccine	Manuf act'R	Preparation	Availability	Dosage and Administration	Notes
Rubella	**Live Rubella Vaccine**	GSK	Inj 1dose/1ml *FOC for staff	Ward supply (Formulary)	A single dose of 0.5 ml is to be administered by deep SC inj into the upper arm.	• Stored in the dark at 2°-8°C for ≤ 8 hrs if not used immediately. • Do not give <1 mth before/after administration of other live virus vaccines
Meningococcal meningitis	**Menveo ACWY** (Group A, C, W & Y conjugated meningococcal vaccine)	Novartis	1 dose/0.5 ml	Kedai farmasi *only FOC for staff going for Haji. (Infection Control Unit)	> 11 yr: 0.5 ml IM.	• Must not be administered intravascularly, subcutaneously or intradermally.
DTP + Polio	**Infanrix-IPV** (Combined diptheria-tetanus-accellular pertussis, and inactivated polio)	GSK	1 dose/0.5 ml (Prefilled syringe	Ward Supply (Formulary)	**Primary vaccination**: 3 doses in the 1st yr of life and may be started from 2 mths of age. Should have an interval of at least 1 month between subsequent doses. **Booster dose**: 2nd yr of life, after the primary course is completed	• For deep IM inj. Infanrix can only be mixed in the same syringe as Hiberix ® - haemophilus Influenzae. • Infants: the preferred site of inj is the anterolateral aspect of the thigh. • Older children: vaccine should be administered in

Indication	Vaccine	Manuf act'R	Preparation	Availability	Dosage and Administration	Notes
					before 6 mths of age. An interval of at least 6 mths after completion of primary vaccination should be respected. Also as booster dose for children up to 18 yrs, who have previously been immunized with DTP and polio antigens.	the deltoid. • It is preferable that each subsequent dose is given at alternate sites.
HPV (Cervical cancer, genital warts)	**Gardasil** [Quadrivalent Human Papillomavirus (Types 6, 11, 16, 18) Recombinant Vaccine]	Merck	1 dose/0.5 ml	Kedai farmasi (NF)	Administered **IM** in the deltoid region of the upper arm or in the higher anterolateral area of the thigh as 3 separate 0.5-ml doses according to the following schedule: **1st dose**: at elected date **2nd dose**: 2 mths after the 1st dose **3rd dose**: 6 mths after the	• Must not be injected intravascularly. • SC and intradermal administration are not recommended. • Indicated for prophylaxis of Cervical cancer and genital warts

CHAPTER 6 b : VACCINES IN PPUKM

Indication	Vaccine	Manuf act'R	Preparation	Availability	Dosage and Administration	Notes
					1st dose If an **alternate vaccination schedule** is necessary, the 2nd dose should be administered at least 1 mth after the 1st dose, and the 3rd dose should be administered at least 3 mths after the 2nd dose	
	Cervarix [Quadrivalent Human Papillomavirus (Types 16, 18) Recombinant Vaccine]	GSK	1 dose/0.5mL	Kedai farmasi (NF)	Three 0.5mL doses IM in the deltoid region at 0, 1, 6 mth schedule.	• Must not be injected intravascularly or intradermally. • Indicated for prophylaxis of Cervical cancer only

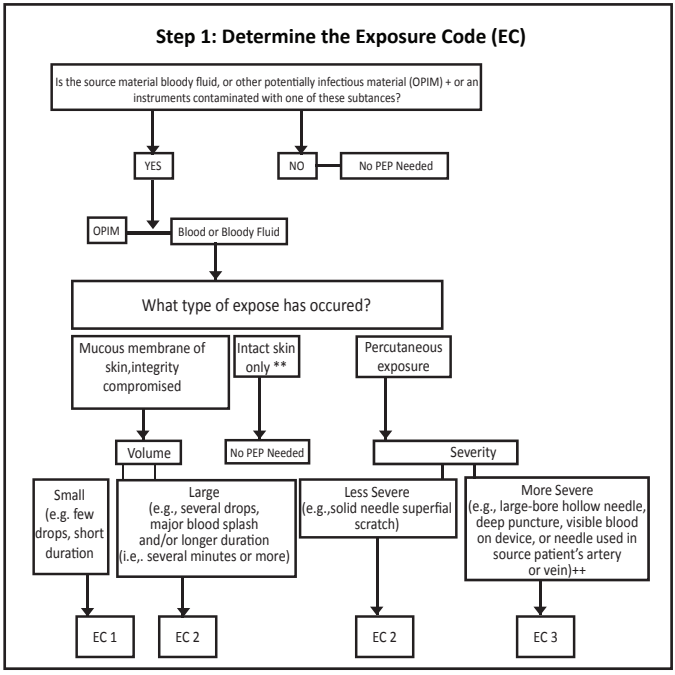
Indication	Vaccine	Manuf act'R	Preparation	Availability	Dosage and Administration	Notes
Pneumo-coccal infection(pneumonia, meningitis, acute otitis media,)	**>2 years old Pneumo** 23 (Purified Strep Pneumoniae polysaccharides of 23 types)	Aventis	1 dose/0.5 ml	Kedai farmasi / Ward supply (Formulary) *FOC for staff	**Primary immunization (≥ 2yo)**: A single inj of 0.5 ml given IM or SC deltoid region. **Booster dose:** Must not be given within 5 yr except high risk subjects or under immunosuppressive treatment.	• Do not inject IV. • It should be given at least 2 wks before scheduled splenectomy, cochlear implant surgery and before chemotherapy / immuno-suppressive therapy.
	< 2 years old Synflorix (Pneumococcal polysaccharide & adsorbed nontypeable Haemophilus influenza protein D conjugate vaccine, 10 valent adsorbed)	GSK	1 dose/0.5mL	Kedai farmasi (NF)	**Infants 6 weeks - 6 months:** 3 doses of 0.5mL with an interval of at least 1 month between doses. A booster dose is recommended at least 6 months after the last priming dose I**nfants 7-11 months:** 2 doses of 0.5mL with interval of at least 1 month between doses. A 3rd dose is recommended in the 2nd	• Should be given IM injection • The preferred sites are anterolateral aspect of the thigh in children <12 months or the deltoid muscle of the upper arm in children >12 months • Must not be injected intravascularly or intradermally

Indication	Vaccine	Manuf act'R	Preparation	Availability	Dosage and Administration	Notes
					year of life with an interval of at least 2 months. **Children 12-23 months:** 2 doses of 0.5 mL with an interval of at least 2 months between doses.	
	2 months-5 years **Prevenar 13** (Pneumococcal 13-valent conjugate vaccine)	Pfizer	1 dose/0.5mL	Farmasi tingkat 7 (NF)	**Infants 2-6 months:** 3 doses with interval of at least 1 month between doses. 1st dose may be as early as 6 weeks of age. 4th (booster) dose recommended between 12-15 months OR 1st dose from the age of 2 months, 2nd dose 2 months later. 3rd (booster) dose is recommended between 11-15 months.. Unvaccinated Children > 7 months:	• Give IM • Contains the same 7 serotypes contained in Prevenar, using the same carrier protein CRM197. • Children who have begun immunization with Prevenar may complete immunization by switching to Prevenar 13 at any point in the schedule • Children 15 months - 5 years who have received 4 doses of Prevenar may

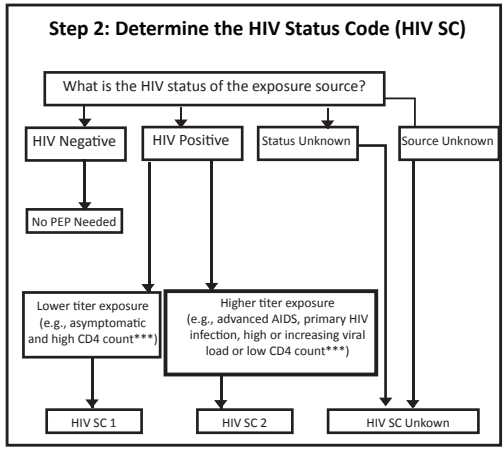
Indication	Vaccine	Manuf act'R	Preparation	Availability	Dosage and Administration	Notes
					Infants 7-11 months: 2 doses with interval of at least 1 month between doses. 3rd dose is recommended in the 2nd year of life **Children 12-23 months:** 2 doses with interval of at least 2 months between doses **Children 2-5 years:** 1 single dose of 0.5 mL	receive 1 dose of Prevenar 13 (at least 8 weeks after the 4th dose of Prevenar) to elicit immune responses to the 6 additional serotypes.
Influenza prophylaxis	**Vaxigrip** (Inactivated split virion influenza vaccine/ thiomersal free)	Aventis	1 dose/0.5mL	Kedai farmasi (Formulary)	**Adults ≥18 yo:** IM deltoid region: single 0.5 mL inj.	• Do not inject IV.
Tuberculosis	**Bacillus Calmette-Guerin (BCG) Vaccine**	Japan BCG Lab	Inj live, freeze-dried 10 doses/ml	Ward supply (Formulary)	**Adult:** Intradermal: 0.1 ml **Infant ≤ 12 mth:** Intradermal: 0.05 ml * 1 amp = 0.5 mg	• Give via Intradermal inj with a 25 or 26 gauge needle at the deltoid region of the upper arm, which will minimize post vaccination lymphade

Indication	Vaccine	Manuf act'R	Preparation	Availability	Dosage and Administration	Notes
						nopathy. • Do not exclude air. • Skin test for hypersensitivity to tuberculoprotein prior to BCG immunization. • Keep in the dark (sensitive to light). • Keep opened ampoules at 2-8°C for max 6 hrs.
Gastro-enteritis	**Rotarix** (Live attenuated human rotavirus vaccine)	GSK	1 dose/0.5mL	Kedai farmasi (NF)	2 doses, with an interval of at least 4 weeks between doses. First dose from 6 weeks of age, second dose by age of 24 weeks.	For oral use only. Do not inject. There are no restrictions on the infant's consumption of food or liquid.

Step Wise Guide in Post Exposure Prophylaxis



	Suggested Regime
LOW RISK (EC1, SC1)	**No treatment / Monotherapy**
MEDIUM RISK (EC1, SC2) (EC2, SC1)	**2 NRTI (Basic Regime) Zidovudine 300mg bd + Lamivudine 150mg bd**
HIGH RISK (EC2, SC2) (EC3, SC 1/2)	**2 NRTI + PI (Expanded Regime) As Above + Kaletra 2 tab bd**
? SOURCE/STATUS (risk high)	**Monotherapy / 2 NRTI**



APPENDIX 2
Therapeutic Drug Monitoring Sampling Guideline

APPENDIX 2
Therapeutic Drug Monitoring
Sampling Guideline

APPENDIX 2 TDM

DRUG	ADMINISTRATION	TIME FOR 1ST SAMPLING/ STEADY STATE	SAMPLING TIME	
			PRE	POST
VANCOMYCIN	IV infusion over 1 hour	24-36 hours after initiation or After 3rd/ 4th dose	Just before dose	1 hour after the end of 1 hour infusion
GENTAMICIN/ NETILMICIN/ AMIKACIN	IV BOLUS	AFTER 3RD DOSE	JUST BEFORE DOSE	1 HOUR AFTER DOSE
	IV infusion	After 3rd dose	Just before dose	At the end of 1 hr inf. Or ½ hr after ½ hr infusion
	IM	After 3rd dose	Just before dose	1 hour after dose
GENTAMICIN/ NETILMICIN	Once Daily Dosing	After 3rd dose or as ordered	Just before dose	1hour after dose or acc. to order
THEOPHYLLINE	IV Bolus	30 min after end of 30 min infusion	6-8H (or acc to order) after the 1st sample	
	IV infusion	12-24 H post loading dose	Repeat 24H ly if required	
	PO, liquid/ fast-released tab	After at least 1 day of therapy	Just before dose	2 hour post dose
	PO, slow-release	After at least 1 day of therapy	Just before dose	4 hour post dose
PHENYTOIN	IV or Oral	-WITH LOADING DOSE:2-4 HOURS AFTER DOSE -WITHOUT LOADING DOSE: AFTER 2-3 DAYS OF INITIATION	Just before dose	-
VALPROIC ACID	IV or Oral	After 2- 4 days	Just before dose	-
CARBAMAZEPINE	Oral	After 2-3 weeks	Just before dose	-
DIGOXIN	IV or Oral	- WITH LOADING DOSE:> 6 HOURS AFTER DOSE - Without Loading dose : 5-7 days after dose	Just before dose OR At least 6 H post dose	
CYCLOSPORIN	Oral	After 4 days	Just before dose (C0)	2 hour post dose(C2)
LITHIUM	Oral	After 7 days	Just before dose	At least 10-12hour post dose
BENZODIAZEPINE	IV/Oral	In suspected overdose	-	-
ACETAMINOPHEN	Oral	- In suspected overdose	> 4 H after ingestion	
		- After 4-7 days *(For analgesic or anti-inflammatory properties)*	Just before dose or 4-6 H post dose	-
PHENOBARBITOL	IV or Oral	After 20-30 days	Just before dose	-
SALICYLATE	Oral	After 4-7 days	Just before dose	-

ATTENTION : Please note that it is important to record down the **exact dosing time and sampling time** into the form provided when drug levels are requested to avoid any confusion or misinterpretation of results.

TYPES	THERAPEUTIC RANGE (UMOL/L) (UNLESS STATED)	TOXIC CONCENTRATION (UMOL/L) (UNLESS STATED)
Acetaminophen	66-199	>1324 (post 4 hours), >662(after 8 hours), >331 (after 12 hours)
Amikacin	Peak :34.2-42.8 (could be higher in once daily dosing) Trough : 8.6-17.1 (much lower in once daily dosing)	Peak : >59.9 Trough : >17.1
Benzodiazepine Diazepam	0.35-3.30	>17.0
Carbamazepine (Tegretol)	• 22.4 - 50.8 (if alone) • 16.9 - 33.8 (if other anticonvulsant are given concomitantly)	
Cyclosporin	• 250 - 375 ng/ml (<6M after transplant) • 100 - 250 ng/ml (>6M after transplant	400 ng/ml
Digoxin	1.0- 2.6 nmol/L (up to 1.28 nmol/L in CCF pt)	>2.6 nmol/L
Gentamycin	Peak : 12.5 - 20.0 (could be higher in once daily dosing) Trough : <4.2 (much lower in once daily dosing)	>25.0 >4.2
Netilmycin	Peak : 12.6 - 21.0 (could be higher in once daily dosing) Trough : <4.2 (much lower in once daily dosing)	>21.0 >4.2
Phenytoin	Total PHT 39.6 - 79.2 (to adjust for hypoalbuminaemia & renal impairment <10ml/min)	Total PHT >79.2
Phenobarbital	43.1 - 129	>172
Salicylate	• 0.22 - 0.72 (mmol/L) (for antipyretic / analgesic control) • 1.09-2.17 (mmol/L) (if anti-inflammatory / rheumatic fever conditions)	>2.17 (mmol/L)
Theophyline	55 - 111 (Lower in elderly)	>111
Valproic acid	347 - 693	>1040
Vancomycin	Peak : 17.3 - 27.6 Trough : 3.5 - 6.9 (up to 10 if severe infection)	