National Antimicrobial Treatment Guidelines 2023

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Government of Nepal
Ministry of Health and Population
Quality Standards and Regulation Division
Ramshahpath, Kathmandu

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Disclaimer

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Foreword

Antimicrobial Resistance (AMR) is a pressing Global Public Health issue. Resistance in disease-causing pathogens affects countries worldwide, its impact is particularly significant in countries like Nepal as well. The irrational and widespread use and availability of antimicrobials for human and animal consumption are the primary drivers behind the development of resistance. Rational prescription practices for antibiotics will not only minimize the morbidity and mortality caused by resistant microbial infections but also reduce the financial burden of patient management.

The fight against AMR is gaining momentum worldwide as awareness of the problem grows. Antimicrobial resistance poses a threat to the achievement of Sustainable Development Goals, and decision-makers in policies, business, and civil society are increasingly recognizing the scale of this issue. It is with great pleasure that I acknowledge the Ministry of Health and Population's publication of the National Antimicrobial Treatment Guideline 2023, an updated version of the National Antibiotic Treatment Guideline from 2014. This guideline will pave the way for the rational use of antimicrobials in healthcare settings across the country, thereby reducing and containing AMR.

Under a "One Health" approach, the Ministry of Health and Population (MoHP) serves as the coordinating body for national efforts to combat AMR. This guideline will significantly contribute shaping policies and programs aimed at containment of AMR. I hope that all healthcare providers, both public and private, will prioritize and wholeheartedly support the utilization of this guideline for the benefit of all.

I would like to extend my sincere acknowledgement and congratulate Dr. Roshan Pokhrel, Secretary of Health, the entire team at the MoHP, and all the contributors engaged for their diligent efforts in developing this crucial guideline. Your dedication and commitment are instrumental in addressing the challenges posed by AMR and safeguarding Public Health.

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Preface

The discovery of antibiotics brought about a revolution in the treatment of infections, saving countless lives. However, the inappropriate use of these powerful drugs has led to a concerning increase in the number of microorganisms developing resistance to them, giving rise to the phenomenon of antimicrobial resistance (AMR). This alarming trend, coupled with the time-consuming process of developing new antibiotics, poses extreme consequences as common infections become increasingly difficult to treat effectively. As a result, conditions that were previously manageable with first-line antibiotics now pose greater challenges, leading to severe illness and prolonged treatment.

The launch of the National Antimicrobial Treatment Guideline 2023, by the Ministry of Health and Population (MoHP) is an exciting development. It proudly builds upon the prior National Antibiotic Treatment Guideline from 2014, driven by the urgent need to address the threats posed by AMR. Unlike its predecessor, this updated guideline takes a comprehensive approach by incorporating all antimicrobials based on the latest evidence. It serves as a valuable tool with specific objectives aimed at promoting the rational use of antimicrobials at all levels of healthcare, thereby limiting the further increase in resistance and improving patient outcomes.

I would like to express my heartfelt thanks to the Dr. Madan Kumar Upadhyaya, Chief of the Quality Standards and Regulation Division, for providing overall leadership in this endeavor, and to all the contributors for their valuable inputs in preparing the guideline. My gratitude also extends to the Therapeutic Guideline Development Committee and expert invitees for their technical inputs and guidance throughout the entire process. I am sincerely appreciative of the core team members who dedicated their time and efforts to bring forth this invaluable document.

It is my firm belief that this guideline will greatly assist clinicians and healthcare professionals in both public and private healthcare services, empowering them to rationalize the use of antimicrobials in their daily practice. By adhering to this guideline, we can collectively combat AMR and ensure the optimal use of these crucial medications for the benefit of all patients.

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Acknowledgement

The Ministry of Health and Population (MoHP) has taken a significant step in healthcare by revising the National Antibiotic Treatment Guideline from 2014 and introducing the revised and updated National Antimicrobial Treatment Guideline in 2023. This comprehensive document provides invaluable information to healthcare professionals regarding the rational use of antibiotics for empirical or definitive treatment and various prophylaxes. While the guideline does not cover infections and disease conditions with well-established national treatment protocols, it has been meticulously developed based on national surveillance data on Antimicrobial Resistance (AMR), antimicrobial availability, and international guidelines. To cater to different patient populations, the guideline has been divided into adult and pediatric sections.

One of the key aspects emphasized in the guideline is the prioritization of the use of Access group antibiotics, as per the WHO AWaRe classification, as the first-line therapy. This approach aims to contain the development of AMR. It is anticipated that this guideline will greatly support the implementation of Antimicrobial Stewardship Programs in both public and private healthcare settings. By minimizing the irrational use of antimicrobials, it is expected to improve patient outcomes, reduce adverse effects, and optimize resource utilization across the continuum of care.

We would like to express our utmost appreciation for the invaluable technical and financial support provided by FHI 360/Fleming Fund Country Grant Nepal in the production of this essential document. Furthermore, we extend our deepest gratitude to the Therapeutic Guideline Development Committee, as well as all the individuals and organizations involved in the development process. It is through your dedication, expertise, and collaborative efforts that this guideline has become a reality, bringing immense benefits to healthcare professionals and patients alike.

Dr. Madan Kumar Upadhyaya
Chief, Quality Standards and Regulation Division

Contents

LIST OF ABBREVIATIONS

AAD	Antibiotic Associated Diarrhea
ABLC	Amphotericin B Lipid Complex
ABRS	Acute Bacterial Rhinosinusitis
ABU	Asymptomatic Bacteriuria
ADR	Adverse Drug Reaction
AIDS	Acquired Immunodeficiency Syndrome
AMR	Antimicrobial Resistance
AMS	Antimicrobial Stewardship
AMSP	Antimicrobial Stewardship Programmes
AOM	Acute Otitis Media
ARDS	Acute Respiratory Distress Syndrome
ARF	Acute Rheumatic Fever
ARHAI	Antimicrobial Resistance and Healthcare Associated Infection
ART	Antiretroviral Therapy
ARV	Antiretroviral
ASHP	American Society of Hospital Pharmacists
BPM	Beats per Minute
BSI	Blood Stream Infection
BUN	Blood Urea Nitrogen
CA	Community Acquired
CS	Culture Sensitivity
CA-MRSA	(Community Acquired-) Methicillin-resistant *Staphylococcus aureus*
CAP	Community Acquired Pneumonia
CBA	Colistin Base Activity
CBC	Complete Blood Count
CDAD, CDI	*Clostridioides difficile* Associated Diarrhea, *Clostridioides difficile Infection*
CDC	Centers for Disease Control and Prevention
CGA	Corrected Gestational Age
CHD	Congenital Heart Disease
CISNE	Clinical Index of Stable Febrile Neutropenia
CMV	Cytomegalovirus
CNE	Culture-negative Endocarditis
CNS	Central Nervous System
CoNS	Coagulase- negative Staphylococci
COPD	Chronic Obstructive Pulmonary Disease
COVID-19	Coronavirus Disease 2019
CPT	Cotrimoxazole Prevention Therapy
CRAB	Carbapenem-Resistant *Acinetobacter baumannii*
CSF	Cerebrospinal Fluid
CT	*Chlamydia trachomatis*
DAT	Diphtheria Antitoxin
DFA	Direct Fluorescence Antibody

DILI	Drug-Induced Liver Injury
DITP	Drug-Induced Immune Thrombocytopenia
DOTS	Directly Observed Treatment Short-course
DRESS	Drug Reaction with Eosinophilia and Systemic Symptoms
DRSP	Drug-Resistant *Streptococcus pneumoniae*
DRTB	Drug Resistant Tuberculosis
DST	Drug Sensitivity Test
DTG	Dolutegravir
ECOG	Eastern Cooperative Oncology Group
EML	Essential Medicine List
ESBL	Extended Spectrum Beta-Lactamase
ESC	European Society of Cardiology
FDC	Fixed Dose Combination
FFA	Fundus Fluorescein Angiography
FQ	Fluoroquinolone
GABHS	Group B Beta Hemolytic Streptococcus
GBS	Group B Streptococcus
GFR	Glomerular Filtration Rate
GI	Gastrointestinal
GNR	Gram-negative Bacilli/rod
GOLD	Global Initiative for Chronic Obstructive Lung Disease
HAP	Hospital Acquired Pneumonia
HDU	High Dependency Unit
HFMD	Hand Foot and Mouth Disease
HIV	Human Immunodeficiency Virus
HLAR	High Level Aminoglycoside-Resistant
HSV	Herpes Simplex Virus
HSV-1	Herpes Simplex Virus Type 1
HSV-2	Herpes Simplex Virus Type 2
HZV	Herpes Zoster Virus
IAI	Intra Abdominal Infections
IAP	Intra-partum Antibiotic Prophylaxis
ICU	Intensive Care Unit
ID	Infectious Diseases
IDSA	Infectious Diseases Society of America
IE	Infective Endocarditis
IPT	Isoniazid Preventive Therapy
IV	Intra Venous
IVDU	Intra Venous Drug User
IVIG	Intravenous Immunoglobulin
LP	Lumbar Puncture
LSCS	Lower Segment Caesarean Section
MAC	Mycobacterium Avium Complex
MASCC	Multinational Association of Supportive Care in Cancer
MCUG	Micturating Cystourethrogram

MDR	Multi-Drug Resistant
MDRO	Multidrug Resistant Organisms
MIC	Minimum Inhibitory Concentration
MU	Million International Units
MoHP	Ministry of Health and Population
MRSA	Methicillin-Resistant *Staphylococcus aureus*
MSM	Men Who Have Sex with Men
MSSA	Methicillin-Sensitive *Staphylococcus aureus*
NEC	Necrotizing Enterocolitis
NG	*Neisseria gonorrhoeae*
NHS	National Health Services
NICE	National Institute for Health and Care Excellence
NIH	National Institutes of Health
NLEM	National List of Essential Medicines
NVE	Native Valve Endocarditis
OI	Opportunistic Infections
OM	Osteomyelitis
PAS	Periodic Acid Schiff
PCNL	Percutaneous Nephrolithotomy
PJP/PCP	Pneumocystis jirovecii pneumonia/ Pneumocystis carinii pneumonia
PCR	Polymerase Chain Reaction
PDR	Pretreatment Drug Resistance
PEG	Percutaneous Endoscopic Gastrostomy
PEJ	Percutaneous EndoscopiC Jejunostomy
PEP	Post Exposure Prophylaxis
PI	Protease Inhibitor
PLHIV	People Living with HIV
PML	Progressive Multifocal Leucoencephalopathy
PNA	Postnatal Age
PO	Per os (Orally)
PPI	Proton Pump Inhibitors
PPROM	Preterm Premature Rupture of Membranes
RADT	Rapid Antigen Detection test
RIRS	Retrograde Intrarenal Surgery
SA	Septic Arthritis
SEM	Skin Eye and Mouth
SHEA	Society of Healthcare Epidemiology of America
SIRS	Systemic Inflammatory Response Syndrome
SJS	Stevens-Johnson Syndrome
SSI	Surgical Site Infections
SSSS	Staphylococcal Scalded Skin Syndrome
SSTI	Skin and Soft Tissue Infections
STSS	Streptococcal Toxic Shock Syndrome
TaP	Tetanus acellular Pertussis

TEN	Toxic Epidermal Necrolysis
TG	Transgender
TMP	Trimethoprim
TURP	Transurethral Resection of the Prostate
UTI	Urinary Tract Infection
URS	Ureteroscopy
VAP	Ventilator-Associated Pneumonia
VISA	Vancomycin Intermediate *Staphylococcus aureus*
VRE	Vancomycin-Resistant Enterococcus
VRSA	Vancomycin-Resistant *Staphylococcus aureus*
VZIG	Varicella Zoster Immune Globulin
VZV	Varicella-Zoster Virus
WHO	World Health Organization

INTRODUCTION

The National Antibiotic Treatment Guidelines were initially released by the Ministry of Health and Population in 2014 to align with the regional strategy of preventing and containing Antimicrobial Resistance (AMR) developed by the World Health Organization's South-East Asia Regional Office. These guidelines aimed to address the emergence and spread of resistance, optimize the use of available antimicrobial agents, reduce selection pressure through appropriate control measures, change the behavior of prescribers and communities to ensure rational use, and combat AMR through nationally coordinated efforts.

Since the circulation of the first guideline in 2014, significant changes have occurred in Nepal's health sector. The focus has shifted towards healthcare, and diagnostic and therapeutic services, once limited to a few cities, are now accessible in the periphery. The establishment of Intensive Care Units (ICUs) and the deployment of trained personnel to remote areas will increase the demand and use of antimicrobials. This updated version of the National Antimicrobial Treatment Guidelines aims to provide prescribers with the necessary guidance on selecting the right drug, dose, and duration for commonly encountered infectious conditions in Nepal.

The document incorporates the cumulative antibiogram from national AMR surveillance data, considers the availability and affordability of drugs in Nepal, references the National List of Essential Medicines (NLEM), and consults other national and international protocols and guidelines. Efforts have been made to prioritize antibiotics from the "Access" group (as per the WHO AWaRe Classification of antibiotics) as the first-line therapy whenever possible. It should be noted that this document adopts the WHO's AWaRe classification.

This update introduces additional topics, such as infections of the Central Nervous System (CNS) and infections caused by multi-drug resistant organisms often associated with healthcare settings. Furthermore, the guideline provides expanded information on infections in the pediatric and neonatal populations.

The primary objective of this guideline is to promote Antimicrobial Stewardship Programmes (AMSP). However, it is essential for each institution to develop its own antimicrobial guideline based on their local antibiogram.

Scope of the document

- This document provides information to healthcare workers on the rational use of antibiotics for empirical or definitive treatment of commonly encountered infections in Nepal, as well as various prophylactic measures. However, it is not exhaustive and excludes infections for which national treatment protocols already exist.
- This document will be regularly updated as new data becomes available.

Objectives

- To offer guidance for the optimal use of antimicrobials in various infectious conditions and for prophylactic purposes, taking into account the cumulative antibiogram from National AMR surveillance.
- To promote the preferential use of antimicrobials from the "Access" group, while ensuring judicious use of those from the "Watch" and "Reserve" groups.

GENERAL PRINCIPLES

Empirical Therapy – Antibiotic treatment is considered empirical when it is administered in the absence of microbiological confirmation or while awaiting pending reports. Reevaluation of empirical antibiotics must be conducted after 48-72 hours and once the reports become available.

Important considerations

Determine if antibiotic therapy is necessary. Discontinue if the cause is determined to be non-infectious. Seek assistance from the Antimicrobial Stewardship (AMS) team within the institution, if available.

Evaluate the possibility of using a narrow-spectrum antibiotic based on the reports. Consider de-escalating the antibiotics based on the clinical condition and available reports.

- Assess if **switching to monotherapy** is appropriate (if initially using a combination).
- Evaluate the feasibility of changing the **route of administration** to oral.
- Adjust the **dosage** based on renal and hepatic functions, if necessary.
- Check for potential **drug interactions** with other medications being used.
- Determine if any **laboratory parameters** need monitoring during therapy.

These recommendations serve as a treatment guide and do not replace the clinical judgment of the responsible physician after a comprehensive assessment of each individual case.

Prescriptions should clearly include

- **Indication** for antibiotic use.
- **Formulation**; Capsule/Tablet or Injection.
- **Route of administration** (e.g., IM or IV), infusion rate for IV, and dosing.
- **Start date, review date, stop date,** or duration.

Consider implementing transmission-based precautions and isolation for patients with infectious diseases and drug-resistant organisms such as methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococci (VRE), drug-resistant tuberculosis (DRTB), *Clostridioides difficile*, etc.

Precautions to observe

Standard precautions: Practice proper hand hygiene, respiratory hygiene, sharps safety, safe injection practices, use sterile instruments and devices, maintain clean and disinfected environmental surfaces, and use gloves and protective clothings. Use mouth, nose, and eye protection during procedures.

Contact precautions: Ensure appropriate patient placement, limit patient transport, use disposable or dedicated equipment, perform cleaning and disinfection of the room, and use gloves gown.

Droplet precautions: Have patients wear masks for source control, ensure appropriate patient placement, limit patient transport, and provide masks for healthcare personnel.

Airborne precautions: Ensure patients wear masks for source control, place them in isolation rooms, limit patient transport, restrict susceptible healthcare personnel from entering the room, and have healthcare personnel wear N-95 masks or higher level respirators.

Please note that these precautions are subject to local guidelines and protocols and may require additional measures based on the specific circumstances.

ADMINISTRATION OF ANTIBIOTICS

Loading dose

The loading dose (LD) of a drug is calculated from the volume of distribution (V) and the required plasma concentration (Cp) where LD = V x Cp. The loading dose is different for hydrophilic antimicrobials and lipophilic antimicrobials because of the difference in volume of distribution. The V of hydrophilic antimicrobials is increased due to expansion of extracellular water volume due to increased permeability of vascular endothelium in infection, particularly sepsis and septic shock. The V of lipophilic antimicrobials is higher in obese individuals. The required Cp depends on the MICs of different antimicrobials and varies greatly.

For concentration-dependent antibiotics (e.g. aminoglycosides, fluoroquinolones and polymyxins), a high initial dose is essential for maximum bactericidal effect and a large initial dose is often chosen for time-dependent antibiotics to ensure good tissue penetration. Also, renal function plays no role in the calculation of the LD. Thus, a high initial dose of antibiotic is a standard practice. However, adverse effects of high doses of the drugs should be taken into consideration (e.g. CNS toxicity and seizures with high-dose penicillin particularly in those with renal failure).

Interval between dosing

For concentration-dependent antibiotics with strong post-antibiotic effects (e.g. aminoglycosides), high doses at longer intervals are better than lower doses at shorter intervals. This also reduces the toxicity (especially nephrotoxicity).

Extended-interval dosing of Aminoglycosides

Parenteral aminoglycosides at higher doses administered at an extended interval (once-daily dosing) has efficacy comparable with traditional intermittent administration but has potential advantages of decreased nephrotoxicity, ease of administration and reduction of administration and monitoring-related costs. Examples: For Gram-negative microorganisms

Amikacin
- Conventional dosing – 5mg/kg q8h or 7.5mg/kg q12h
- High-dose extended-interval dosing – 15-20 mg/kg once daily over 60 mins

Gentamicin
- Conventional dosing – 3-5 mg/kg/day in divided doses q8h
- High-dose extended-interval dosing – 5-7mg/kg once daily over 120 mins

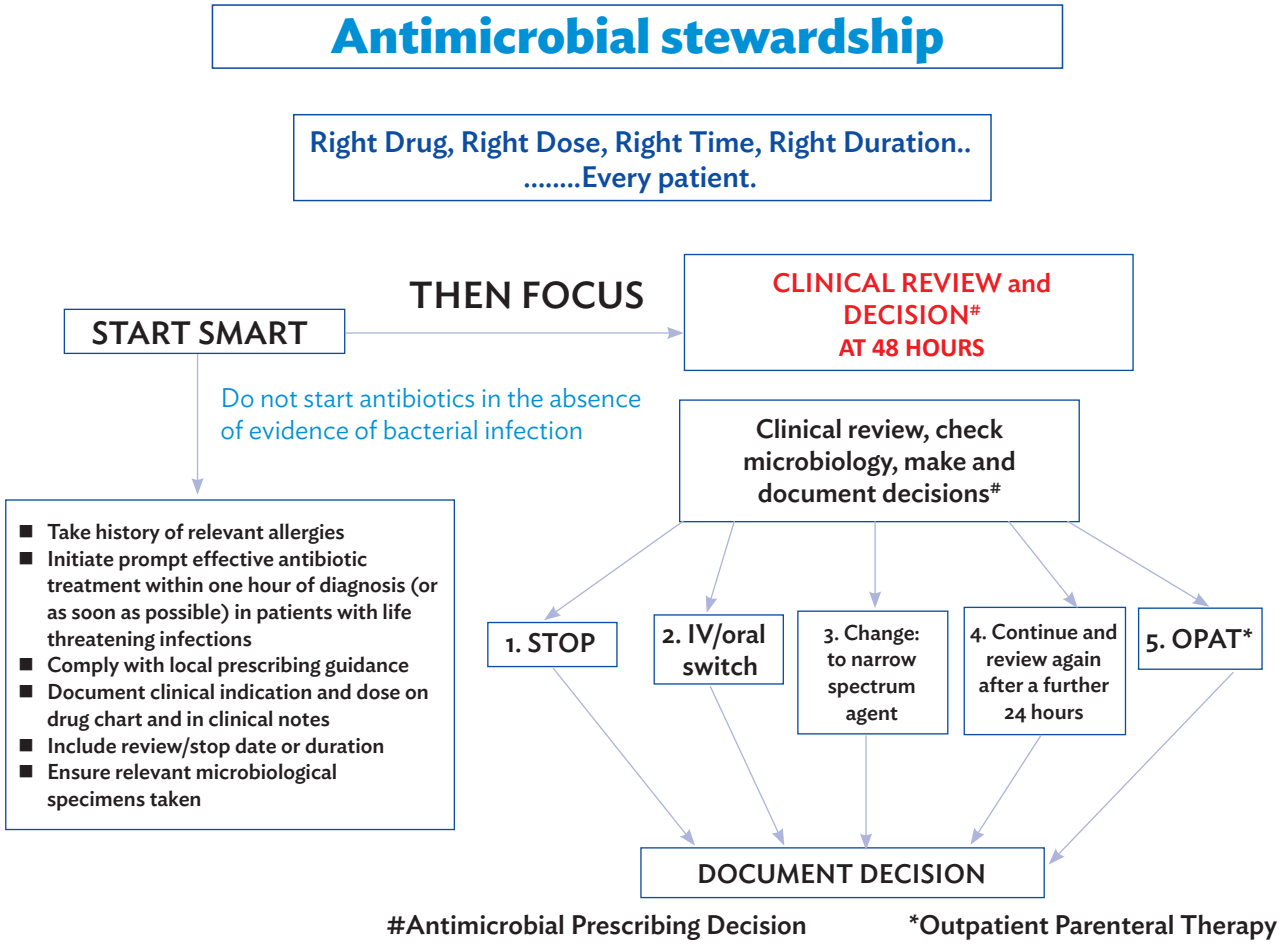
For time-dependent antibiotics like beta-lactams, the duration of the antibiotic level above the minimum inhibitory concentration (MIC) level is an important determinant of bacterial eradication and clinical response. Hence, they are given in prolonged infusions and at shorter intervals. Prolonged administration strategies for these beta-lactam antibiotics may include either a continuous IV infusion (over the entire dosing interval) or an extended IV infusion (over 2 to 4 hours) compared to traditional IV infusions over 30 to 60 minutes. Example:

Extended infusion of Piperacillin-tazobactam

Piperacillin-tazobactam
- Traditional infusion method (over 30 mins) – every 6 to 8 hours
- Extended infusion method (over 4 hours) – preferred when used every 8 hours

However for extended infusions, the beta-lactam drugs must be stable over that time and the stability can be influenced by the type of intravenous fluid used to reconstitute the drug, the concentration of the final solution, and the storage temperature.

ANTIMICROBIAL STEWARDSHIP



Source: Advisory Committee on Antimicrobial Resistance and Healthcare Associated Infection (ARHAI), Department of Health, UK

APPROACH TO MULTIDRUG RESISTANT ORGANISMS

Overview

Colonization and infection with Multidrug resistant organisms (MDRO) are on the rise with increased morbidity, mortality and costs. With increased use of antibiotics and hence, enhanced selective antimicrobial pressure multi- and extensively drug-resistant pathogens (e.g. methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant Enterococci (VRE), extended spectrum beta-lactamase (ESBL) producing Enterobacteriaceae, and carbapenem-resistant Enterobacteriaceae, *Pseudomonas aeruginosa, Acinetobacter baumannii,* etc.) are increasing in prevalence.

Restricted and judicious antibiotics use, usually implemented as part of AMSP (Antimicrobial stewardship programme) and guided by local antibiogram, along with infection control measures prevent the emergence and spread of MDRO.

Antibiogram use

Monitoring of clinical microbiology isolates resulting from tests done as a part of routine clinical care helps to understand the common pathogens in various specimens as well as to generate an overall profile of antimicrobial susceptibility of a specific microorganism. The development of such antibiograms can help to detect the emergence of new MDROs not previously detected and also prepare facility-specific summary antimicrobial susceptibility reports which provide clinicians with information to guide antimicrobial prescribing practices. Antibiograms, the simplest form of MDRO surveillance, are the easiest method to prepare facility-specific antimicrobial guidelines and thus an essential tool to fight against MDROs.

Fluoroquinolones and linezolid use

Because of the high prevalence of Tuberculosis and increasing prevalence of MDR-TB in Nepal, it's advisable to reserve Fluoroquinolones and Linezolid and limit their use for other indications.

Combination Antibiotics with Polymyxins

When a polymyxin (Polymyxin B or Colistin) is being used to treat MDRO, it should be used in combination with a second active agent. The second active agent could be Meropenem (especially if MIC to meropenem is ≤ 8 mcg/mL) or Tigecycline (especially for GI tract and pulmonary infections) or an aminoglycoside. The rationale for using two or more agents when a polymyxin-based regimen is being used includes reduced mortality with combination therapy and the concern for emergence of resistance during monotherapy.

Approach

- Good hand hygiene compliance.
- Contact precautions for patients who harbor epidemiologically relevant drug-resistant organisms.
- Minimizing unnecessary hospitalization and interventions.
- Adequate and standardized approaches to environmental cleaning and disinfection.
- Intensive infection control interventions to reduce colonization pressure – e.g. cohorting with dedicated staff, chlorhexidine bathing, selective decontamination, active surveillance for specific pathogens, reduction of catheterization utilization, etc.
- Restricted and judicious antimicrobial utilization – e.g. institutional AMSP, Infection Prevention and Control (IPC)

INFECTIONS IN ADULTS

RESPIRATORY TRACT INFECTIONS

Infection/Condition and Likely Organism	Suggested treatment		Comments
	Preferred	Alternative	
Lower Respiratory Tract Infections			
Community Acquired Pneumonia (CAP)			
Pneumonia of low severity With CURB-65 score 0-1 Causative organism *Streptococcus pneumoniae* *Haemophilus influenzae* *Mycoplasma pneumoniae*	Amoxicillin 500mg PO q8h for 5-7 days	Penicillin allergy or if atypical pathogens suspected Doxycycline 200mg on first day, then 100mg PO q24h for 4 days (total 5 days course) OR Clarithromycin 500mg q12h for 5 days OR Erythromycin (in pregnant) 500mg q6h for 5 days	CURB-65 is a clinical prediction rule that has been validated for grading severity and predicting mortality in CAP. One point each is given for Confusion, BUN > 7 mmol/l, Respiratory rate of ≥ 30 breaths/min, Blood pressure ≤ 90/60 mmHg, Age ≥ 65.
Pneumonia of moderate severity With CURB-65 score 2 Causative organism *Streptococcus pneumoniae* *Haemophilus influenzae* *Chlamydia pneumoniae*	Amoxicillin 500mg PO q8h for 5-7 days PLUS Clarithromycin 500mg PO q12h for 5 days OR Erythromycin (in pregnant) 500mg PO q6h for 5 days	Penicillin allergy Doxycycline 200mg on first day, then 100mg PO q24h for 4 days (total 5 days course) OR Clarithromycin 500mg q12h for 5 days	
Pneumonia of high severity With CURB-65 score 3-5 Causative organism *Streptococcus pneumoniae* *Staphylococcus aureus* *Legionella* spp.	Amoxicillin-clavulanate 1.2gm IV q8h for 5-7 days PLUS Clarithromycin 500mg PO or IV q12h for 5 days OR Erythromycin (in pregnant) 500mg PO q6h for 5 days	Levofloxacin 500-750mg PO or IV q24h for 5 days	
Viral Pneumonia			
COVID-19	Remdesivir 200mg IV once then 100mg IV once a day for 4 days or until hospital discharge (may extend to 10 days)		For symptomatic patients with hypoxemia in early viremic phase.
Influenza	Oseltamivir 75mg PO q12h for 5 days		

Infection/Condition and Likely Organism	Suggested treatment		Comments
	Preferred	Alternative	
Varicella zoster	Acyclovir 10mg/kg IV q8h for 7 days		
Hospital Acquired Pneumonia (HAP/VAP) ***If MRSA is common nosocomial pathogen in the institution (>10-20% local prevalence) – empirically cover for MRSA in VAP			
Early Onset HAP/VAP AND No associated risk for MDR (5 days of admission/ intubation)	Amoxicillin-clavulanate 1.2 gm IV q8h for 5-7 days	Ceftriaxone 2gm IV q24h for 5-7 days	Risk factors for multi-drug resistant (MDR) organisms: 1. Prior IV antibiotic use within 90 days. 2. > 5 days of hospitalization in ICU/ HDU. 3. Previous colonization with MDR pathogens Risk of MDR organisms is lower with early onset HAP/VAP.
Late Onset HAP/VAP (5 days or more of admission/intubation)	Piperacillin-tazobactam 4.5gm IV q6-8h for 7 days OR Cefepime 2gm IV q8h for 7 days	Imipenem-cilastatin 500mg IV q6h for 7 days OR Meropenem 1gm IV q8h for 7 days	Duration - 7 days.
Aspiration Pneumonia			
Causative organisms *Streptococcus pneumoniae* *Staphylococcus aureus* *Haemophilus influenzae* *Pseudomonas aeruginosa*	Amoxicillin-clavulanate 1.2gm IV q8h	Ceftriaxone 2gm IV q24h PLUS *Metronidazole 500mg IV q8h OR Azithromycin 500mg q24h for 5 days OR Clarithromycin 500mg q12h for 5 days	Duration: 7-10 days *In those with poor dental hygiene Antibiotics - not indicated for chemical pneumonitis.
Infective Exacerbation Of Chronic Obstructive Pulmonary Disease (COPD)			
Outpatient Causative organism *Streptococcus pneumoniae*	Amoxicillin-clavulanate 625mg PO q8h for 5-7 days	Doxycycline 100mg PO q12h for 5-7 days OR Cefuroxime 500mg PO q12h for 5-7 days	

Infection/Condition and Likely Organism	Suggested treatment		Comments
	Preferred	Alternative	
Inpatient Causative organisms *Streptococcus pneumoniae* *Pseudomonas aeruginosa* **Suspect Pseudomonas infection if: • Frequent exacerbation • Severe airflow limitation • Exacerbation requiring mechanical ventilation	Amoxicillin-clavulanate 1.2gm IV q8h for 5-7 days PLUS* Azithromycin 500mg IV/ PO for 3-5 days	Ceftriaxone 2gm IV q24h for 5-7days PLUS* Azithromycin 500mg IV/ PO for 3-5 days	*If atypical pneumonia
	Piperacillin-tazobactam 4.5gm IV q6-8h OR Cefepime 2gm IV q8h PLUS Azithromycin 500mg IV/ PO for 3-5 days	Ceftazidime 2gm IV q8h PLUS Azithromycin 500mg IV/ PO for 3-5 days	
Lung Abscess And Empyema			
Empirical	Amoxicillin-clavulanate 1.2gm IV q6-8h	Ceftriaxone 2gm IV q24h PLUS *Metronidazole 500mg IV q8h Penicillin allergy Clindamycin 600mg IV/ PO q6h	In empema drain the collection wherever feasible. Duration of treatment: After drainage : 2-4 weeks Undrained : 4-6 weeks *Metronidazole: in cases of lung abscess when aspiration is suspected.
Causative organism *Staphylococcus aureus*	Cloxacillin 2gm IV q4-6h	Cefazolin 2gm IV q8h	Duration 4-6 weeks, depending on clinical response. In case of slow response, may have to be prolonged. May change to oral therapy (e.g. Amoxicillin-clavulanate 625mg PO q8h) to complete the duration once patient stabilized and improved.

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CARDIOVASCULAR SYSTEM INFECTIONS

<table>
<tr><th rowspan="2">Infection/Condition and Likely Organism</th><th colspan="2">Suggested Treatment</th><th rowspan="2">Comment</th></tr>
<tr><th>Preferred</th><th>Alternative</th></tr>
<tr><td colspan="4">Acute Rheumatic Fever
Group A Streptococcus</td></tr>
<tr><td colspan="4">All patients with ARF should receive antibiotic to treat precipitating Group A Streptococcus infection. Primary Prevention of ARF means timely and complete treatment of Group A Streptococcus sore throat with antibiotics. If commenced within 8 days of sore throat onset, a course of penicillin will prevent almost all the cases of ARF that would otherwise have developed.</td></tr>
<tr><td>Primary prophylaxis</td><td>Benzathine penicillin G 1.2 MU IM
OR
Phenoxymethylpenicillin 500mg orally q12h for 10 days
OR
<u>Penicillin hypersensitivity (non-severe)</u>
Cephalexin 1 gm PO q12h for 10 days
OR
<u>Penicillin immediate hypersensitivity</u>
Azithromycin 500mg PO q24h for 5 days</td><td></td><td>Streptococcal infection may not be evident by the time ARF manifests (e.g. cultures often negative) but eradication therapy for possible persisting streptococci is recommended nonetheless. Intramuscular penicillin is preferred due to better adherence and its ongoing use in secondary prophylaxis.</td></tr>
<tr><td rowspan="5">Secondary prophylaxis</td><td>Parenteral Prophylaxis:
Benzathine penicillin G 1.2MU IM every 3 to 4 weeks

Oral Prophylaxis:
Phenoxymethylpenicillin (Penicillin V)
250mg PO q12h daily</td><td>Penicillin allergy:
Erythromycin ethylsuccinate 800mg PO q12h</td><td></td></tr>
<tr><td>Type of infection</td><td colspan="2">Duration of Prophylaxis</td></tr>
<tr><td>Rheumatic fever with carditis and residual heart disease (persistent valvular disease)</td><td colspan="2">10 years or until 40 years of age, whichever is longer; sometimes lifelong prophylaxis</td></tr>
<tr><td>Rheumatic fever with carditis but no residual heart disease (no valvular disease)</td><td colspan="2">10 years or until 21 years of age, whichever is longer</td></tr>
<tr><td>Rheumatic fever without carditis</td><td colspan="2">5 years or until 21 years of age whichever is longer</td></tr>
</table>

Infection/Condition and Likely Organism	Suggested Treatment		Comment
	Preferred	Alternative	
Infective Endocarditis			
Empirical Treatment for native valve / late prosthetic valve (>1 year post surgery) endocarditis			
	Ampicillin 12 gm/day IV in 4-6 doses PLUS Gentamicin 3mg/kg IV q24h PLUS* (Flu)Cloxacillin 12 gm/day IV in 4-6 doses	Penicillin allergy: Vancomycin 30-60mg/kg/day IV in 2-3 doses PLUS Gentamicin 3mg/kg IV q24h	*For suspected *Staphylococcus aureus* infection (e.g. IVDU, prosthesis) Duration and regimen decided after confirmation of organism.
Empirical Treatment for early prosthetic valve (<12 months post-surgery) or healthcare associated endocarditis			
	Vancomycin 30-60mg/kg/day IV in 2 doses PLUS Gentamicin 3mg/kg IV q24h PLUS Rifampicin 900-1200mg PO in 2-3 divided doses		Rifampicin is only recommended for prosthetic valve endocarditis and it should be started 3-5 days after Vancomycin and Gentamicin.
Viridans Streptococci and *Streptococcus bovis*			
Native and Prosthetic Valves Penicillin- Susceptible	Penicillin G 12-18 MU/day IV either in 4-6 doses or continuously OR Ampicillin 2gm IV q4h OR Ceftriaxone 2gm/day IV	For Beta-lactam allergic patient Vancomycin 30mg/kg/day IV in 2 doses	Duration – 4 weeks (native valve) or 6 weeks (prosthetic valve).
Native and Prosthetic Valves Penicillin- Resistant	Penicillin G 24 MU/day IV either in 4-6 doses or continuously OR Ampicillin 2gm IV q4h OR Ceftriaxone 2gm/day IV PLUS Gentamicin 3mg/kg IV q24h	For Beta-lactam allergic patient Vancomycin 30mg/kg/day IV in 2 doses PLUS Gentamicin 3mg/kg IV q24h	

Infection/Condition and Likely Organism	Suggested Treatment		Comment
	Preferred	Alternative	
***Enterococcus* - Test for high level aminoglycoside resistance (HLAR)**			
Beta lactam and HLA-susceptible strain	Ampicillin 2gm IV q4h for 4 - 6 weeks (prosthetic valve) PLUS *Gentamicin 1mg/kg IV q8h for4-6 weeks	Ampicillin 2gm IV q4h for 4-6 weeks PLUS **Ceftriaxone 2gm IV q12h for 4-6 weeks (for renal impairment, elderly patients or those with resistance to Gentamicin)	This is active against *Enterococcus faecalis* strain with and without HLAR, being the combination of choice in patient with HLAR *E. faecalis* endocarditis. ** Ceftriaxone should not be used alone due to intrinsic resistance of *Enterococcus*.
		If resistant to Penicillin and susceptible to Vancomycin and aminoglycoside Vancomycin 30mg/kg/day IV in 2 doses for 6 weeks PLUS Gentamicin 1mg/kg IV q8h for 6 weeks	* In order to maximize synergistic effect, administer Gentamicin at the same time or temporally close to Ampicillin.
***Staphylococcus* spp**			
Native valve Methicillin - Susceptible Staphylococci (MSSA)	(Flu)Cloxacillin 12gm/day IV in 4-6 doses for 4-6 weeks	For Penicillin allergic patient Non-immediate type hypersensitivity Cefazolin 2gm IVq8h for 4-6 weeks For immediate type hypersensitivity Vancomycin 30mg/kg/day IV in 2 doses for 4-6 weeks	

Infection/Condition and Likely Organism	Suggested Treatment		Comment
	Preferred	Alternative	
Prosthetic valves Methicillin – Susceptible Staphylococci	(Flu)Cloxacillin 12 gm/ day IV in 4-6 doses for >6 weeks PLUS Rifampicin 900-1200mg PO in 2-3 divided doses for >6 weeks PLUS Gentamicin 1mg/kg IV q8h for 2 weeks	For Penicillin allergic patient replace (Flu) Cloxacillin with I. Non-immediate type hypersensitivity Cefazolin 2gm IVq8h for 4-6 weeks II. For immediate type hypersensitivity Vancomycin 30mg/kg/day IV in 2 doses for 4-6 weeks	Rifampicin: start after 3-5 days of effective initial Cloxacillin therapy and / or once the bacteremia has been cleared.
Native valves Methicillin – Resistant Staphylococci	Vancomycin 30-60mg/kg/ day IV in 2 doses for 4-6 weeks		
Prosthetic valves Methicillin – Resistant Staphylococci	Vancomycin 30-60mg/kg/ day IV in 2 -3 doses for > 6 weeks PLUS Rifampicin 900-1200mg PO in 2-3 divided doses for >6 weeks PLUS Gentamicin 1mg/kg IV q8h for 2 weeks		Rifampicin: start after 3-5 days of effective initial Cloxacillin therapy and / or once the bacteremia has been cleared.
HACEK group of microorganism (*Haemophilus parainfluenzae, Haemophilus aphrophilus, Actinobacillus actinimycetemcomitans, Cardiobacterium hominis, Eikenella corrodens* and *Kingella kingae*)			
Native and Prosthetic valves	Ceftriaxone 2 gm IV q24h for 4 weeks (native valve) or 6 weeks (prosthetic valve)	Ampicillin-sulbactam 3gm IV q6h for 4-6 weeks OR *Ciprofloxacin 400mg IV q12h for 4-6 weeks	*Ciprofloxacin can be changed to oral 500mg q12h for remaining duration once clinically stable.
Therapy for Culture Negative Endocarditis			
Brucella spp.	Gentamicin 5mg/kg IV q24h (for first 2-4 weeks) PLUS Doxycycline 100mg IV/PO q12h PLUS Rifampicin 300-600mg PO q24h		Duration of treatment 3-6 months depending on clinical response

Infection/Condition and Likely Organism	Suggested Treatment		Comment
	Preferred	Alternative	
Legionella spp.	Levofloxacin 500mg/12h/ IV or PO ≥ 6weeks OR Clarithromycin 500mg/12h IV for 2 weeks then PO for 4 weeks		
Mycoplasma spp.	Levofloxacin 500mg/12h/ IV or PO ≥ 6weeks		
Therapy for Candida Endocarditis (Native and Prosthetic valve)			
Candida Endocarditis (Native and prosthetic valve)	Initial therapy Amphotericin B deoxycholate 0.5-1mg/kg IV q12h for at least 6 weeks after surgery OR Lipid formulation Amphotericin B 3-5mg/kg IV q24 h for at least 6 weeks after surgery PLUS* Flucytosine 25mg/kg PO q6h for at least 6 weeks after surgery (if available)		Surgery is mandatory. Continue therapy for 6 weeks after the surgical replacement or longer in patient with perivalvular abscess. If prosthetic valve cannot be replaced, lifelong suppressive therapy with Fluconazole 400mg (6mg/kg) daily is recommended. *Flucytosine: for synergistic effect. Causes dose related marrow toxicity. Avoid using in patients with renal failure.
	Step down therapy: Fluconazole 400-800mg (6-12mg/kg) PO q24h after negative blood cultures		

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CENTRAL NERVOUS SYSTEM INFECTIONS

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Meningitis (Acute)			
Empirical treatment Common organisms: *Streptococcus pneumoniae* *Neisseria meningitidis* *Haemophilus influenzae* Other organisms: Gram-negative rods	Ceftriaxone 2gm IV q12h OR Cefotaxime 2gm IV q6h PLUS* *Ampicillin 2gm IV q4h	Alternative for immunocompromised: Meropenem 2gm IV q8h	Antibiotic should not be delayed awaiting investigations. Duration: 10-14 days Dexamethasone 0.4mg/kg/dose 15 to 20 minutes before or at the same time as first dose of antibiotics. Continue q12h for 4 days if the Gram stain and/or cultures are consistent with *Streptococcus pneumoniae*. *Consider empirical coverage with Ampicillin for Listeriosis in people >60 years of age, alcoholic, immunosuppressed and pregnant.
Causative Organism isolated:			
Streptococcus pneumoniae	Penicillin-susceptible strains Benzylpenicillin 4MU IV q4h		Ceftriaxone or Cefotaxime should be de-escalated to Benzylpenicillin once the MIC result has been confirmed. Duration: 10-14 days
	Penicillin resistant strains Ceftriaxone 2gm IV q12h OR Cefotaxime 2gm IV q6h	Penicillin resistant strains Cefepime 2gm IV q8h OR Meropenem 2gm IV q8h	
	Cephalosporin resistant strains Vancomycin 25-30mg/kg loading dose then 15-20mg/kg IV q8-12h; not to exceed 2gm per dose OR Rifampicin 600mg IPO q12h PLUS Ceftriaxone 2gm IV q12h OR Cefotaxime 2gm IV q6h		

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Neisseria meningitidis	Benzylpenicillin 4MU IV q4h	If resistant to Penicillin Ceftriaxone 2gm IV q12h OR Cefotaxime 2gm IV q6h	Duration 5-7 days If treated with Benzylpenicillin, chemoprophylaxis given at discharge to eliminate nasopharyngeal carriage.
Neisseria meningitidis Prophylaxis for household and close contacts*	Age > 15 years: Ciprofloxacin 500mg PO as single dose OR Rifampicin 600mg PO q12h for 2 days (4 doses) [not recommended in pregnancy]	Ceftriaxone 250mg IM as single dose (especially in pregnancy and lactating mothers) OR Azithromycin 500mg PO as single dose	*Contact for > 8 hours and within 1 meter of the index case and contact with oropharyngeal secretions in the last 7 days before onset of symptoms up to 24 hours after appropriate antibiotics.
Listeriosis	Ampicillin 2gm IV q4h OR Benzylpenicillin 4MU IV q4h PLUS* Gentamicin 5mg/kg/day IV in 3 divided doses	Trimethoprim-sulfamethoxazole 10 to 20mg/kg/day (TMP component) IV q6-12h OR Meropenem 2gm IV q8h	Duration - 3 weeks or longer (in immunocompromised host) depending on clinical response. Gentamicin is given until symptoms improve (minimum of 1 week).
Haemophilus influenzae	Ceftriaxone 2gm IV q12h OR Cefotaxime 2gm IV q6h	Cefepime 2gm IV q8h If organism is susceptible and patient is allergic to cephalosporins: Ciprofloxacin 400mg IV q8h	Duration: 7-10 days.
Meningitis (Chronic)			
Tuberculous meningitis *Mycobacterium tuberculosis*	2HRZE + (7-10)HRE Isoniazid (H)-5mg/kg Rifampicin (R)- 10mg/kg Ethambutol (E)- 15mg/kg Pyrazinamide (Z)- 25mg/kg Pyridoxine 10-50mg PO q24h needs to be prescribed together with Isoniazid	Infection in HIV patients: Similar to HIV-uninfected adults. Consider drug interactions Daily dosing is recommended as per DOTS. (Follow National Tuberculosis Guidelines)	Add dexamethasone 0.3-0.4mg/kg/day for 2 weeks, then 0.2mg/kg/day for week 3, then 0.1mg/kg/day for week 4 and taper gradually and stop by 8 weeks. Duration - usually 12 months.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Cryptococcal meningitis *Cryptococcus neoformans* (In immunocompetent)	Induction Therapy: Amphotericin B 0.7-1.0mg/kg/day IV q24h PLUS 5-Flucytosine 100-150mg/kg/day PO q6h OR Fluconazole 800-1200mg PO q24h	Induction Therapy: Fluconazole 1200mg PO q24h PLUS 5-Flucytosine 100-150mg/kg/day PO q6h	Duration of induction therapy: 4-6 weeks Duration of consolidation therapy: 8 weeks Duration of maintenance therapy: up to 12 months
	Consolidation Therapy: Fluconazole 400-800mg PO q24h		
	Maintenance Therapy: Fluconazole 200mg PO q24h		
Viral Encephalitis *Herpes simplex* *Varicella zoster*	Acyclovir 10mg/kg* IV q8h		*dosing based on ideal body weight and not measured weight in obese. Duration: 14-21 days
Brain Abscess/Subdural Empyema <u>Common organisms:</u> *Streptococci* *Staphylococci* Gram-negative bacilli Anaerobes	Brain abscess/subdural empyema suspected arising from an oral source: Ampicillin 2g q4-6h OR Ceftriaxone 2g IV q12h PLUS Metronidazole 500mg IV q8h		Duration - 4-8 weeks (IV 2 weeks minimum) *Add Cloxacillin if suspected hematogenous spread, post-neurosurgery or post penetrating injury. In post-neurosurgery or trauma, consider cover for *Pseudomonas*.
	Brain abscess/subdural empyema suspected arising from sinus or otogenic source: Ceftriaxone 2gm IV q12h OR Cefotaxime 2gm IV q4-6h PLUS Metronidazole 500mg IV q8h		
	Brain abscess/subdural empyema arising from hematogenous spread or penetrating trauma (community acquired): Ceftriaxone 2gm IV q12h OR Cefotaxime 2gm IV q4-6h PLUS* Cloxacillin 2gm IV q4h PLUS Metronidazole 500mg IV q8h		
	Brain abscess arising from hematogenous spread (hospital acquired) or post- neurosurgery: Vancomycin 25-30mg/kg loading dose then 15-20mg/kg IV q8-12h; not to exceed 2gm per dose PLUS Ceftazidime 2gm IV q8h OR Cefepime 2gm IV q8h OR Meropenem 2 g IV q8h		

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Spinal Epidural Abscess <u>Common organisms:</u> *Streptococci* *Staphylococci* Gram-negative bacilli	Cloxacillin 2gm IV q4h OR* Vancomycin 25-30mg/kg loading dose then 15mg/kg IV q8-12h; not to exceed 2gm per dose PLUS Gentamicin 4-7mg/kg/day IV in 3 divided doses OR **Ceftriaxone 2gm IV q12h OR **Cefotaxime 2gm IV q4-6h		Duration: 2-6 weeks (IV 2 weeks minimum) * Vancomycin if suspecting MRSA or allergy to Cloxacillin. **3rd Generation Cephalosporin if Gentamicin is contraindicated.
Healthcare-associated ventriculitis and Meningitis	If C&S is not available: Ceftazidime 2gm IV q8h PLUS* Vancomycin 25-30mg/kg loading dose then 15-20mg/kg IV q8-12h; not to exceed 2gm per dose	Meropenem 2gm IV q8h PLUS* Vancomycin 25-30mg/kg loading dose then 15-20mg/kg IV q8-12h; not to exceed 2gm per dose	*Vancomycin if MRSA suspected.
Cranial Trauma Open fracture and Penetrating injuries	Amoxicillin-clavulanate 1.2gm IV q8h	Cefuroxime 1.5gm IV q8H PLUS Metronidazole 500mg IV q8H	Duration: 5-7 days
Penetrating craniocerebral injuries	Ceftriaxone 2gm IV q12h PLUS Metronidazole 400mg PO q8h		Duration: For 2 weeks initially and then review with microbiology

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ORAL/DENTAL INFECTIONS

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Infections of the Teeth and Supporting Structures			
Reversible / Irreversible Pulpitis	Systemic antibiotic use not recommended		
Localised Dentoalveolar Abscess	Superficial Systemic antibiotic use not recommended (unless medically compromised)		
	Deep Infection/Medically Compromised Amoxicillin 500mg PO q8h PLUS Metronidazole 400mg PO q8h OR Amoxicillin-clavulanate 625mg PO q8h	Penicillin allergy Cephalexin 500mg q12h OR Azithromycin 500mg q24h OR Clarithromycin 500mg q12h	
Dry Socket	Systemic antibiotic use not recommended		Local treatment with saline irrigation and antiseptic/analgesic dressings and symptomatic relief of pain.
Localised Pericoronitis	Systemic antibiotic use not recommended in absence of regional or systemic signs and symptoms		Local treatment with antiseptic irrigation and mouthwash and symptomatic relief of pain.
Chronic Gingivitis	Systemic antibiotic use not recommended		Mechanical and chemical plaque control. *0.2% Aqueous Chlorhexidine gluconate not be used alone but as an adjunct to mechanical debridement
Chronic Periodontitis Common organisms: *Aggregatibacter actinomycetemcomitans* *Porphyromonas gingivalis* *Tannerella forsythia* *Prevotella intermedia* Spirochaetes	Systemic antibiotic use generally not recommended. Amoxicillin 500mg PO q8h PLUS Metronidazole 400mg PO q8h OR Amoxicillin-clavulanate 625mg PO q8h	Penicillin allergy Cephalexin 500mg q12h OR Azithromycin 500mg q24h OR Clarithromycin 500mg q12h OR Clindamycin 300mg PO q6h	1st line treatment - Mechanical plaque control. Consider antibiotics if: Unresponsive to conventional mechanical therapy. Acute infection associated with systemic manifestation Medically compromised

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Periodontal Abscess	Systemic antibiotic use not recommended		Incision and drainage Management of cause of abscess and symptomatic relief of pain.
Infections of the Jaws			
Osteomyelitis of the jaws (dental origin)	For acute cases, start with: Amoxicillin 500mg PO q8h PLUS Metronidazole 400mg PO q8h OR Amoxicillin-clavulanate 625mg PO q8h	Penicillin allergy Clindamycin 300-450mg PO/IV q6h	For chronic cases, start with surgical treatment first. Use antibiotics only when causative organisms are identified. Duration: 4-6 weeks
Spreading Infections and Infections of Fascial Spaces (with/without Systemic Signs)			
Cellulitis/Abscess of dental origin Common organisms: *Viridans Streptococci* *Staphylococci* *Prevotella* *Peptostreptococcus* *Fusobacterium nucleatum* *Clostridium* spp. Surgical site infection and Traumatic wound infection Common organisms: *Viridans Streptococci* *Staphylococci* *Prevotella* *Peptostreptococcus* *Fusobacterium nucleatum*	Benzylpenicillin 2-4MU IV q4-6h PLUS Metronidazole 500mg IV q8h OR Amoxicillin-clavulanate 1.2 gm IV q8h PLUS Metronidazole 500mg IV q8h	Penicillin allergy Clindamycin 300-450 IV/ PO q6h If not responding to preferred treatment: Ceftriaxone 1-2gm IV q24h PLUS Metronidazole 500mg IV q8h	Incision and drainage as required.
	Step Down/Oral Therapy Amoxicillin 250-750mg PO q8h PLUS Metronidazole 400mg PO q8-12h OR Amoxicillin-clavulanate 624mg PO q8h OR Cefuroxime 250-500mg PO q12h PLUS Metronidazole 400mg PO q8-12h	Penicillin allergy Clindamycin 300-450mg PO q6h	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Infection of skin origin / Wound infection involving skin	Cloxacillin 500-1000mg IV q6h OR Clindamycin 300-450mg IV/PO q6h OR Amoxicillin 250-750mg PO q8h PLUS Metronidazole 400mg PO q8-12h		
Post Implant Infection ("Periimplantitis")			
Causative Organisms: *Actinomyces* spp. *Eubacterium* spp. *Propionibacterium* spp. *Lactobacillus* spp. *Veillonella* spp. *Porphyromonas gingivalis* *Prevotella intermedia* *Fusobacterium nucleatum*	Amoxicillin-clavulanate 625mg PO q8h OR Amoxicillin 500mg PO q8h PLUS Metronidazole 400mg PO q8h	Penicillin allergy Doxycycline 100mg PO q12h OR Clindamycin 300mg PO q6h	Local mechanical and chemical debridement and irrigation with Chlorhexidine and optimal oral hygiene by patient is necessary. Bacteria associated with periimplantitis are extremely resistant to antibiotics.
Antimicrobial use for Viral Infections			
Common oral viral infections: Herpes simplex virus type 1 (HSV-1) ▪ Primary herpetic gingivostomatitis ▪ Herpes labialis Herpes simplex virus type 2 (HSV-2) Epstein-Barr virus ▪ Infectious mononucleosis ▪ Oral hairy leukoplakia Varicella-zoster virus Coxsackie virus* ▪ Herpangina ▪ Hand, foot and mouth disease	Symptomatic treatment in most cases. Can also consider: Topical Acyclovir 5% cream q4h for 5-10 days in prodromal phase for recurrent herpes labialis.	Systemic antiviral Acyclovir 400-800mg PO 5 times daily for 7-14 days Acyclovir 400mg 3 times daily for 5 to 10 days in immunocompetent patient with orolabial herpes simplex virus infection.	*Management is mostly supportive. Antivirals don't have direct effect.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Antimicrobial use for Fungal Infections			
Common oral fungal infection Oropharyngeal Candidiasis/ Oral Thrush	Topical Clotrimazole	Systemic antifungal agents Fluconazole 200mg PO stat dose followed by 100mg PO q24h for at least 2 weeks until negative blood culture result or clinical sign of improvement.	

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OCULAR INFECTIONS

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Blepharitis Common organisms: *Staphylococcus aureus* *Staphylococcus epidermidis*	Eyelid hygiene, warm compresses, massage and scrubs are the mainstay of therapy. Topical antibiotics are not indicated as initial therapy	Fusidic acid 1% eye ointment applied q12h to the lid margin OR Oxytetracycline with Polymyxin B eye ointment applied q12h to lid margin	Chronic or severe blepharitis may need systemic therapy with oral Doxycycline 100mg PO q12h for 1 month then 100mg q24h for 2-3 months.
Meibomian Gland Dysfunction	Warm compresses and massage Tetracycline 1% eye ointment applied q24h at lid margin with gentle massage Systemic therapy is not indicated as an initial therapy	In resistant cases: *Doxycycline 100mg PO q12h for 4-6 weeks OR Azithromycin 500mg PO q24h for 3 days	*Tetracyclines are contraindicated in children <8 years.
Internal Hordeolum with Secondary Infection *Staphylococcus aureus*	Warm compresses Cloxacillin 500mg PO q6h	Amoxicillin-clavulanate 625mg PO q8h	Duration: 5 days Systemic antibiotics are indicated in the presence of superficial cellulitis or abscess.
External Hordeolum (Stye) *Staphylococcus aureus*	Cloxacillin 500mg PO q6h	Amoxicillin-clavulanate 625mg PO q8h	Duration: 5 days Epilation of affected eye lash and warm compresses Antibiotics - In the presence of superficial cellulitis or abscess.
Bacterial Conjunctivitis Common organisms: *Staphylococcus aureus* *Streptococcus pneumoniae* *Haemophilus influenzae*	Chloramphenicol 0.5% eye drop q6h	Moxifloxacin 0.5% eye drop q6h OR Ciprofloxacin 0.3% eye drop q6h OR Levofloxacin 0.5% eye drop q6h OR Ofloxacin 0.3% eye drop q6h	Chloramphenicol or Ciprofloxacin ointment can be applied at bedtime.
Gonococcal Conjunctivitis (including neonates) *Neisseria gonorrhoeae*	Ceftriaxone 50mg/kg IM single dose to a maximum of 125mg for neonates Ceftriaxone 1g stat IM for adults		Copious irrigation with topical saline drops or artificial tears every 30-60 minutes. Topical antibiotics may be considered as ancillary therapy.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Chlamydial Conjunctivitis (including neonates) *Chlamydia trachomatis*	Erythromycin 50mg/kg / day q6h for 2 weeks for neonates Doxycycline 100mg PO q12h for 7 days	For pregnant Azithromycin 1g stat	
Bacterial Keratitis	Ciprofloxacin 0.3% eye drop q1-2h OR Moxifloxacin 0.5% eye drop q1-2h OR Levofloxacin 0.5% eye drop q1-2h	*Gentamicin 0.9% or 1.4% eye drop q1-2h PLUS *Cefuroxime 5% eye drop q1-2h	*Prepared extemporaneously using injectable forms
Contact Lens Related Bacterial Keratitis	Ciprofloxacin 0.3% eye drop q1-2h OR Levofloxacin 0.5% eye drop q1-2h	*Gentamicin 0.9% or 1.4% eye drop q1-2h PLUS *Ceftazidime 5% eye drop q1-2h	
Bacterial Keratitis Gram-positive cocci	Moxifloxacin 0.5% eye drop q6h	*Cefuroxime 5% eye drop q1-2h For MRSA: *Vancomycin 5% eye drop q1-2h	
Bacterial Keratitis Gram-negative rods	Ciprofloxacin 0.3% eye drop q1-2h OR Levofloxacin 0.5% eye drop q1-2h	*Gentamicin 0.9% or 1.4% eye drop q1-2h PLUS *Ceftazidime 5% eye drop q1-2h	
Acanthamoeba Keratitis *Acanthamoeba* spp.	*Chlorhexidine 0.02% eye drop q1-2h PLUS Propamidine isethionate 0.1% eye drop q1-2h		
Fungal Keratitis	Natamycin 5% eye drop q1-2 OR *Amphotericin B 0.15%-0.2% eye drop q1-2h	*Voriconazole 1% eye drop q1-2h OR *Fluconazole 0.2% eye drop q1-2h	Natamycin is the choice therapy for fusariam. Amphotericin B is the choice therapy for candida In severe fungal keratitis – combination therapy may be used. *Prepared extemporaneously using injectable forms.
		<u>Oral Therapy:</u> May be considered in the absence of contraindications: Fluconozole 200mg PO q24h OR Ketoconazole 200mg PO q24h	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Herepes Simplex Keratitis Herpes Simplex Type 1 and 2	Acyclovir 3% eye ointment 5 times/day	In presence of stromal or endothelial disease: Acyclovir 400mg PO 5times/day for 7-14 days	Prophylaxis for recurrent cases: Acyclovir 400mg PO q12h for 12 months.
Herpes Zoster Ophthalmicus *Herpes zoster Virus*	Immunocompetent Acyclovir 800mg PO 5 times a day for 7days Immunocompromised or sight threatening Acyclovir 10mg/kg IV q8h for 7 days (switch to oral once there is improvement)		Systemic antiviral treatment for all immunocompromised patients or for immunocompetent patient with Age > 50y Moderate or severe pain/ rash.
Ocular Toxoplasmosis *Toxoplasma gondii*	Trimethoprim-sulfamethoxazole 160/800mg PO q12h for at least 6 weeks	Pyrimethamine 25-50mg PO q24H PLUS *Folinic acid 10-25mg PO q24H PLUS Sulfadiazine 1gm PO q6H OR Clindamycin 300mg PO q6h for 3-4 weeks, then 150mg q6h PO for 3-4 weeks OR Azithromycin 500mg PO q24h	Pregnancy: May consider intravitreal Clindamycin 1.0mg/0.1ml. Systemic steroids are usually indicated in immunocompetent patients. It is advisable to start glucocorticoids 2-3 days after antimicrobial therapy. *DO NOT replace folinic acid with folic acid.
	Prophylaxis for recurrent lesions: Trimethoprim-sulfamethoxazole 80/400mg q12h PO for 3 times a week for 3-6 months		
Acute Retinal Necrosis *Herpes simplex*	Acyclovir 10mg/kg/dose IV q8h (max. 800mg) for 10-14 days Followed by Acyclovir 800mg PO 5 times/day for 6 weeks	Valacyclovir 1gm PO q8h for 6 weeks	Systemic steroid is indicated depending on location or severity of the infection.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
CMV Retinitis *Cytomegalovirus*	Systemic therapy: Ganciclovir 5mg/kg IV q12h for 2-3 weeks	Systemic therapy: Valganciclovir: 900mg PO q12h for 3 weeks (induction) followed by 900mg PO q24h (maintenance)	Systemic therapy is indicated in all cases. Maintenance may need to continue until CD4 count is > 150 cells/mm^3 for 3 consecutive months.
	Intravitreal therapy: Intravitreal Ganciclovir 2mg/0.1ml biweekly	Intravitreal therapy: Intravitreal Foscarnet 2.4mg/0.1ml (1-2 weekly)	Intravitreal therapy is indicated in zone 1 and 2 lesions. Intravitreal to be tapered according to clinical response.
Ocular Syphilis *Treponema pallidum*	Benzylpenicillin 2 MU q4h IV for 14 days OR Aqueous Procaine penicillin 1.2 MU IM for 10 days PLUS Probenecid 500mg q4h for 10-14 days	Penicillin allergy Doxycycline 200mg PO q12h for 28 days OR Tetracycline 500mg q6h for 14 days OR Ceftriaxone 2g IV/IM q24h for 14 days (if no anaphylaxis to penicillin)	
Ocular Tuberculosis *Mycobacterium tuberculosis* Presents as a unilateral/ bilateral infective uveitis characterized by multifocal choroiditis/ granuloma and there may be supportive FFA findings of occlusive vasculitis. Clinical response to anti-TB is often diagnostic.	Needs systematic therapy for Extra pulmonary TB usually for >6 months *Ethambutol may cause optic neuropathy and should be avoided depending on the case. Anti-tuberculosis Treatment (ATT) is started along with topical steroid eyedrop depending upon the anatomical site of uveitis.		Uveitis can occur secondary to TB Hypersensitivity due to an immune response to acid fast bacilli in the eye. Systemic steroids may be indicated but is only for non-active systemic TB Immunocompetent patients Tubercular retinal vasculitis Severe ocular inflammation developing after starting anti-TB treatment and Vision threatening condition. Systemic steroids should not be started ALONE without anti-TB treatment.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Postoperative Bacterial Endophthalmitis <u>Common Organisms:</u> *Staphylococcus epidermidis* *Staphylococcus aureus* *Pseudomonas aeruginosa* *Bacteroides* species *Streptococcus pneumoniae* Alpha-haemolytic *Streptococcus* spp.	Intravitreal antibiotic injections: Vancomycin 1-2mg/0.1ml PLUS Ceftazidime 2gm/0.1ml PLUS Intravitreal Amphotericin B 0.005mg/0.1ml (If suspicious of fungal endophthalmitis)	Intravitreal antibiotic injections: Vancomycin 1-2mg/0.1ml PLUS Amikacin 0.4/0.1ml	Systemic antibiotics are indicated in severe, virulent endophthalmitis. Repeat intravitreal antivitreal antibodies after 48 to 72 hours if indicated. *Prepared extemporaneously using injectable forms.
	Topical treatment-options: *Gentamicin 1.4% eye drop *Ceftazidime 5% eye drop *Vancomycin 5% eye drop Ofloxacin 0.3% eye drop Moxifloxacin 0.5% eye drop Levofloxacin 0.5% eye drop (monotherapy or combination)		
	Systemic treatment: Ciprofloxacin 750mg PO q12h for 10 days For culture negative cases: PLUS Clarithromycin 250-500mg PO q12h for 7-14 days	Systemic treatment Vancomycin 15-20mg/kg IV q8-12h; not exceed 2gm/dose PLUS Ceftazidime 1-2gm IV q8h	
Postoperative Fungal Endophthalmitis	Intravitreal therapy: Intravitreal Amphotericin B 0.005mg/0.1ml	Intravitreal therapy: Intravitreal Miconazole 0.01mg/0.1ml	Intravitreal and systemic therapy are indicated in all cases.
	Systemic therapy: Fluconazole 200mg PO q24h for 6 weeks (minimum)	Systemic therapy: Voriconazole 200mg PO q12h	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Endogenous Endophthalmitis Systemic treatment	Systemic therapy: Ciprofloxacin 750mg PO q12h for 10 days PLUS* Clarithromycin 250-500mg PO q12h for 7-14 days (*for culture negative cases)	Systemic therapy: Vancomycin 15-20mg/kg IV q8-12h; not to exceed 2gm/dose PLUS Ceftazidime 1-2gm IV q8h	All cases require systemic therapy. Intravitreal injection is indicated in cases with vitreous involvement and sight threatening choroidal lesions. Topical therapy may supplement therapy. Not to use systemic steroids in these cases. Review antibiotic regimen after microbiology results. Repeat intravitreal antibiotics after 48 to 72 hours if indicated. *Prepared extemporaneously using injectable forms
	Topical treatment-options: Gentamicin 0.3% eye drop *Ceftazidime 5% eye drop *Vancomycin 5% eye drop Moxifloxacin 0.5% eye drop Levofloxacin 0.5% eye drop (monotherapy or combination)		
	Intravitreal antibiotic injections: Vancomycin 1-2mg/0.1ml PLUS Ceftazidime 2mg/0.1ml PLUS Intravitreal Amphotericin B 0.005mg/0.1ml (If suspicious of fungal endophthalmitis)	Intravitreal antibiotic injections: Vancomycin 1-2mg/0.1ml PLUS Amikacin 0.4mg/0.1ml	
Dacryocystitis <u>Common Organisms:</u> *Streptococcus pneumoniae* *Staphylococcus aureus* *Gram-negative anaerobes*	Amoxicillin-clavulanate 625mg PO q8h	Cefuroxime 250mg PO q12h	Consider intravenous antibiotics in severe infections. Duration: 7 days
Preseptal Cellulitis <u>Common Organisms:</u> *Streptococcus pneumoniae* *Staphylococcus aureus* *Streptococcus* spp.	Cloxacillin 500-1000mg PO q6h for 5 days	Amoxicillin-clavulanate 625mg PO q8h for 7 days OR Ceftriaxone 1-2gm IV q24h	Consider intravenous antibiotics in severe infections.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Orbital Cellulitis/abscess <u>Common Organisms:</u> *Streptococcus pneumoniae* *Staphylococcus aureus* *Streptococcus* spp. *Gram-negative anaerobes*	Amoxicillin-clavulanate 1.2gm IV q8h	Ceftriaxone 1-2gm IV q24h If anaerobes suspected: PLUS Metronidazole 500mg IV q8h	Duration: 7-10 days

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OTORHINOLARYNGOLOGICAL INFECTIONS

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Sore Throat			
The modified Centor Criteria (McIsaac criteria) can be used to help physicians decide which patients need no testing, throat culture/rapid antigen detection testing, or empiric antibiotic therapy. The cumulative score determines the likelihood of streptococcal (GAS – Group A Streptococcus) pharyngitis and the need for antibiotics: **CRITERIA** — **SCORE** Absence of cough, rhinorrhea, hoarseness and oral ulcer — 1 Swollen and tender anterior cervical lymph nodes — 1 Temperature > 100.4° F (38° C) — 1 Tonsillar exudates or swelling — 1 Age less than 15 years (1 point is deducted if age >44years) — 1 **Cumulative Score:** **TOTAL SCORE** 0 or 1 — No antibiotic or culture needed 2-3 — Antibiotics based on culture or Rapid Antigen Detection Test (RADT) >3 — Empirical antibiotics Treatment – as given below			
Throat and Upper Respiratory Tract			
Tonsillitis/Pharyngitis <u>Common organism:</u> Group A Streptococcus	Phenoxymethylpenicillin (Penicillin V) 500mg PO q12h for 5-10 days OR Amoxicillin 500mg PO q8h for 5-10 days	Benzathine penicillin G 1.2MU IM, one single dose	Antibiotics should be prescribed in suspected (Modified Centor Score ≥3)/proven bacterial infections, as sore throats are commonly viral in origin.
	For Penicillin allergic Cephalexin 500mg q12h for 10 days OR Cefixime 200-400mg q12h for 7 days	For Penicillin allergic Clindamycin 300mg PO q8h for 10 days OR Azithromycin 500mg PO q24h for 3-5 days	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Acute Peritonsillar Abscess Common organisms: Group A Streptococcus *Staphylococcus aureus* *Haemophilus influenzae* *Fusobacterium necrophorum*	Amoxicillin-clavulanate 625mg PO q8h OR Phenoxymethylpenicillin (Penicillin V) 500mg PO q6h PLUS Metronidazole 500mg PO q6h	Ceftriaxone 1gm IV q12h for 7 days PLUS Metronidazole 500mg IV q8h for 5 days OR Clindamycin 300-450 PO q6h For Penicillin allergic Clindamycin 600mg IV q8h for 7-10 days	Abscess to be drained.
Diphtheria *Corynebacterium diphtheriae*	*Antitoxin PLUS Benzylpenicillin 50,000 units/kg to a maximum of 1.2 MU IV q12h followed by Phenoxymethylpenicillin (Penicillin V) 250mg PO q6h for total of 14 days	Erythromycin 500mg IV q6h followed by Erythromycin 800mg PO q12h for total of 14 days	*Diphtheria Antitoxin: Pharyngeal/laryngeal disease of 2 days duration 20,000 – 40,000 units Nasopharyngeal disease 40,000 – 60,000 units Systemic disease of ≥3 days or any patient with diffuse neck swelling 80,000 – 120,000 units Administer over 60 mins to inactivate toxin rapidly
Acute Epiglottitis Common organisms: *Haemophilus influenzae type B* Viruses *Streptococcus pneumoniae*	Ampicillin-sulbactam 3gm IV q6h OR Ceftriaxone 2gm IV q24h	For Penicillin allergic: Clindamycin 600-900mg IV q8h PLUS Ciprofloxacin 400mg IV q12h	Urgent hospitalization. May present with life threatening upper airway obstruction, especially in paediatric population. Consider adding Vancomycin for patients with moderate to severe sepsis, meningitis or previously colonized with MRSA.
	Oral step down therapy: Amoxicillin-clavulanate 625mg PO q8h for 7-14 days		

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Deep Neck Space Abscess Common organisms: *Streptococcus pyogenes* *Staphylococcus aureus* *Fusobacterium necrophorum*	Ampicillin-sulbactam 3gm IV q6h OR Ceftriaxone 2gm IV q24h PLUS Metronidazole 500mg IV q6h		Duration 7-14 days
Rhinology			
Acute Bacterial Rhinosinusitis (ABRS) Common organisms: *Streptococcus pneumoniae* *Haemophilus influenzae* *Moraxella catarrhalis*	Mild case Amoxicillin-clavulanate 1000mg PO q12h for 5-7 days or 625mg q8h 10-14 days	For Penicillin allergic: Cefuroxime 500mg PO q12h for 10-14 days OR Roxithromycin 150mg PO q12h for 10-14 days	Any of the following clinical presentations be used to identify patients with acute bacterial vs. viral rhinosinusitis; -Symptoms and signs persistent and not improving for more than 10 days - Severe symptoms or signs for at least 3-4 days -Worsening symptoms or signs OR becoming worse after initial recovery
	Severe infection requiring hospitalization Amoxicillin-clavulanate 1.2mg IV q8h for 10-14days	For Penicillin allergic: Cefuroxime 500mg PO q12h for 10-14 days OR Levofloxacin 500mg PO/ IV q24 h for 10-14 days	
Chronic Rhinosinusitis	Doxycycline 100mg PO q12h for 10-14 days	Roxithromycin 150mg q12h for 2-4 weeks	
Otology			
Acute otitis media (AOM) Common organisms: *Streptococcus pneumoniae* *Haemophilus influenzae* *Moraxella catarrhalis*	*For non-severe AOM: Amoxicillin 500mg PO q8h for 7-10days If symptoms not improved in 48-72 hours, treat as severe AOM	For Penicillin allergic: Cefixime 200-400mg q12h for 7-10 days OR Azithromycin 500mg PO on day 1, Followed by 250mg PO q24h until day 5	*Non-severe AOM: Mild otalgia Temp < 39°C May consider 48-72 hours of observation with symptomatic therapy before prescribing antibiotic. **Severe AOM: Moderate to severe otalgia Temperature > 39°C
	**For severe AOM or perforated tympanic membrane: Amoxicillin-clavulanate 625mg PO q8h for 7-10 days		

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Malignant Otitis Externa/ Necrotizing Otitis Externa Common organism: *Pseudomonas aeruginosa*	Ciprofloxacin 200-400mg IV q8h OR Ceftazidime 2gm IV q8h Followed by oral therapy (upon clinical response): Ciprofloxacin 750mg PO q12h to complete 6 weeks		Ciprofloxacin 750mg PO q12h for initial 2 weeks then 500mg PO q12h for 4 weeks.
Acute Localized Otitis Externa	Flucloxacillin/Cloxacillin 500mg PO q6h for 5-7 days	With Neomycin + Steroid ointment pack	
Acute Diffuse Otitis Externa Common organisms: *Pseudomonas aeruginosa* *Staphylococcus aureus*	Ofloxacin 0.3% otic solution Instill 3 drops into affected ear(s) q24h for 7 days OR (Flu)Cloxacillin 500mg PO q6h for 5-7 days	With Neomycin + Steroid ointment pack	Aural toileting required in discharging ears.
Chronic Suppurative Otitis Media *Pseudomonas aeruginosa* *Staphylococcus aureus*	Ofloxacin 0.3% otic solution Instill 3 drops into affected ear(s) q12h for 10-14 days PLUS Ciprofloxacin 500mg q12h for 5-7 days		Aural toileting required in discharging ears.
Otomycosis Common organisms: *Aspergillus* spp. *Candida*	Clotrimazole 1% ear solution, applied q12h for 10-14 days		Aural toileting required.
Acute Mastoiditis	Amoxicillin-clavulanate 1.2g IV q12h for 10-14days OR Ceftriaxone 2g IV q12h for 14days PLUS Metronidazole 500mg IV q8h for 5 days		

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GASTROINTESTINAL TRACT INFECTIONS

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Peptic ulcer disease			
Helicobacter pylori	Triple regimen* Clarithromycin 500mg PO q12h PLUS Amoxicillin 1 gm PO q12h OR Metronidazole 400mg PO q12h** Levofloxacin based Triple regimen* Levofloxacin 500mg PO q24h PLUS Amoxicillin 1 gm PO q12h	Quadruple therapy* Metronidazole 200mg PO q6h PLUS Tetracycline 500mg PO q6h PLUS Bismuth subsalicylate 300mg PO q6h	*PLUS Pantoprazole 40mg PO q12h OR Omeprazole 20mg PO q12h OR Esomeprazole 20mg PO 12h OR Rabeprazole 20mg PO q12h OR Lansoprazole 30mg PO q12h Duration of Treatment: 14 days. **Metronidazole is not preferred as first line in triple regimen as its resistance is common in Nepal. Dose can be 400mg q8-12h.
Oropharyngeal Candidiasis	Clotrimazole Mouth Paint 10-20 drops (about 1ml) apply locally q6h OR Nystatin suspension 4-6 lakh Units (4-6ml) locally q6h	Moderate to severe or Unresponsive to topical therapy Fluconazole 200mg orally on Day 1 then 100-200mg orally q24h	Duration – 7-14 days (can be extended to 28 days for refractory disease).
Esophageal Candidiasis	Fluconazole 400mg IV/PO on Day 1 then 200-400mg q24h	Voriconazole 200mg IV/PO q12h	Duration – 14-21 days (can be extended to 28 days for refractory disease).
Acute Gastroenteritis Viral Entero-toxigenic *Escherichia coli* Entero-pathogenic *Escherichia coli* Food Poisoning *Staphylococcus aureus* *Bacillus cereus* *Clostridium botulinum*	No antibiotics		Rehydration (oral or IV based on hydration status and ability to drink).

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Cholera *Vibrio cholerae*	Doxycycline 300mg PO stat	Azithromycin 1 gm PO stat OR Ciprofloxacin 500mg PO q12h for 3 days	
Bacillary dysentery *Shigella* spp. *Campylobacter** Non-typhoidal salmonella	Ceftriaxone 2 gm IV q24h for 5 days OR Cefixime 10-15mg/kg/day PO in divided doses q12h for 5 days	Azithromycin 1 gm PO q24h for 3 days	**For Campylobacter*, Azithromycin is the drug of choice, if treatment is indicated.
Bacillary dysentery Shiga toxin producing *Escherichia coli*	No antibiotics		Antibiotic use may be associated with hemolytic uremic syndrome.
Amoebic dysentery *Entamoeba histolytica*	Metronidazole 400mg PO q8h for 7-10 days	Tinidazole 2g PO q24h for 3 days	Add Diloxanide furoate 500mg q8h for 10 days
Giardiasis *Giardia lamblia*	Tinidazole 2g PO stat	Metronidazole 400mg PO q8h for 7-10 days	
Enteric fever	Cefixime 20mg/kg/day for 7-14 days	Azithromycin 1g stat on D1 followed by 500mg q24h for total of 5-7 days OR Ceftriaxone 2 gm IV q12-24h for 7-14 days	Further treatment modalities in Tropical Infection section
Clostridioides difficile Diarrhea	Metronidazole 400mg PO q8h for 10 days	For severe disease Vancomycin 250mg PO q6h	
Spontaneous bacterial peritonitis Enterobacteriaceae *Escherichia coli* *Klebsiella* spp.	Cefotaxime 2gm IV q8h	Ceftriaxone 2 gm IV q24h OR Piperacillin-tazobactam 4.5gm IV q6-8h OR Meropenem 1 gm IV q8h	Duration: 5-7 days.
Spontaneous bacterial peritonitis Prophylaxis in cirrhosis	Trimethoprim-sulfamethoxazole 160/800mg PO q24h OR Norfloxacin 400mg PO q24h In GI bleed Ceftriaxone 1 gm IV q24h*		*Switch to oral once bleeding has been controlled and patient is stable and eating.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Secondary peritonitis, Intra-abdominal abscess/ GI perforation Causative Organisms Enterobacteriaceae *Escherichia coli* *Klebsiella* spp. Bacteroides (in colonic perforation) Anaerobes	Piperacillin-tazobactam 4.5gm IV q6-8h OR Meropenem 1 gm IV q8h	In very sick patients - PLUS Fluconazole 800mg IV on Day 1 then 400mg q24h PLUS Vancomycin 15-20mg/kg IV (max 2g)	Source control to reduce bacterial load. Duration: 5-7 days if good response and excellent source control. Can be extended to 2-3 weeks depending upon response.
Biliary tract infections Cholecystitis, Cholangitis	Amoxicillin-clavulanate 1.2gm IV q8h OR Ceftriaxone 2 gm IV q24h PLUS* Metronidazole 500mg IV q8h	Piperacillin-tazobactam 4.5gm IV q6-8h OR Meropenem 1 gm IV q8h	Duration: 7-10 days Surgical or endoscopic intervention for biliary obstruction. *If biliary enteric anastomosis present.
Diverticulitis Gram-negative bacteria Anaerobes	Mild Amoxicillin-clavulanate 625mg PO q8h for 7 days Moderate Ceftriaxone 2 gm IV q24h PLUS Metronidazole 500mg IV q8h OR Piperacillin-tazobactam 4.5gm IV q6-8h Severe Meropenem 1 gm IV q8h	Mild Ciprofloxacin 500mg PO q12h for 7 days PLUS Metronidazole 400mg PO q8h for 7 days	Duration of treatment for moderate and severe diverticulitis: Based on clinical improvement.
Liver abscess (Pyogenic) *Klebsiella* spp. *Escherichia coli* Polymicrobial	Ampicillin 2gm IV q4h PLUS Gentamicin 5mg/kg/day IV q24h PLUS* Metronidazole 500mg IV q8h	Ceftriaxone 2 gm IV q24h OR Cefotaxime 2gm IV q8h PLUS* Metronidazole 500mg IV q8h OR Piperacillin-tazobactam 4.5gm IV q6-8h	Duration: 2-4 weeks (if good response to initial drainage) and 4-6 weeks of parenteral therapy for those with incomplete drainage. Consider drainage of abscess if impending rupture or large abscess or no response to medical treatment.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Liver abscess (Amoebic) *Entamoeba histolytica*	Metronidazole 500-750mg IV q8h OR Tinidazole 2g PO q24h for 5 days PLUS* Diloxanide furoate 500mg PO q8h for 10 days OR Paromomycin 25-30mg/kg/day PO in three divided doses for 7 days		* Luminal agents Diloxanide furoate or paromomycin are used to eliminate intraluminal cysts even if stool microscopy is negative.

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SURGICAL INFECTIONS IN ADULT

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
1. General Surgery			
Acute Pancreatitis			
Mild to moderate	No antibiotics		Antibiotics should be given for an extra-pancreatic infection, such as cholangitis, catheter-acquired infections, bacteremia, urinary tract infections and pneumonia.
Severe Possible causative organisms: Enterobacteriaceae, Enterococci, *Staphylococcus aureus, Streptococcus* spp., *Staphylococcus epidermidis* Anaerobes, *Candida* spp. (rarely)	Piperacillin-tazobactam 4.5gm IV q6-8h	Cefoperazone 1-2gm IV q12h PLUS Metronidazole 500mg IV q8h	Antibiotic mainly indicated for infected pancreatic necrosis. Carbapenem for resistant pathogens ONLY.
Diverticulitis			
Diverticulitis (Not undergoing a source control procedure)	Amoxicillin-clavulanate 625mg PO q8h for 5 days OR Ampicillin-sulbactam IV 3gm q6h	Non-severe Penicillin allergy: Cefuroxime 1.5gm IV q8h PLUS Metronidazole 500mg IV q8h	Antibiotics considered for patients with following: Fever, elevated WBC, patients who have failed to respond to conservative management.
Diverticulitis (Severe infection/life threatening infection)	Piperacillin-tazobactam 4.5gm IV q6-8h for 7 days OR Meropenem 1 gm IV q8h	**Severe Penicillin allergy: Ciprofloxacin 400mg IV q12h PLUS Metronidazole 500mg IV q8h	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Breast abscess/Mastitis Common organism: *Staphylococcus aureus*	Flucloxacillin 500mg IV q6h OR Cloxacillin 500mg IV q6h OR Cefazolin 1-2gm IV q8h	Amoxicillin-clavulanate 625mg PO q8h OR Ampicillin-sulbactam 750mg PO q12h Penicillin allergy: Clindamycin 600mg IV/PO q8h	Aspp.iration/Drainage is required for abscess. For lactating mastitis: Consider sending breast milk for C&S if not responding after 48h of initial antibiotic therapy or recurring mastitis. Duration: 10-14 days but shorter course (5 to 7 days) can be used if the response to therapy is rapid and complete.
Appendicitis Common organisms: Enterobacteriaceae Enterococci Bacteroides	Ceftriaxone 1 gm IV q12h OR Amoxicillin-clavulanate 1.2gm IV q8h	Ampicillin-sulbactam 1.5gm IV q6-8h OR Cefoperazone 1-2 gm IV q12h PLUS Metronidazole 500mg IV q8h OR Ornidazole 500mg IV q12h	Acute appendicitis without evidence of perforation, abscess, or local peritonitis; undergoing emergency appendectomy, treatment should be discontinued within 24 hours. For patients with various forms of appendicitis not undergoing a source control procedure, change to early oral therapy. Duration: 5-7 Days.
Perforated Appendix / Appendicular Lump	Ceftriaxone 1g IV q12h OR Amoxicillin-clavulanate 1.2gm IV q8h	Ampicillin-sulbactam 1.5-3gm IV q6-8h PLUS Metronidazole 500mg IV q8h OR Piperacillin-tazobactam 4.5 gm IV q8h	Duration: 5-7 days.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Perforated Viscus Peritonitis	Ampicillin-sulbactam 1.5-3gm IV q6-8h PLUS Metronidazole 500mg IV q8h OR Ornidazole 500mg IV q12h	Amoxicillin-clavulanate 1.2gm IV q8h OR Piperacillin-tazobactam 4.5 gm IV q8h	Duration: 5-7 days (If adequate source control, no delay in surgical intervention and patient has rapid clinical recovery).
Abdominal trauma Stab Wound Suspected bowel or solid organ injury <u>Common organisms:</u> Gram negative enteric aerobes and anaerobes	Amoxicillin-clavulanate 1.2gm IV q8h	Cefuroxime 1.5gm IV q8h PLUS Metronidazole 500mg IV q8h	*Stab wound without bowel injury or solid organ injury – Ceftriaxone 1g IV q12h. Duration: 5-7 days (If adequate source control, no delay in surgical intervention and patient has rapid clinical recovery). *Abdominal trauma with suspected bowel injury – treat as perforated viscus peritonitis.
	Severe / Infected wound: Ceftriaxone 1gm IV q12h PLUS Metronidazole 500mg IV q8h (if anaerobic contamination suspected) OR Piperacillin-tazobactam 4.5gm IV q6-8h	Severe / Infected wound: Ciprofloxacin 400mg IV q12h PLUS Clindamycin 450-600mg IV q8h	
Perianal abscess	Ceftriaxone 1 gm IV q12h OR Ciprofloxacin 500mg IV q12h PLUS Metronidazole 500mg IV q8h	Piperacillin-tazobactam 4.5gm IV q6-8h	Drainage is required. Duration: 5-7 days (If adequate source control, no delay in surgical intervention and patient has rapid clinical recovery). Routine antibiotic is not recommended in otherwise healthy patients.
Vascular			
Mycotic aneurysm (Initial Treatment) Vascular prosthesis infection <u>Common organisms:</u> *Streptococcus pneumoniae* *Staphylococcus aureus (30%)* *Salmonella* spp. *(50%)*	Ceftriaxone 2gm IV q24h	Piperacillin-tazobactam 4.5gm IV q6-8h	Duration: At least six weeks (IV then oral based on clinical response and cultures). Consider adding Vancomycin if suspecting MRSA/CoNS or Vascular prosthesis infection. * C-reactive protein (CRP) monitoring upon follow-up.
	*Step down therapy: Amoxicillin-clavulanate 625mg PO q8h OR Ciprofloxacin 250mg PO q12h		

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Ischemic limb ulcers with infection	Ampicillin-sulbactam 1.5-3gm IV q6-8h for 7 days* OR Cefazolin 1-2 gm IV q12h	Amoxicillin-clavulanate 1.2 gm IV q8h for 7 days*	Duration: Depends on the extent of the infection. (longer if bone involved) *Continue until C&S report available.
Bites (Penetrating Injuries)			
Animal bite <u>Common organisms:</u> *Staphylococcus aureus* *Streptococcus* *Gram negative bacilli* *Anaerobes* *Pasteurella (50% dog bites and 75% cat bites)* *Eikenella corrodens* *Pseudomonas* spp.	Amoxicillin-clavulanate 625mg PO q8h (IV if severe infection)	Doxycycline 100mg PO q12h PLUS Clindamycin 300mg PO q6h	Prophylactic duration: 3-5 days. Associated crush injury In the hands or proximity to a joint Associated edema. If wound is infected: 10 days or longer is recommended. Note: Vaccination against rabies and/or TT as required.
	If severe/life threatening: Ampicillin-sulbactam 1.5-3gm IV q6-8h	If severe/life threatening: Piperacillin-tazobactam 4.5gm IV q6-8h	
Human bite <u>Common organisms:</u> *Staphylococcus aureus* *Anaerobes* *Eikenella corrodens* *Streptococcus* (esp. *viridans)*	Amoxicillin-clavulanate 625mg PO q8h (IV if severe infection)	<u>Penicillin allergy:</u> Clindamycin 300mg PO q6h PLUS Ciprofloxacin 500-750mg PO q12h OR Trimethoprim-sulfamethoxazole 160/800mg PO q12h	

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Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Diabetic Foot Infections			
Antibiotics should not be used unless there are local or systemic symptoms of infection. Local treatment including surgical debridement is important. Antibiotic selection should be based on the most recent culture and sensitivity report.			
Mild infections: Local infection involving skin and subcutaneous tissues Erythema, less than 2 cm around the ulcer No systemic signs of infection	Amoxicillin-clavulanate 625mg PO q8h OR Ampicillin-sulbactam 375-750mg PO q12h	Cephalexin 500mg PO q6H PLUS Metronidazole 400mg PO q8h	Duration 5-7 days.
Moderate infection: a. Deep tissue infection b. Erythema more than 2 cm around ulcer c. No SIRS	Ampicillin-sulbactam 3gm IV q6-8h OR Amoxicillin-clavulanate 1.2g IV q12h PLUS Metronidazole 500mg IV q8h	Cefazolin 2gm IV q8hrly PLUS Clindamycin 600mg IV q8h Penicillin allergy: Ciprofloxacin 400mg IV q8-12h PLUS Clindamycin 600mg IV q8h	Duration: 7-14 days Modify according to clinical response.
	If *Pseudomonas* is suspected: Piperacillin-tazobactam 4.5gm IV q6-8h		
Severe Infections: ● All of the above 2 or more SIRS ● History of previous antibiotics exposure ● Recurrent admission ● Risk of *Pseudomonas* infection ● Immunocompromised	Piperacillin-tazobactam 4.5gm IV q6-8h	Cefepime 2gm IV q8h PLUS Metronidazole 500mg IV q8h	URGENT Surgical debridement. Duration: 7-14 days (up to 4-6 weeks). Shorter duration can be considered if the osteomyelitis is fully resected. No surrounding soft tissue infection: 5 days. Evidence of soft tissue infection: 10-14 days.
Necrotizing Fasciitis			
Type 1 Polymicrobial infection Primarily occurs in patients who are immunocompromised or have certain chronic disease such as diabetes	Ampicillin-sulbactam 3 gm IV q6-8h PLUS* Clindamycin 600-900mg IV q8h OR Metronidazole 500mg IV q8h	Piperacillin-tazobactam 4.5gm IV q6-8h OR Cefepime 2 gm IV q8h PLUS Clindamycin 600-900mg IV q8h OR Metronidazole 500mg IV q8h	Source Control *Clindamycin: Only necessary if risk of group A streptococcus/ presence of gas crepitus.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Type 2 Monomicrobial infection Group A streptococcus (most common)	Benzylpenicillin 2-4MU IV q4h PLUS* Clindamycin 600-900mg IV q8h		*Clindamycin: Only necessary if risk of group A streptococcus/ presence of gas crepitus. Duration: 7-14 days.
Vibrio vulnificus *Aeromonas hydrophila* Consider in water related injuries and patients with liver cirrhosis and ingestion of raw oysters	Ceftriaxone 1gm IV q12h PLUS Doxycycline 100mg PO q12h	Ciprofloxacin 400mg IV q8h	
Fournier's Gangrene <u>Common organisms:</u> *Escherichia coli* *Klebsiella* spp. *Proteus* spp. *Enterococcus* spp. *Pseudomonas* spp. Anaerobes	Piperacillin-tazobactam 4.5gm IV q6-8h PLUS Metronidazole 500mg IV q8h	Imipenem 1g IV q6-8h PLUS Clindamycin 600-900mg IV q8h Consider Vancomycin 30mg/kg/day IV in 2 divided doses if MRSA suspected	Aggressive debridement is necessary to remove all necrotic tissue.
Soft Tissue Infection Secondary to Gas Producing Organism			
<u>Common organisms:</u> *Clostridium* spp. Gram negative organism	Benzylpenicillin 4MU IV q4h PLUS Clindamycin 600-900mg IV q6h PLUS* *Gentamicin 5mg/kg IV q24h	Piperacillin-tazobactam 4.5gm IV q6-8h PLUS Clindamycin 600-900mg IV q6h	Duration: 10-28 days Source control is necessary. *Gentamicin: If Gram negative infection suspected.
Suppurative Wound Infections, Surgical or Traumatic			
Suppurative wound infections, surgical or traumatic Antibiotics if surrounding cellulitis and/or systemic symptoms	Cloxacillin 500mg PO/IV q6h PLUS* Gentamicin 5mg/kg IV q24h OR Cefuroxime 1.5gm IV q8h	Flucloxacillin 500mg PO q6h	Topical antibiotics - NOT recommended Duration : 5-7 days Patient's tetanus immunization status should be assessed in all cases. *Gentamicin if gram negative organisms suspected or isolated.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
2. Bone and Joint Infections			
Osteomyelitis			
Acute Osteomyelitis Common organisms: *Staphylococcus aureus (80%)* *Streptococcus pyogenes* Rarely gram negative bacilli	Cloxacillin 2gm IV q6h	Penicillin allergy: Cefazolin 2 gm IV q6-8h OR Clindamycin 600mg IV q6h then PO OR Vancomycin 15-20mg/kg (actual body weight) IV q8-12h; not to exceed 2gm/dose (if risk of MRSA)	Duration: Initial IV therapy for 2-4 weeks followed by oral therapy. Minimum 6 weeks. Tailor therapy based on C&S reports. Shorter duration can be considered if the osteomyelitis is fully resected No surrounding soft tissue infection: 5days. Evidence of soft tissue infection: 10-14 days.
Chronic Osteomyelitis or Chronic synovitis Most common Organism: *Staphylococcus aureus*	No Empirical treatment.		Duration: 6 weeks but usually > 3 months. Treatments until inflammatory parameters are normal. Thorough surgical debridement required
Vertebral Osteomyelitis Epidural Abscess Common organisms: *Staphylococcus aureus (main)* *Brucella* spp. *Salmonella* spp. Gram negative bacilli	Cloxacillin 2gm IV q4h Empirical therapy only if sepsis or neurologic compromise	Cefazolin 2gm IV q6-8h	Empiric gram negative should be covered if patient had: Recent spinal hardware inserted or surgery Intra-abdominal infections Coexisting or synchronous genitourinary infection HIV infection. Surgical therapy is necessary in: Spinal cord compression/ instability Persistence of epidural abscess despite adequate antibiotic Considering TB spine/ MDR organisms
	Duration: Minimum 6 weeks. Minimum 8 weeks if undrained paravertebral abscess (es) and/or infection due to drug-resistant organisms. Up to 12 weeks if extensive bone destruction.		

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Septic Arthritis			
Acute monoarticular No risk factors of STD	Cloxacillin 2gm IV q4-6h Duration: Parenteral therapy 2-4 weeks Oral therapy to complete total 4-6 weeks	Penicillin allergy: Cefazolin 2gm IV q6-8h OR Clindamycin 600mg IV q6h, followed by oral therapy (same dose) OR **Vancomycin 15-20mg/kg (actual body weight) IV q8-12h; not to exceed 2gm/dose Duration: Parenteral therapy 2-4 weeks Oral therapy to complete total 4-6 weeks	Drainage, debridement and washout of infected joint are important to limit further damage. Shorter duration possible if adequate surgical drainage. **Vancomycin: If suspected/confirmed MRSA. Consider loading dose 25-30mg/kg for critically ill/septic patient to achieve faster steady state.
Acute monoarticular Risk factors of Sexually Transmitted Infection (STI)	Ceftriaxone 2gm IV q24h for 1-2 weeks PLUS Doxycycline 100mg PO q12h for 7 days OR Azithromycin 1gm PO stat	Substitute Ceftriaxone with Cefotaxime 2gm IV q8h for 1-2 weeks	
Polyarticular *Neisseria gonorrhoeae*	Ceftriaxone 2gm IV q24h for 7 days		
Prosthetic Joint Infections			
Prosthetic Joint Infections (Empirical) Early: <3 months after surgery *Staphylococcus aureus* Gram negative bacilli Delayed onset: from 3-12 months after surgery Less virulent organism: CoNS/*Enterococcus* spp./ anaerobes Late onset:> 12 months after surgery *Staphylococcus aureus* Enterobacteriaceae β-hemolytic *Streptococcus* Anaerobes	Empiric therapy ONLY if sepsis or unstable patients Amoxicillin-clavulanate 625mg PO q8h		Treatment is based on C&S. Rifampicin should never be used alone and should be started only after the clearance of bacteraemia. Treatment strategy and duration of treatment depends on surgical strategy.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Definitive Prosthetic Joint infection Methicillin-susceptible *Staphylococcus aureus*	Initial Treatment: Cloxacillin 2gm IV q4-6h OR Cefazolin 2gm IV q6-8h PLUS Rifampicin 600mg PO q24h or 450 PO q12h	Penicillin allergy: Cefazolin 2gm IV q6-8h OR Clindamycin 600mg IV q6h, followed by oral therapy (same dose) PLUS Rifampicin 600mg PO q24h or 450 PO q12h	Duration: 2-6 weeks. (Parenteral 2-4 weeks, oral therapy for the rest of 4-6 weeks). Followed by an oral combination therapy according to susceptibility. Rifampicin should be included if implant is in situ.
Definitive Prosthetic Joint infection Methicillin-resistant *Staphylococcus aureus*	Initial Treatment: Vancomycin 15-20mg/kg (actual body weight) IV q8-12h; not to exceed 2gm/dose PLUS Rifampicin 300-450mg PO q12h	Teicoplanin 400mg IV q12h for 3 doses then 400mg IV q24h	Duration: 2-6 weeks. Followed by an oral combination therapy according to susceptibility. Rifampicin should be included if implant is in situ.
Muscular, Skeletal and Soft Tissue Trauma, Crush Injuries and Stab Wounds			
Muscular, skeletal and soft tissue trauma, crush injuries and stab wounds	Cloxacillin/Flucloxacillin 2gm IV q6h PLUS* Metronidazole 500mg IV q8h PLUS** Gentamicin 5mg/kg IV q24h	Cefazolin 2gm IV q6-8h OR Cefuroxime 1.5gm as a loading dose, followed by 750mg IV q8h PLUS Metronidazole 500mg IV q8h	*Metronidazole: In soil/rust contamination or heavy machinery. **Gentamicin: If there's extensive skin and soft tissue involvement. Thorough surgical debridement and fracture stabilization. For severe penetrating injuries, especially those involving joints and/or tendons, antibiotics must be given for at least 5 days.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Compound Fractures/Open Fractures			
Compound fractures: Antibiotics are administered as prophylaxis within 3 hours of injury.			
Gustilo 1 and 2 fractures	Cefazolin 1-2gm IV q8h OR Amoxicillin-clavulanate 1.2gm IV q8h	Cefuroxime 1.5gm IV q8h	Pre-debridement and post debridement cultures are not representative of actual infection. Duration of antibiotic for open fractures classification Gustilo type I : stop after 24 hours Gustilo type II: discontinue after 24 hours to 48 hours Gustilo type III: 24 hours after wound closure or up to a maximum of 72 hours (whichever is earlier) *Gentamicin: If initial debridement is expected to last more than 2 hours will need higher dose of Gentamicin 5mg/kg IV stat dose. *Metronidazole: In soil/ rust contamination or heavy machinery. If soft tissue injury is of concern, to follow antibiotic guide for soft tissue injury.
Gustilo 3 fractures Mostly nosocomial and gram positive	As per Gustilo 1 and 2 fractures PLUS *Gentamicin 3-5mg/kg IV stat dose PLUS **Metronidazole 500mg IV q8h		

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Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
3. Urology			
Pyonephrosis/Perinephric Abscess/ Renal Abscess Common organisms: Enterobacteriaceae Enterococci *Pseudomonas* spp. *Staphylococcus aureus*	Amoxicillin-clavulanate 1.2gm IV q8h OR Ampicillin-sulbactam 3gm IV q6-8h PLUS Gentamicin 5mg/kg IV q24h	Ceftriaxone 2gm IV q24h OR Cefuroxime 750mg IV q8h PLUS Gentamicin 5mg/kg IV q24h	Blood and urine cultures before starting treatment. Pus for C&S. Drainage ± definitive surgical therapy. Oral antibiotic once afebrile and feeding orally > 48 hours following catheter removal. Duration: 2-3 weeks (Longer if difficult to drain abscess or slow resolution).
Acute Prostatitis Common organisms: Enterobacteriaceae Enterococci *Pseudomonas* spp.	Outpatient treatment: Trimethoprim-sulfamethoxazole 160/800mg PO q12h OR Ciprofloxacin 500mg PO q12h		Obtain urine culture before starting treatment. Duration: 2 -4 weeks.
	Inpatient treatment: Amoxicillin-clavulanate 1.2gm IV q8h OR Ampicillin-sulbactam 3gm IV q6-8h PLUS* Gentamicin 5mg/kg IV q24h	Ceftriaxone 1-2gm IV q24h OR Cefuroxime 750mg IV q8h PLUS* Gentamicin 5mg/kg IV q24h	
Chronic Bacterial Prostatitis (NIH Type II) Chronic or recurrent urogenital symptoms that persist for at least 3 months. Relapsing UTI with repeated isolation of same organism from urine is the hallmark	Trimethoprim-sulfamethoxazole 160/800mg PO q12h	Ciprofloxacin 500mg PO q12h	Reassess after 2 weeks of antimicrobial therapy. Only continue antibiotics if pre-treatment cultures are positive and/or symptoms improve. Duration: 4-6 weeks.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Epididymo-orchitis (non-STD related) Common organisms: Enterobacteriaceae Enterococci *Pseudomonas* spp. Acute onset, usually unilateral scrotal pain swelling with or without fever, rigors, and lower urinary tract symptoms	Ciprofloxacin 500mg PO q12h for minimum of 2 weeks		For STD related epididymo-orchitis, refer to national STD guidelines.
Testicular Abscess Common organisms: Enterobacteriaceae Enterococci *Pseudomonas* spp.	Amoxicillin-clavulanate 1.2gm IV q8h OR Ampicillin-sulbactam 3gm IV q6-8h OR Cefuroxime 750mg IV q8h PLUS* Gentamicin 5mg/kg IV q24h	Ceftriaxone 2gm IV q24h PLUS* Gentamicin 5mg/kg IV q24h	Drainage is the mainstay of treatment. Send pus for culture and sensitivity.
Fournier's Gangrene	Refer to section Necrotizing fasciitis		
4. Neurosurgery			
Antibiotic prophylaxis NOT RECOMMENDED for: ● Basal skull fractures ● Traumatic CSF fistula ● Post-surgical CSF leak			
Depressed skull fractures	Cefuroxime 1.5gm IV q8h PLUS Metronidazole 500mg IV q8h		Duration 5-7 days. Review tetanus status of patient and consider vaccination.
Penetrating craniocerebral injuries	Ceftriaxone 2gm IV q12h PLUS Metronidazole 400mg PO q8h		Duration: 2 weeks initially and then review with microbiology.

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URINARY TRACT INFECTIONS

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
1. Cystitis			
Acute Uncomplicated Cystitis Common organisms: *Escherichia coli* *Staphylococcus saphrophyticus* (in sexually active young women) *Klebsiella pneumoniae* In non-pregnant, pre-menopausal women with structurally and functionally normal urinary tract	Nitrofurantoin* 100mg PO q12** for 7 days OR Cotrimoxazole 960mg q12 for 3-5 days OR Ciprofloxacin 500mg q12h for 3-5 days	Cefuroxime 250mg PO q12h for 3-5 days	*Avoid Nitrofurantoin if GFR < 60ml/min. May be used in GFR >30 but <60 with variable outcome. **Based on composition – Monohydrate/ macrocrystals composition : 100mg q12h Macrocrystals composition: 50-100mg q6h
Cystitis in Pregnancy	Nitrofurantoin* 100mg PO q12h for 7 days (Monohydrate/ macrocrystals composition 100mg q12h Macrocrystals composition: 50-100mg q6h)	Cefuroxime 250mg PO q12h for 5 days OR Amoxicillin-clavulanate# 625mg PO q8h for 5-7 days OR Ampicillin-sulbactam 375-750mg PO q12h for 5-7 days	Repeat Urine C&S 1-2 weeks after completion of antibiotics to ensure eradication. Treat for 7 days if recurrent. *Avoid Nitrofurantoin in third trimester if another option available due to small risk of haemolytic anemia in newborn. #Amoxicillin-clavulanate is generally safe in pregnancy (Category B), but there may be an increased risk of necrotizing enterocolitis associated with use in preterm, premature rupture of membranes.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
2. Pyelonephritis			
Acute Uncomplicated Pyelonephritis Common organisms: *Escherichia coli* *Staphylococcus saprophyticus* (in sexually active young women) *Klebsiella pneumoniae* *Proteus mirabilis*	*Amikacin 1 gm IM/IV q24 for 14 days OR *Gentamicin 7mg/kg/day IM/IV q24h for 14 days	Piperacillin-tazobactam 4.5 gm IV q6h for 14 days	Obtain urine culture before starting treatment. Perform ultrasound of the upper urinary tract to exclude obstructive pyelonephritis. May step down to oral antibiotic guided by culture and sensitivity result once can tolerate orally and afebrile ≥48 hours. Monitor renal function closely and rationalize according to culture report.
3. Other Urinary Tract Infections (UTI)			
Complicated UTIs Common organisms: *Escherichia coli* *Klebsiella pneumoniae* *Proteus mirabilis* *Pseudomonas aeruginosa* *Enterobacteriaceae* *Enterococci* *Pseudomonas* spp. UTI symptoms in men OR presence of a structural or functional abnormality: Urinary tract obstruction Chronic kidney disease Poorly-controlled type 2 diabetes Immunosuppression Urinary catheter in situ Neurogenic bladder Post-menopausal women History of recurrent UTIs Nephrolithiasis	Ampicillin-sulbactam 1.5-3gm IV q6-8h OR Amoxicillin-clavulanate 1.2gm IV q8h OR Amikacin 1 gm IM/IV q24 for 14 days OR Gentamicin 5mg/kg IM/IV q24 for 14 days OR Piperacillin-tazobactam 4.5 gm IV q6h for 14 days	Imipenem 1 gm IV q8h OR Meropenem 1 gm IV q8h	Obtain urine culture before starting treatment and treat for 10-14 days in patients with upper tract symptoms, delayed response or sepsis. May step down to oral antibiotic guided by C&S result once can tolerate orally and afebrile for ≥48 hours.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Asymptomatic Bacteriuria (ABU) Urine bacterial growth ≥ 10^5cfu/mL of bacteria of same species in 2 serial samples in women obtained 2-7 days apart or a single sample in men without UTI symptoms.	Nitrofurantoin* 100mg PO q12h for 7 days OR Amoxicillin 500mg PO q12h for 7-10 days Nitrofurantoin Monohydrate/ macrocrystals composition 100mg q12h Macrocrystals composition – 50-100mg q6h	Cefuroxime 250mg PO q12h for 5-7 days	*Avoid Nitrofurantoin in third trimester if another option available due to small risk of haemolytic anemia in newborn. Screening for, and treating asymptomatic bacteriuria is not recommended, except in pregnant women, OR prior to transurethral resection of prostate (TURP) or urological procedures breaching the mucosa Whenever indicated, treatment should be guided by urine culture and sensitivity result.

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INFECTIONS IN IMMUNOCOMPROMISED PATIENTS

Neutropenic Fever

Neutropenic fever
Fever:
- Single temperature equivalent to ≥38.3 °C orally OR
- Equivalent to ≥38.0 °C orally over 1-hour period

Neutropenia:
- ≤ 500 neutrophils/µl
- ≤1000 neutrophils/µl and a predicted decline to ≤ 500/µl over the next 48 hours

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Low risk None of the high-risk factor and most of the following - Outpatient status at the time of development of fever - No associated acute comorbid illness, independently indicating inpatient treatment or close observation - Anticipated short duration of severe neutropenia (≤100 cells/ul for 7 days) - Good performance status (ECOG 0-1) - No hepatic insufficiency - No renal insufficiency - MASCC Risk-Index Score of ≥21 or CISNE score of <3 **Site of care** - Home for selected low-risk patients with adequate outpatient infrastructure established or - Ambulatory clinic or - Hospital			
Low Risk (Outpatient)	Amoxicillin-clavulanate 625mg PO q8h PLUS Ciprofloxacin 500mg PO q12h OR Levofloxacin 500mg PO q24h OR Moxifloxacin 400mg PO q24h		Criteria for oral therapy: No nausea or vomiting Patient able to tolerate oral medication patient not on prior fluoroquinolone prophylaxis Treat till counts > 0.5 x 10^9/L Can consider stopping the antibiotic after reassessing the patient following 2 days afebrile at the discretion of the treating hemato-oncologists- If the patient has stable vital signs, no evidence of ongoing infection, are educated about their condition and stay near to hospital facilities.

High risk
Any factor listed below
- MASCC Risk-Index score <21 or CISNE score ≥3
- Inpatient status at the time of development of fever
- Significant medical comorbidity or clinically unstable
- Allogenic Hematopoietic Cell Transplantation (HCT)
- Anticipated prolonged severe neutropenia: <100 cells/ul and ≥7 days
- Hepatic insufficiency (5 times upper limit of normal for aminotransferases)
- Renal insufficiency (a creatinine clearance of < 30 ml/min)
- Uncontrolled/ progressive cancer
- Pneumonia or other complex infection at clinical presentation
- Use of immune and /or targeted treatments
- Mucositis grade 3-4

Site of care
- Hospital

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
High risk	Antipseudomonal beta-lactam like Piperacillin-tazobactam 4.5gm IV q6-8h OR Cefepime 2gm IV q8h	Carbapenem like Meropenem 1-2gm IV q8h OR Imipenem 500mg IV q6h	
Severe sepsis Or Second line therapy for persistent fever of 4-7 days and deterioration of clinical signs	Meropenem 1-2gm q8h PLUS* Vancomycin 15mg/kg IV q12h	Imipenem 500mg q6h or 1gm q8h (in severe sepsis) IV PLUS* Vancomycin 15-20mg/kg (actual body weight) IV q8-12h; not to exceed 2gm/dose	*Consider adding Vancomycin for patients colonized with MRSA, suspected to have catheter-related infection, skin and soft-tissue infection, in septic shock Stop Vancomycin after 48 hours if no evidence of gram-positive cocci. Linezolid is an alternative in those patients with no clinical response to Vancomycin and in those with suspected or confirmed VRE, VISA or VRSA

Antifungal therapy

It should be initiated earlier in the presence of:
- severe mucositis
- oral thrush
- dysphagia
- suspicious skin infiltrates or pulmonary infiltrates
- fundal exudates
- prolonged steroid use more than 2 weeks

IV Amphotericin B remains the empirical therapy of choice for invasive fungal infections. For patients who are intolerant, refractory or those with toxicity to conventional amphotericin B, the lipid formulations of amphotericin B, voriconazole and echinocandins are alternatives empirical therapy based on local availability and costs.

Voriconazole is an alternative to amphotericin B for preemptive and directed therapy for invasive aspergillosis.

In candidiasis, echinocandins, azoles and amphotericin B are antifungals of choice

ANTIFUNGAL AGENT	DAILY DOSE
Amphotericin B deoxycholate	0.5-1.5mg/kg q24h
ABLC (Amphotericin B Lipid Complex)	3-5mg/kg q24h
Liposomal amphotericin B	3-5mg/kg q24h
Anidulafungin	200mg loading dose, followed by 100mg q24h
Caspofungin	70mg loading dose, followed by 50mg q24h
Micafungin	100mg q24h
Fluconazole	400mg IV/PO q24h
Itraconazole	200mg q8h for 3 days, followed by 200mg q12h
Posaconazole	800mg (syrup), 300mg (tablet) q12h for 1 day, followed by 300mg 124h
Voriconazole	6mg/kg q12h for 2 doses, followed by 3-4mg/kg q12h

Minimum duration of therapy for documented infection differs in different scenarios

Skin and soft tissue: 5-14 days

Blood–stream infections
- Gram-negative/ Gram Positive- 7-14 days
- *Staphyloccus aureus*: typically requires 4 weeks after negative blood culture
- Candida: minimum 2 weeks after negative blood culture
- Aspergillus: minimum 12 weeks

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Hospital Acquired Carbapenem-Resistant *Acinetobacter baumannii* (CRAB) infection treatment options			
Severe infections (HAP/VAP/ BSI with severe sepsis or septic shock)	Less severe infections (BSI without severe sepsis or septic shock)	Less severe infections (SSTI/IAI)	Less severe infections (UTI)
If two in vitro active agents available, Treatment with combination of two in vitro active agents	Monotherapy with an atibiotic if susceptible. For neutropenic patients, combination of two active agents.	Tigecycline 200mg IV stat and 100mg IV q12h OR Minocycline 200mg IV stat and 100mg IV q12h OR Ampicillin-sulbactam 8g/4g IV q8h (high dose)	Ampicillin-sulbactam 8g/4g IV q8h (high dose) OR Trimethoprim-sulfamethoxazole OR An aminoglycoside OR Colistin 300mg CBA loading dose followed by 150-180mg CBA q12h as maintenance starting 12 hours after loading dose (Colistin 9 MIU loading dose followed by 4.5 MIU q12h as maintenance) CBA= Colistin Base Activity MIU= Million International Units
For Pan-drug resistance CRAB infection Ampicillin-sulbactam 8g/4g IV q8h (high dose) PLUS Meropenem 2g IV q8h PLUS Polymyxin B 2.5mg/kg loading dose over 2 hours then 1.5mg/kg IV over 1 hour q12h (Polymyxin B 20,000- 25,000 U/kg loading dose then 12,500-15,000 U/kg IV q12h)	Ampicillin-sulbactam 8g/4g IV q8h (high dose) OR An aminoglycoside OR A polymyxin		

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CHEMOPROPHYLAXIS : SURGICAL

The goal of antimicrobial prophylaxis is to prevent surgical site infection by reducing the burden of microorganisms at the surgical site during the operative procedure.

Single-dose prophylaxis is usually sufficient. If antimicrobial prophylaxis is continued post-operatively, duration should be less than 24 hours (up to 48 hours for cardiac surgery), regardless of the presence of intravascular catheters or indwelling drains.

If presence of pre-existing infections (known or suspected), use appropriate treatment regimen instead of prophylactic regimen for procedure. However, re-dosing is required just prior to skin incision.

The optimal time for administration of pre-operative antibiotics is 60 minutes prior to surgical incision. Some agents, such as fluoroquinolones and Vancomycin, require administration over one to two hours; therefore, the administration of these agents should begin within 120 minutes before surgical incision.

An additional dose of prophylactic antibiotic during operation is indicated if:

- Excessive blood loss (>1500ml)
- Procedures exceed two half-life of the drug
- If there are other factors that may shorten the half-life of the prophylactic agent (e.g. extensive burns)

Antimicrobial	Recommended Re-dosing Interval in Adults with Normal Renal Function (From Initiation of Preoperative Dose in hours)
Cefazolin	4
Cefuroxime	4
Ampicillin-sulbactam	2
Metronidazole	4
Clindamycin	6
Vancomycin	NA
Gentamicin	NA
Amoxicillin-clavulanate	3
Benzylpenicillin	2

For patients with Penicillin allergy, Clindamycin or Vancomycin is recommended unless stated otherwise. The dose of Vancomycin is according to patient's body weight, as follows:

- <75 kg: 1 gm infused over 60 minutes.
- ≥75 kg: 1.5 gm infused over 90 minutes.

Administration of Cefazolin in obese patients:

- 2 gm if body weight <120 kg.
- 3 gm if body weight ≥120 kg.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
1. Obstetrics and Gynecology Surgery			
Cesarean Section Elective Emergency	Cefazolin 2gm IV (3gm IV for patients weighing) ≥120 kg	Ampicillin-sulbactam 3gm IV	
Elective surgery: TAH/BSO Hysterectomy (vaginal or abdominal) Laparoscopy (vaginal and/or uterus entered)	Cefazolin 2gm IV (3 gm IV for patients weighing ≥120 kg) OR Cefuroxime 750mg IV PLUS Metronidazole 500mg IV	Ampicillin-sulbactam 3gm IV	Consider second or additional dose for prolonged procedures.
Laparoscopic surgery (vagina and/or uterus not entered)	Antibiotic not recommended	Antibiotic not recommended	
Repair of perineal tear e.g. third or fourth degree tears	Cefazolin 2gm IV (3 gm IV for patients weighing ≥120 kg) PLUS Metronidazole 500mg IV	Ampicillin-sulbactam 3gm IV	Duration: 5-7 days.
Surgical termination of pregnancy	Doxycycline 400mg PO as a single dose (1 hour prior to procedure) OR Azithromycin 1gm PO (1 hour prior to procedure		No evidence outcomes are improved by including Metronidazole in prophylactic regimens.
Emergency laparotomy	As per elective surgery		

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
2. Otorhinolaryngologic Surgery			
Head and Neck			
Clean	Antibiotic not required	Antibiotic not required	
Clean with placement of prosthesis (excludes tympanostomy tubes)	Cefazolin 2gm IV (3gm IV for patients weighing ≥ 120 kg)		
Clean-contaminated cancer surgery Other clean-contaminated procedures with the exception of tonsillectomy and functional endoscopic sinus procedures	Cefazolin 2gm IV (3gm IV for patients weighing ≥ 120 kg) PLUS Metronidazole 500mg IV	Cefuroxime 1.5gm IV PLUS Metronidazole 500mg IV OR Ampicillin-sulbactam 3gm IV	
3. Oral / Dental Surgery			
Clean Surgery (Class 1) Submandibular gland surgery Temporomandibular Joint (TMJ) Surgery Excision of benign tumors / cysts	Not indicated for most surgeries May be indicated if the duration of the surgery is expected to be very long For open reduction and internal fixation of facial bone fractures		Prophylaxis is recommended for all patients with an increased risk of surgical wound infection- i.e. in immunocompromised patients. *In patients with cardiac conditions with increased risk of Infective endocarditis.
Minor Clean-contaminated surgery (Class 2) Soft tissue surgery Dentoalveolar surgery*			

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Periodontal surgery			Chemoprophylaxis is indicated. Please refer to Chemoprophylaxis Non-Surgical Section – Infective endocarditis.
Minor clean-contaminated surgery (Class 2) Insertion of dental implants and use of graft material High degree of difficulty / long duration	Amoxicillin 1gm PO OR Clindamycin 600-900mg PO/IV OR Benzylpenicillin 2 MU IV	Amoxicillin-clavulanate 1.25gm PO or 1.2gm IV OR Cefuroxime 500mg PO or 1.5gm IV	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Major clean-contaminated surgery (Class 3) Orthognathic surgery Excision / enucleation of large benign tumors / cysts All oral cancer surgery Open reduction and internal fixation of facial bone fractures	Benzylpenicillin 2MU IV OR Clindamycin 600-900mg IV	Amoxicillin-clavulanate 1.2gm IV OR Cefuroxime 1.5gm IV	For oral and maxillofacial fractures, antibiotic is recommended for the immediate post trauma period and should be discontinued once open reduction and internal fixation is completed.
4. Plastic Surgery			
Not indicated: for the majority of clean procedures*, unless the patient has risk factors for postoperative infection (e.g. implantation of prosthetic material, prior skin irradiation). The continuation of antibiotics while waiting for non-infected skin grafts or flaps to epithelialize is not evidence-based.			
For clean-contaminated procedures	Cefazolin 2mg IV (3gm IV for patients weighing ≥120 kg)	Amoxicillin-clavulanate 1.2gm IV	
5. Vascular Surgery			
Amputation of ischemic limb	Ampicillin-sulbactam 3gm IV	Amoxicillin-clavulanate 1.2gm IV	
Suspected organism: Staphylococcus spp. and anaerobic organism			
Open and endovascular repair of abdominal aneurysm	Amoxicillin-clavulanate 1.2gm IV	Penicillin allergy: Vancomycin 1gm IV (1.5gm IV for patients weighing ≥75 kg)	
Bypass surgery	Amoxicillin-clavulanate 1.2gm IV	Penicillin allergy: Vancomycin 1gm IV (1.5gm IV for patients weighing ≥75 kg)	
Arteriovenous graft	Amoxicillin-clavulanate 1.2gm IV If high risk For MRSA: Vancomycin 1gm IV (1.5gm IV for patients weighing ≥75 kg)		MRSA risk (defined as history of MRSA colonization or infection, or inpatient of high-risk hospital or unit (where MRSA is endemic).

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
6. General Surgery			
Procedures involving entry into lumen of gastrointestinal tract (bariatric, pancreaticoduodenectomy)	Cefazolin 2gm IV (3gm IV for patients weighing ≥120 kg)	Cefuroxime 1.5gm IV	
Other GI Procedures without entry into gastrointestinal tract (antireflux, highly selective vagotomy) - for high-risk patients	Cefazolin 2gm IV (3gm IV for patients weighing ≥120 kg)	Cefuroxime 1.5gm IV	
Appendectomy for uncomplicated appendicitis Colorectal	Cefazolin 2gm IV (3gm IV for patients weighing ≥120 kg) PLUS Metronidazole 500mg IV OR Ampicillin-sulbactam 3gm IV	Cefuroxime 1.5gm IV PLUS Metronidazole 500mg IV Penicillin allergy: Clindamycin 600-900mg IV PLUS Gentamicin 5mg/kg IV	
Small intestine	Non-obstructed: Cefazolin 2gm IV (3gm IV for patients weighing ≥120 kg)	Cefuroxime 1.5gm IV Penicillin allergy: Clindamycin 600-900mg IV PLUS Gentamicin 5mg/kg IV	
	Obstructed: Cefazolin 2gm IV (3gm IV for patients weighing ≥120 kg) PLUS Metronidazole 500mg IV	Cefuroxime 1.5gm IV PLUS Metronidazole 500mg IV Penicillin allergy: Clindamycin 600-900mg IV PLUS Gentamicin 5mg/kg	
Hernia repair with mesh	Cefazolin 2gm IV (3gm IV for patients weighing ≥120 kg)	Amoxicillin-clavulanate 1.2gm IV OR Ampicillin-sulbactam 3gm IV	Includes laparoscopic repair Single / stat dose only.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Breast cancer surgery	Cefazolin 2gm IV (3gm IV for patients weighing ≥120 kg)	Amoxicillin-clavulanate 1.2gm IV OR Ampicillin-sulbactam 3gm IV	The benefits of routine postoperative antibiotic doses in reconstruction surgery are uncertain; there may be a benefit in obese patients or those treated with radiation therapy. The need for postoperative doses should be considered on an individual patient basis; if used, postoperative prophylaxis should not exceed 24 hours.
Breast reshaping procedures	Cefazolin 2gm IV (3gm IV for patients weighing ≥120 kg)	Amoxicillin-clavulanate 1.2gm IV OR Ampicillin-sulbactam 3gm IV	
Breast surgery with implant (reconstructive or aesthetic)	Cefazolin 2gm IV (3gm IV for patients weighing ≥120 kg)	Amoxicillin-clavulanate 1.2gm IV OR Ampicillin-sulbactam 3gm IV	
7. Orthopaedic Surgery			
Clean operations involving hand, knee, or foot and not involving implantation of foreign materials	None	None	
Internal fixation of all closed fracture/ Total Joint Replacement/ Spine surgery (with and without instrumentation) Arthroscopy	Cefazolin 2gm IV (3gm IV for patients weighing ≥120 kg)	Cefuroxime 1.5gm IV Penicillin/Cephalosporin Allergy: Clindamycin 600-900mg IV	The benefits of routine postoperative antibiotic are uncertain. If used, postoperative prophylaxis should not exceed 24 hours.
8. Urological Surgery			
Diagnostic Procedures			
Transrectal ultrasound and prostate biopsy Common organisms: *Escherichia coli, Klebsiella* spp., *Proteus* spp, *Enterococcus, Pseudomonas*	Ciprofloxacin 500mg PO q12h for 3 days (start 24 hours before procedure) PLUS* Gentamicin 80mg IV single dose given 30-60 minutes before procedure	Targeted antibiotic therapy based on pre-operative rectal swab result	Consider povidone-iodine bowel preparation to further decrease infection risk.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Cystoscopy / Urodynamic study	Antibiotic not recommended	Antibiotic not recommended	Prophylaxis only for high risk cases (immunocompromised patients, e.g. debilitated patients on long term catheters, patient with prosthesis/heart valves, diabetes, transplant recipients): Cefuroxime 250mg PO stat. If heart valve: Follow recommendation from Subacute Bacterial Endocarditis (SBE) prophylaxis.
Retrograde pyelogram/ Ureteric stenting	Cefuroxime 250mg PO stat		
Endourology			
Endourological surgery E.g. PCNL, URS, RIRS, TURP Common organisms: *Escherichia coli, Klebsiella* spp., *Proteus* spp., *Enterococcus* spp., *Pseudomonas* spp.	Amoxicillin-clavulanate 1.2gm IV OR Ampicillin-sulbactam 3gm IV	Cefuroxime 1.5gm IV OR Ceftazidime 2gm IV (if urine grew *Pseudomonas* spp.)	Antibiotic selection to be determined based on patient's latest urine culture result.
Open Surgery			
Clean operations e.g. orchidectomy, orchidopexy, varicocelectomy, deroofing renal cysts	Antibiotic not required	Antibiotic not required	
Clean-contaminated (with opening of urinary tract) E.g. nephrectomy, prostatectomy, open stone surgery. Common organisms: *Escherichia coli, Klebsiella* spp., *Proteus* spp., *Enterococcus* spp., *Pseudomonas* spp.	Amoxicillin-clavulanate 1.2gm IV q8h for 1 day OR Ampicillin-sulbactam 3gm IV q8h for 1 day	Cefoperazone 1gm IV q12h for 1 day OR Ceftazidime 2gm q8h IV for 1day (if *Pseudomonas* spp is isolated from urine)	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Clean-contaminated (with use of bowel segments) E.g. Cystectomy with urinary diversion, cystoplasty. Common organisms: *Escherichia coli, Klebsiella* spp., *Proteus, Enterococcus, Pseudomonas*	Cefoperazone 1gm IV q12h PLUS Metronidazole 500mg IV q8h	Gentamicin 1.5mg/kg IV q8h PLUS Metronidazole 500mg IV q8h	For duration of catheter present.
Implant of prosthetic devices e.g. Insertion of penile prosthesis or artificial urinary sphincter, artificial slings Common Organism: *Staphylococcus aureus*	Amoxicillin-clavulanate 1.2gm IV q8h for 1 week OR Ampicillin-sulbactam 3gm IV q8h for 1 week	Cefuroxime 1.5mg IV q8h for 1 week	
Laparoscopic surgery	As for open surgery	As for open surgery	Depending on type of procedure performed whether clean or clean-contaminated.
9. Neurological Surgery			
Clean wounds (Uninfected operative wounds in which no inflammation is encountered and no viscus is entered during the procedures) Elective craniotomy or spinal procedures	Cefuroxime 1.5gm IV (Given as a single IV dose at induction or within 60 minutes before incision. For prolonged procedures, additional intraoperative doses are given at every 4 hours interval during surgery in patients with normal renal function)	Vancomycin 15-20mg/kg IV (max 2g) (Infusion is started within 60-120 min before incision. Additional redoses interval is at every 12 hours during surgery in patients with normal renal function)	Situation where the use of Vancomycin is appropriate: - In hospitals in which MRSA or *Staphylococcus epidermidis* are frequent causes of postoperative wound infection. In patients previously colonized with MRSA, or those who are allergic to penicillins or cephalosporins. Rapid IV administration of Vancomycin may cause hypotension.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Clean wounds with Foreign Body or Instrumentation. CSFs hunting procedures, implantation of cranial or spinal implants	Cefuroxime 1.5gm IV PLUS Metronidazole 500mg IV (Given as a single IV dose at induction or within 60 minutes before incision. Additional redose interval is at every 4 hours during surgery in patients with normal renal function)	Vancomycin 15-20mg/kg IV (max 2g) PLUS Gentamicin 5mg/kg IV (Given as a single IV dose at induction or within 60 minutes before incision in patients with normal renal function) PLUS Metronidazole 500mg IV (Given as a single IV dose at induction or within 60 minutes before incision. Additional redose interval is at 4 hours during surgery in patients with normal renal function)	Addition of another drug such as Metronidazole and aminoglycoside is appropriate for procedures in which anaerobic and enteric gram negative bacilli are common pathogens.
Clean-Contaminated wounds (Operative wounds in which a viscus is entered and without unusual contaminations) Procedures that breach air cells or nasal or oral cavity.	Cefuroxime 1.5gm IV PLUS Metronidazole 500mg IV	Vancomycin 15-20mg/kg IV (max 2g) PLUS Gentamicin 5mg/kg IV PLUS Metronidazole 500mg IV	
Contaminated wounds (Open, fresh accidental wounds, operation with major breaks in sterile technique, or gross spillage from a viscus)	Ceftriaxone 2gm IV (Given as a single IV dose at induction or within 60 minutes before incision. Additional redoses interval is at every 12 hours during surgery in patients with normal renal function)	Vancomycin 15-20mg/kg IV (max 2g) PLUS Gentamicin 5mg/kg IV PLUS Metronidazole 500mg IV	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Dirty wounds (Infected CSF shunt, old traumatic wounds with retained devitalized tissue, foreign bodies or wounds that involve existing clinical infection or perforated viscus)	Ceftriaxone 2gm IV PLUS Metronidazole 500mg IV	Vancomycin 15-20mg/kg IV (max 2g) PLUS Gentamicin 5mg/kg IV PLUS Metronidazole 500mg IV	Settings where intraventricular antibiotics (Vancomycin 10mg or Gentamicin 5mg may be useful) Failure to sterilize the CSF with IV therapy Poor response to IV systemic antibodies Presence of highly resistant organisms susceptible to only antibiotics with poor CSF penetration. Circumstances in which shunt devices cannot be removed (including infected Ommaya reservoirs).
10. Cardiac Surgery			
Coronary artery bypass	Cefazolin 2gm IV (3gm IV for patients weighing ≥120 kg)	Cefuroxime 1.5gm IV	
Cardiac device insertion procedures (e.g. Pacemaker implantation)	Cefazolin 2gm IV (3gm IV for patients weighing ≥120 kg)	Cefuroxime 1.5gm IV	
11. Ophthalmologic Surgery			
The use of povidone iodine 10% to the periorbital skin and 5% to the conjunctival sac as an antiseptic agent for preoperative surgical site preparations are recommended.			
Intracameral injection of 1mg Cefuroxime in 0.1ml at the end of cataract surgery is recommended. Careful dilution should be undertaken to prevent potential toxicity.			
Topical antibiotics at end of surgery.			

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
12. Hepatobiliary Surgery			
Laparoscopic procedures Low risk	Cefazolin 2 gm (3 gm IV for patients weighing ≥120 kg)		Optimum antibiotic timing is to complete intravenous infusion given 60 min prior to surgery (optimal window 15-45 min) prior to skin incision; to ensure adequate time to reach bactericidal serum and tissue concentration before skin is incised. Repeat intraoperative dosing is recommended in: Prolonged surgery > 4 hours. Massive blood loss > 1.5 L Aminoglycosides should not be redosed.
Laparoscopic procedures High risk: Stent insertion Biliary obstruction (High direct bilirubin)	Cefazolin 2 gm (3 gm IV for patients weighing ≥120 kg) PLUS Gentamicin 5mg/kg IV (2mg/kg IV single dose if CrCl<20)		
Open surgery (Low risk)	Cefazolin 2gm IV (3 gm IV for patients weighting ≥120 kg)		
Open surgery High Risk Multiple ERCP (≥2) done with stenting Biliary Obstruction Biliary infection or surgery within < 30 days	Cefazolin 2gm IV (3 gm IV for patients weighting ≥120 kg) PLUS Gentamicin 5mg/kg IV (2mg/kg IV single dose if CrCl < 20) If high risk ESBL/Multi-resistant organisms, e.g. ESBL in the last 3 months/12 but treated Piperacillin-tazobactam 4.5 gm IV PLUS Gentamicin 5mg/kg IV (2mg/kg IV single dose if CrCl < 20)		
Pre-exiting infection before surgery, GB empyema, ascending cholangitis	Initiate antibiotic according to culture results, or refer to treatment guidelines		

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CHEMOPROPHYLAXIS : NON SURGICAL

Patients with cardiac conditions are considered as being at increased risk of developing IE and are indicated for antimicrobial prophylaxis prior to certain procedures.

1.	Prosthetic cardiac valves or prosthetic material used for cardiac valve repair
2.	Established rheumatic heart disease
3.	Previous history of infective endocarditis
4.	Unrepaired cyanotic congenital heart disease (CHD), including palliative shunts and conduits
5.	Completely repaired CHD with prosthetic material or device, for first 6 months after the procedure
6.	Repaired CHD with residual defects at the site or adjacent to the site of the prosthetic device (which inhibit endothelization)
7.	Cardiac transplantation recipients who develop cardiac valvulopathy

Dental Procedures
For patients considered as high-risk, antimicrobial prophylaxis is recommended for invasive dental procedures which involve manipulation of gingival tissue or the periapical region of teeth or perforation of gingival mucosa.

Even with high cardiac risk of infective endocarditis, antibiotic prophylaxis is not recommended for
- local anaesthetic injections in non-infected tissues
- treatment of superficial caries
- removal of sutures
- dental X-rays
- placement or adjustment of removable prosthodontic or orthodontic appliances or braces
- following the shedding of deciduous teeth
- trauma to the lips and oral mucosa

Respiratory Tract Procedures:
Antimicrobial prophylaxis is recommended for patients with increased risk of IE who undergo an invasive respiratory tract procedure that involve incision or biopsy of the respiratory mucosa. Patients who undergo an invasive respiratory tract procedure to treat an established infection, e.g. biopsy drainage of an abscess, should receive an antibiotic prophylaxis which contains an anti-staphylococcal agent.

Gastrointestinal or genitourinary procedures:
Routine pre-procedural antimicrobial prophylaxis is no longer recommended for patients undergoing genitourinary or gastrointestinal tract procedures. However, for high-risk cardiac patients who have an established gastrointestinal or genitourinary infection, or for those who receive antimicrobial therapy for surgical reasons, the antimicrobial regimen should include an agent active against enterococci, such as Ampicillin or Vancomycin.

Dermatological or musculoskeletal tissue procedures:
For high risk-patients undergoing surgical procedures involving infected skin (including local abscesses), skin structure or musculoskeletal tissue, it is reasonable that the therapeutic regimen contains an agent active against staphylococci and beta-hemolytic streptococci. Vancomycin or Clindamycin may be used in patients unable to tolerate a β-lactam antibiotic. If the infection is known or suspected to be caused by MRSA, Vancomycin or another suitable agent should be administered.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Prophylactic Regimens For High-Risk Dental Procedures In High-Risk Patients			
Prophylactic Regimens	Amoxicillin 2gm PO single dose 30-60 minutes before procedure OR Ampicillin 2gm IV single dose 30-60 minutes before procedure	Penicillin allergy: Clindamycin 600mg PO or IV single dose 30 to 60 minutes before procedure Alternative: Cefazolin 1gm IV single dose 30-60 minutes before procedure	See above for antibiotic prophylaxis in patients undergoing invasive surgical procedure to treat an established infection.
Secondary Prevention Of Rheumatic Fever			
Secondary Prevention of Rheumatic Fever	Parenteral Prophylaxis: Benzathine penicillin G 1.2MU IM every 3 to 4 weeks Oral Prophylaxis: Phenoxymethylpenicillin (Penicillin V) 250mg PO q12h daily	Penicillin allergy: Erythromycin Ethylsuccinate 800mg PO q12h twice daily.	

Type Of Infection	Duration Of Treatment
Rheumatic fever with carditis and residual heart disease (persistent valvular disease).	10 years or until 40 years of age, whichever is longer; sometimes lifelong prophylaxis.
Rheumatic fever with carditis but no residual heart disease (no valvular disease).	10 years or until 21 years of age, whichever is longer.
Rheumatic fever without carditis.	5 years or until 21 years of age whichever is longer.

Reference:

1. ESC Guidelines on Prevention of Infective Endocarditis 2015.
2. The Australian guideline for prevention, diagnosis and management of acute rheumatic fever and rheumatic heart disease (2nd edition).

OBSTETRIC AND GYNAECOLOGICAL INFECTIONS

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Septic Abortion Common organisms: *Prevotella bivia* *Streptococcus* spp. (Grp A, Grp B) Enterobacteriaceae *Chlamydia trachomatis* *Ureaplasma urealyticum*	Ampicillin 2g stat then 1g IV q4-6h PLUS Gentamicin 5mg/kg IV q24h PLUS Metronidazole 500mg IV q8h	Ampicillin-sulbactam 3gm IV q6h PLUS Doxycycline 100mg PO q12h OR Clindamycin 900mg IV q8h PLUS Gentamicin 5mg/kg IV q24h	Intravenous antibiotics are administered until the patient has improved and afebrile for 48 hours, then are typically followed by oral antibiotics to complete a 10-14 days course.
Intra-partum antibiotic prophylaxis (IAP) for Group B *Streptococcus* (GBS) positive mothers Indications of IAP: Previous infant with invasive GBS disease Preterm labour GBS carriage in previous pregnancy PPROM with known GBS carrier GBS carriage in current pregnancy	Benzylpenicillin 5MU IV initial dose, Then 2.5-3MU IV q4h until delivery OR Ampicillin 2gm IV initial dose then 1 gm IV q4-6h until delivery	Mild Penicillin allergy Cefazolin 2gm IV initial dose, then 1 gm IV q8h until delivery. OR Cefuroxime 1.5 gm IV stat and 750mg IV q8h until delivery Severe Penicillin allergy Vancomycin 15-20mg/kg IV q8-12h until delivery OR Clindamycin 900mg IV q8h until delivery	Prophylaxis begins at hospital admission for labour or rupture of membrane and is continued every four hours until the infant is delivered. Treatment is NOT INDICATED if Caesarean-section performed before onset of labour with intact membrane (Please use standard surgical prophylaxis). Antenatal treatment is NOT RECOMMENDED for GBS cultured from a vaginal or rectal swab.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Preterm Premature Rupture of Membrane (PPROM)	If non-GBS carrier: Erythromycin 250mg PO q6h for 7-10 days If GBS carrier: Ampicillin 2gm IV q6h for 48 hours followed by Amoxicillin 500mg PO q8h for an additional 5-7 days or until delivery whichever comes first PLUS One dose of Azithromycin 1gm PO upon admission (to cover for *Ureaplasma* – important cause of chorioamnionitis and *Chlamydia*)	Ampicillin 2g IV stat dose followed by 1g IV q6h	
Chorioamnionitis	Ampicillin 2gm stat then1g IV q6h PLUS Gentamicin 5mg/kg IV q24h If the patient is undergoing a caesarean delivery: PLUS Metronidazole 500mg IV q8h	Ampicillin-sulbactam 3gm IV q6h Mild Penicillin allergy: Cefazolin 2gm IV q8h PLUS Gentamicin 5mg/kg IV q24h Severe Penicillin allergy: Clindamycin 900mg IV q8h	Antibiotic regimen is continued postpartum until patient is afebrile and asymptomatic for AT LEAST 48 HOURS. There is NO evidence that continuation with oral antibiotic is beneficial after discontinuation of parenteral therapy.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Pelvic Inflammatory Disease Common organisms: *Neisseria gonorrhoeae* *Chlamydia trachomatis* *Bacteroides* spp. Enterobacteriaceae *Haemophilus influenzae* *Streptococcus* spp. *especially Streptococcus agalactiae* (GBS) *Gardnerella vaginalis* *Ureaplasma urealyticum* *Mycoplasma hominis*	Outpatient regimen (Mild-moderate): Ceftriaxone 500mg IM in a single dose OR Cefotaxime 1gm IM in a single dose PLUS Metronidazole 400mg PO q8h for 14 days PLUS Doxycycline 100mg PO q12h for 14 days OR Azithromycin 1gm PO once per week for 2 weeks	Cefixime 400mg PO stat PLUS Tinidazole 2g PO stat PLUS Azithromycin 1g PO stat PLUS Fluconazole 150mg PO stat	
	Inpatient regimen (Moderate-Severe): Cefuroxime 1.5gm IV q8h OR Ceftriaxone 2gm IV q24h PLUS Doxycycline 100mg PO q12h PLUS Metronidazole 500mg IV/PO q8h Duration of treatment: 14 days	Ampicillin-sulbactam 3gm IV q6h PLUS Doxycycline 100mg PO q12h	Tubo ovarian abscess: ▪ Surgical intervention for source control may be required. ▪ May need to consider tuberculosis if not responding to standard treatment.
Endometritis	Post-partum* Clindamycin 900mg IV q8h PLUS Gentamicin 5mg/kg IV q8h OR Metronidazole 500mg IV q8h PLUS Gentamicin 5mg/kg IV x 1dose	Amoxicillin-clavulanate 1.2gm IV q8h OR Ampicillin-sulbactam 3gm IV q6h	Duration of treatment: 10-14 days *For other non-pregnant endometritis – follow regimen for severe PID

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Vaginitis Bacterial vaginosis	Metronidazole 400mg PO q8h for 7 days	Clindamycin 300mg PO q12h for 7 days	Metronidazole can be used in any stage of pregnancy.
Vaginal Candidiasis *Candida albicans* Uncomplicated infection	Clotrimazole 500mg as a single vaginal pessary (Stat dose) OR Clotrimazole 200mg as vaginal pessary for 3 nights	Fluconazole 150-200mg PO for one dose	Pregnancy: If indicated, treat with topical therapy as oral therapy is CONTRAINDICATED.
Vaginal Candidiasis *Candida albicans* Complicated infections:	Severe vaginitis symptoms: Fluconazole 150-200mg PO q72h for 2 or 3 doses		
	Recurrent vulvovaginal candidiasis: Fluconazole 150-200mg PO q72h for 3 doses then weekly for 6 months	Clotrimazole 500mg vaginal suppository once weekly for 6 months	
Trichomoniasis *Trichomonas vaginalis*	Metronidazole 400mg PO q8h for 7 days OR Metronidazole 2gm PO as single dose		Metronidazole can be used in any stage of pregnancy. If post-partum and breastfeeding, not advisable to breastfeed during treatment. May resume breastfeeding after 24 hours of the last dose.
Cervicitis*	Azithromycin 1gm single dose	Doxycycline 100mg PO q12h for 7 days	*Watch group as preferred regimen due to single dose administration.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Postpartum mastitis Common organisms: *Staphylococcus aureus (MSSA)* *Streptococcus pyogenes (Group A, B)* *Escherichia coli, Bacteroides* spp., *Corynebacterium* spp. *CoNS*	Outpatient Cephalexin 500mg PO q6h for 5-7 days		Duration: 5-6 days If poor response: 10-14 days. Less severe infection: Milk culture. Severe infection (hemodynamic instability) blood culture.
	Inpatient Cloxacillin 2gm IV q6h	Cefazolin 1-2gm IV q8h	
Post episiotomy tear	1st and 2nd degree tear: Antibiotics not required		
	3rd and 4th degree tear: Cefuroxime 1.5gm IV as single dose Plus Metronidazole 500mg IV q8h	Penicillin allergy Clindamycin 600mg IV as single dose	
Manual removal of placenta	Ampicillin 2gm IV as single dose Plus Metronidazole 500mg IV q8h	Cefazolin 2gm IV as single dose Plus Metronidazole 500mg IV q8h	
Post Lower Segment Caesarean Section (LSCS) infection	In mild Surgical Site Infections (SSI), antibiotic is generally not indicated. Appropriate dressing is the primary treatment		
	Cloxacillin 1gm q6h OR Cefazolin 1-2gm IV q8h	Risk of Gram negative anaerobic infection (e.g.: Diabetes): Ampicillin-sulbactam 3gm IV q6-8h	
Viral infections in pregnancy			
Influenza in pregnancy (seasonal and H1N1)	Oseltamivir 75mg PO q12h for 5 days	Nebulization with Zanamivir respules (2) 5mg each, q12h for 5 days	Prevention - single dose killed vaccine.
Varicella	>20 weeks of gestation, presenting within 24 hours of the onset of rash. *Acyclovir 800mg PO 5 times a day for 7 days		*IV acyclovir is recommended for severe complications 24 hours from the onset of rash, antivirals are not found to be useful.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Parasitic infestations during pregnancy			
Acute toxoplasmosis in pregnancy	<u><18 weeks of gestation at diagnosis without fetal infection</u> *Spiramycin 1 gm oral q8h (3 weeks on / One week off) <u>>18 weeks gestation and if amniotic fluid PCR is positive indicating fetal infection</u> Pyrimethamine 50mg PO q12h for 2 days then 50mg q24h PLUS Sulfadiazine 75mg/kg PO q24h then 50mg/kg q12h PLUS Folinic Acid (10-20mg oral daily) for minimum of 4 weeks or for the duration of pregnancy		*This should be continued till delivery if there is no evidence of fetal infection or till 18 weeks when amniotic fluid PCR can be done.
Genital Tract Infection			
Candidiasis *Candida* species	Fluconazole 150mg PO stat single dose Intravaginal agent as cream or suppositories Clotrimazole, Miconazole, Nystatin. Intravaginal azole, single dose for 7-14 days.		Non-pregnant- If recurrent candidiasis, (4 or more episodes/year) 6 months suppressive therapy with Fluconazole 150mg PO once a week or Clotrimazole vaginal suppository 500mg once a week.
Bacterial vaginosis Polymicrobial	Metronidazole 400mg PO q8h for 7 days OR Metronidazole vaginal gel 1 HS for 5 days OR Tinidazole 2 gm PO q24h for 3 days OR 2 % Clindamycin vaginal cream 5 gm HS for 5 days		Treatment of the partner with Metronidazole may be done.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Trichomoniasis *Trichomonas vaginalis*	Metronidazole 400mg PO q8h for 7 days OR Tinidazole 2 gm PO single dose For treatment failure Metronidazole 400mg PO q8h for 7 days If 2nd failure Metronidazole 2 gm PO q24h for 3 days		Treat partner with Metronidazole 2 gm single dose.
Cervicitis/ Urethritis/ Mucopurulent Gonococcal Polymicrobial	Ceftriaxone 250mg IM single dose PLUS Azithromycin 1 gm single dose OR Doxycycline 100mg q12h for 7 days		
Mastitis without abscess *Staphylococcus aureus*	Cephalexin 500mg q6h OR Ceftriaxone 2 gm q24h OR Cefuroxime 1g IV q12h	If MRSA- based on susceptibility pattern Clindamycin 300 mg IV q6h OR Vancomycin 1 gm IV q12h OR Teicoplanin 12mg/kg IV q12h for 3 doses then once daily for 6 doses	
Mastitis with abscess	Cloxacillin 1g IV q6h PLUS Metronidazole 500mg IV q8h	If MRSA suspected Clindamycin 300mg q6h OR Vancomycin 15mg/kg IV q12h OR Teicoplanin 12mg/kg IV q12h for 3 doses then 6mg/kg once daily IV	Drainage is necessary.

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SKIN AND SOFT TISSUE INFECTIONS

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
1. Purulent Skin and Soft Tissue Infection			
Localised Impetigo Common organisms: *Staphylococcus aureus* *Streptococcus pyogenes*	Cloxacillin 500-1000mg PO q6h for 5-7 days OR Cephalexin 250-500mg PO q6h for 5-7 days OR Cefadroxil 500mg PO q12h for 7 days	Topical 2% Fusidic acid 18-12h for 5 days (Outpatient use only)	
Generalised Impetigo/ Ecthyma	Cephalexin 250-500mg PO q6h OR Cefadroxil 500mg PO q12h	Amoxicillin-clavulanate 625mg PO q8h	Duration : 5-7 days.
	Penicillin allergy: Erythromycin ethylsuccinate 800mg PO q12h	Other alternative/ in case of CA-MRSA: Clindamycin 600mg PO q8h OR Trimethoprim-sulfamethoxazole 160/800mg PO q12h	
Ecthyma gangrenosum *Pseudomonas* spp.	Ciprofloxacin 500mg PO q12h OR Piperacillin-tazobactam 4.5gm IV q6-8h	Ceftazidime 2gm IV q8h OR Cefepime 2gm IV q8h	Consider adding aminoglycoside in selected cases such as in immunocompromised, neutropenic and septic shock patients.
2. Non-Purulent Skin and Soft Tissue Infection			
Furuncles	Cloxacillin 500mg PO q6h for 5-7 days	Amoxicillin-clavulanate 625mg PO q8h for 5-6 days	
Carbuncles Common organism: *Staphylococcus aureus*	Cloxacillin 1-2gm IV q6h	Cefazolin 1gm IV q8h OR Amoxicillin-clavulanate 1.2gm IV q8h	Surgical drainage is the mainstay of treatment. Duration : 7-10 days.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Erysipelas Common organism: *Streptococcus pyogenes*	Phenoxymethylpenicillin 500mg PO q6h OR Amoxicillin 500mg PO q8h	Cephalexin 500mg PO q6h	Duration : 7-10 days.
	If severe: Benzylpenicillin 2-4MU IV q4-6h	If severe: Cefazolin 1gm IV q8h OR Cefuroxime 750mg IV q8h	
	MRSA: *Vancomycin 15-20mg/kg q8-12h; not to exceed 2gm/dose		
Diabetic Foot Infections	Refer to section Surgical Infection – Diabetic Foot Infections		
Gas Gangrene / Myonecrosis / Necrotizing Fasciitis	Refer to section Surgical Infection – Bone and Joint Infections		
Yaws *Treponema pertenue*	Benzathine penicillin G 1.2MU IM single dose	Doxycycline 100mg PO q12h for 15 days OR Azithromycin 30mg/kg (max 2gm) single dose Penicillin allergy: Tetracycline 500mg PO q6h for 15 days OR Erythromycin ethylsuccinate 800mg PO q12h for 15 days	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Cellulitis			
Mild: Common organisms: *Staphylococcus aureus* *Streptococcus pyogenes*	Cephalexin 500mg PO q6h	Amoxicillin-clavulanate 625mg PO q8h OR Cefuroxime 250-500mg PO q12h	Duration: 5-10 days Change to oral once condition improves. Gram negative coverage may be necessary in the following circumstances: ▪ Potential relation of the cellulitis to a decubitus ulcer. ▪ Crepitant cellulitis Prominent skin necrosis/ gangrene. ▪ Location: Perioral, Perirectal cellulitis. Clinical Condition: ▪ Septicaemic shock Suspecting necrotizing fasciitis. ▪ Immunocompromised patients. ▪ Specific exposures*
Moderate: Common organisms: *Staphylococcus aureus* *Streptococcus pyogenes*	Cloxacillin 1-2gm IV q6h	Cefazolin 1-2gm IV q8h	
Severe: Common organisms: *Staphylococcus aureus* *Streptococcus pyogenes*	Ampicillin-sulbactam 3gm IV q6-8h PLUS* Clindamycin 600mg IV q6h (Deescalate once cultures are available/Necrotizing fasciitis ruled out)	Piperacillin-tazobactam 4.5gm IV q6-8h PLUS* Clindamycin 600mg IV q6h (Deescalate once cultures are available/Necrotizing fasciitis ruled out)	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Consider alternative organisms in the following circumstances:			*** Consider adding 3rd Generation Cephalosporin in severe infection.
Dog/cat bite: Common organisms: *Pasteurella multocida* *Capnocytophaga canimorsus*	Amoxicillin-clavulanate 625mg PO q8h		
Cat scratch disease *Bartonella henselae*	Azithromycin 500mg PO on Day 1, then 250mg PO q24h for 4 days		
Human bite: Common organisms: *Eikenella corrodens, anaerobes, Staphylococcus aureus*	Amoxicillin-clavulanate 625mg PO q8h		
Salt water exposure: Common organism: *Vibrio* sp.	Doxycycline 200mg stat then 100mg PO q12h PLUS ***Ceftriaxone 2gm IV q24h		
Fresh or brackish water exposure: Common organisms: *Aeromonas* spp., *Plesiomonas* spp.	Ciprofloxacin 400mg IV q12h OR Ciprofloxacin 750mg PO q12h		
Neutropenic patients: Common organisms: *Pseudomonas aeruginosa,* other Gram negative bacteria	Piperacillin-tazobactam 4.5gm IV q6-8h	Ceftazidime 2gm IV q8h OR Cefepime 2gm IV q8h	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
MRSA	Vancomycin 15-20mg/kg IV q8-12h In severe infections: To load with Vancomycin 25-30mg/kg IV, followed by 15-20mg/kg (actual body weight) IV q8-12h; not exceeding 2gm /dose	Linezolid 600mg IV/PO q12h	****Consider CA-MRSA if: Outbreaks of known CA-MRSA If non-resolving cellulitis.
**** If CA-MRSA suspected	Clindamycin 300-450mg IV/PO q8h OR Doxycycline 100mg PO q12h OR Trimethoprim-sulfamethoxazole 160/800mg PO q12h		
3. Peripheral Phlebitis/Thrombophlebitis			
Common organisms: *Staphylococcus aureus,* Coagulase negative *Staphylococcus* sp., Gram negative rods	Early stage phlebitis: Remove the intravenous cannula		Peripheral intravenous catheters with associated pain, induration, erythema, or exudate should be removed.
	Medium and advanced stage phlebitis or thrombophlebitis: Remove the intravenous cannula and take blood culture Can consider empirical treatment if persistent fever: Cephalexin 500mg PO q6h OR Cloxacillin 1-2gm IV q6h		

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
4. Bed Sore/Pressure Sore/Decubitus Ulcer			
	Local treatment is preferred. If there is surrounding cellulitis/signs of bacteremia/ fasciitis/ surrounding intramuscular abscess/ osteomyelitic changes (OM) changes: Ampicillin-sulbactam 3gm IV q6-8h		
5. Mycobacterial Infections: Refer to National Tuberculosis Management Guidelines 2019			
Hansen's Disease (Leprosy) in HIV infected	Same as in non HIV infected patients		
Non-Tuberculous Mycobacterial Infections			
Mycobacterium marinum	Clarithromycin 500mg PO q12h PLUS Minocycline/Doxycycline 100mg PO q12h Duration: At least 2 months of treatment until clearance	Rifampicin 600mg PO q24h PLUS Ethambutol 15mg/kg PO q24h for 4-6 months, and continue for at least 1 month after lesions have been cleared OR Monotherapy Doxycycline 100mg PO q12h for 1-2 months after lesion clearance (3-4 months)	Often resistant to Isoniazid
Mycobacterium kansasii	Isoniazid 300mg PO q24h PLUS Rifampicin 600mg PO q24h PLUS Ethambutol 15mg/kg PO q24h for 18 months		

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Mycobacterium ulcerans (Buruli ulcer)	Rifampicin 10mg/kg PO q24h PLUS Streptomycin 15mg/kg IM q24h for 8 weeks	Rifampicin 10mg/kg PO q24h PLUS Streptomycin 15mg/kg IM q24h for 4 weeks Followed by: Rifampicin 10mg/kg PO q24h PLUS Clarithromycin 7.5mg/kg PO q12h	Wide surgical excision and debridement are important. Duration: For 4-6 months, and continue for at least 1 month after lesions have been cleared.
Mycobacterium fortuitum	Combination therapy (2 of the following): Clarithromycin 500mg PO q12h OR Doxycycline/Minocycline 100mg PO q12h OR Ciprofloxacin 500-750mg PO q12h PLUS* *Amikacin 15mg/kg IV q24h		*Amikacin: Started for severe infection until clinical improvement (together with 2 oral agents), then continue with just 2 oral agents.
6. Fungal Infections			
Tinea capitis *Trichophyton* *Microsporum*	Griseofulvin 500mg PO q12h for 6 to 12 weeks or longer till fungal cultures are negative OR Terbinafine 250mg PO q24h for 6-8 weeks PLUS 2.5% Selenium sulphide shampoo OR 2% Keteconazole shampoo, 2-3 times per week for 2 weeks	Itraconazole 200mg PO q24h Duration is based on mycological agent: Trichophyton sp : 2-4 weeks Microsporum sp : 8-12 weeks	Other recommendations: ▪ For kerion, Griseofulvin should be considered as first line unless Trichophyton has been cultured as the pathogen. ▪ Duration of treatment may be longer. Contacts of patient may be treated with 2% ketoconazole shampoo 2-3 times per week for 2 weeks. ▪ Surgical excision is to be avoided. ▪ Topical therapy alone is not recommended for the management of tinea capitis. ▪ Consider adding oral prednisolone in selected cases.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Tinea barbae	Same as treatment of Tinea capitis		
Tinea corporis/ Tinea cruris/ Tinea faciei *Trichophyton* *Mircosporum* *Epidermophyton*	Mild infection: Topical imidazoles or allylamines cream/lotion: e.g.: Terbinafine/Butenafine/ Sertaconazole/ Luliconazole Duration: till clinical clearance with additional 2 weeks		Recommendations: ▪ In patients with renal or hepatic impairment, caution should be exercised while prescribing systemic antifungals. ▪ Terbinafine clearance significantly reduced in patient with renal impairment. Other systemic antifungals are preferred in these patients. ▪ Topical Nystatin should not be used in dermatophytosis as they are not effective against dermatophytes.
	Extensive infections or Tinea incognito (Steroid modified) Above PLUS Terbinafine 250mg PO q24h for 2 weeks OR Itraconazole 200mg PO q24h for 2 weeks OR Griseofulvin 500mg PO q12h or q24h for 4-6 weeks		

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Tinea manuum/ Tinea pedis *Trichophyton, Microsporum, Epidermophyton*	Terbinafine 250mg PO q24h for 2-4 weeks OR Itraconazole 200mg PO q24h for 2-4 weeks OR Griseofulvin 500mg PO q12h or q24h for 6-12 weeks Along with TOPICAL Antifungals	Fluconazole 150mg/week PO for 4 weeks	Recommendations: Topical keratolytic agents can be used in conjunction with antifungals for hyperkeratotic type of tinea pedis/manuum. $KMnO_4$ in 1:10,000 dilution wet dressings, applied for 20 min 2-3 times/day, may be helpful if vesiculation or maceration is present. Systemic antifungals can be prescribed as first line treatment in severe moccasin-type tinea pedis or severe recurrent tinea with blisters.
Tinea unguim *Trichophyton, Microsporum, Epidermophyton*	Amorolfine 5% Nail Lacquer weekly application Duration: For 6 months (fingernails) For 12 months (toenails) OR* Pulse Itraconazole 200mg PO q12h for 1 week per month Duration: For 2 months (fingernails) For 3 months (toenails) OR Terbinafine 250mg PO q24h Duration: For 6 weeks (fingernails) For 12 weeks (toenails)	Griseofulvin 500mg PO q12h Duration: For 6 months (fingernails) For 12 months (toenails)	Amorolfine 5% Lacquer is not indicated for children less than 12 years old. Patients with contraindications to systemic agents may consider topical antifungal agents. *Topical can be used in combination with oral therapy. Diagnosis of onychomycosis should be confirmed with KOH preparation, culture, or PAS stain. Empirical treatment is not recommended.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Tinea versicolor *Malassezia furfur* *Pityrosporum orbiculare*	First line: Topical treatment only Selenium Sulphide 2% shampoo Apply to affected areas 5 minutes before bathing OR 2% Ketoconazole shampoo apply to affected areas 5 minutes before bathing <u>For face:</u> Ketoconazole 200mg 2 tabs stat Or Itraconazole 200mg q12h for 5-7 days		Recommendations: Ketroconazole shampoo or Selenium sulphide shampoo can be used once every two to four weeks for approximately six months in order to try and prevent recurrence.
Candidiasis *Candida albicans*	Mild cutaneous candidiasis: Topical Imidazole q12h till clear e.g., Miconazole 2% cream, Clotrimazole 1% cream, Sertaconazole 1% cream		Treatment of sexual partner is advisable in case of recurrent infection. *Itraconazole: Absorption depends on gut acidity. Take capsule with food and acidic beverage (e.g.: Cola drinks). Avoid PPIs and H2 blockers.
	Extensive cutaneous candidiasis: *Itraconazole 200mg PO q24h for 1 week Vulvovaginitis/ Balanoposthitis: Fluconazole 150mg stat dose	Fluconazole 100mg PO q24h for 1 week (in severe and immunocompromised patients)	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Subcutaneous Fungal infections Lymphocutaneous and Cutaneous Sporotrichosis	*Itraconazole 200mg PO q12h until all lesions have resolved (usually for a total of 2-6 months)	For patients not able to tolerate Itraconazole: Terbinafine 250mg PO q12h OR Fluconazole 400-800mg q24h	In some immunocompromised condition such as AIDS, longer treatment may be necessary. Refer to Opportunistic Infections in HIV Patients. *Itraconazole: Absorption depends on gut acidity. Take capsule with food and acidic beverage (e.g.: Cola drinks). Avoid PPIs and H2 blockers. **Avoid azole in pregnancy.
Systemic sporotrichosis (pulmonary, osteoarticular, meningeal, or disseminated sporotrichosis)	Amphotericin B deoxycholate 0.7-1mg/kg q24h for 2 weeks Followed by, *Itraconazole 200mg PO q12-24h for 12 months		
Sporotrichosis in Pregnancy**	Tebinafine 250mg PO q24h	Amphotericin B deoxycholate 0.7-1mg/kg q24h	
Cutaneous fungal infection in immunocompromised patients	Refer to treatment of disseminated fungal infection in immunocompromised/HIV patients Opportunistic Infections in HIV patients		Skin biopsy for histopathologic examination (HPE) and culture are advised before commencing treatment.
Aspergillus spp., *Scedosporium Apiospermum*, and *Fusarium* sp Infection	Voriconazole 6mg/kg IV q12h for 2 doses, followed by 4mg/kg IV q12h	Amphotericin B (deoxycholate) 0.7-1mg/kg q24h OR Amphotericin B (lipid formulation) 3-5mg/kg q24h	
Cryptococcal infections Mild Life threatening	Fluconazole 100-400mg PO q24h Refer to Treatment of disseminated fungal infection in immunocompromised/HIV patients Opportunistic Infections in HIV patients		
Penicilliosis and life threatening acute severe disseminated Histoplasmosis	Refer to Treatment of disseminated fungal infection in immune compromised/HIV patients Opportunistic Infections in HIV patients		

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
7. Viral Infection			
Herpes Simplex Infections	Mild infection: Acyclovir 400mg PO q8h for 5 days	Valacyclovir 1gm PO q12h	
	Severe life threatening: Acyclovir 5-10mg/kg IV q8h for 5 days or until able to take orally, then change to oral		
	Genitalia: Refer to National STI guidelines		
Chickenpox *(Varicella zoster)*	Immunocompetent Acyclovir 800mg PO 5 times daily for 7 days	Valacyclovir 1gm PO q8h	Advisable to start treatment early within 48 hours.
	Immunocompromised Acyclovir 10mg/kg IV q8h for 7 days (change to oral once there is an improvement)		
Herpes zoster	Please refer to varicella zoster treatment above		Topical antiviral treatment is not recommended for Herpes Zoster. Systemic antiviral treatment is recommended for all immunocompromised patient or for immunocompetent patients with following criteria: >50 years of age Have moderate or severe pain Have moderate or severe rash Have non-truncal involvement Advisable to start treatment early within 48-72 hours.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
8. Parasitic Infestation			
Scabies *Sarcoptes scabiei*	Permethrin 5% lotion/ cream apply and leave overnight, clean next day, family treatment, wash clothes PLUS Antihistamines Repeat application after 1 week	Tab. *Ivermectin 6mg 2tabs stat, repeat after 1 week *Not recommended for children <12 years or <15kg	
	In pregnancy/ Immunocompromised: Permethrin 5% lotion/ cream apply and leave for 8 hours Repeat application after 1 week		
Head Lice *Pediculus humanus capitis*	Permethrin 1% lotion apply to scalp for 10 min and wash off OR Malathion 1% shampoo Repeat application after 1 week		
Body Lice/Pubic Lice *Pediculus humanus*	Malathion lotion 0.5% for 8-12 hours and wash off OR Permethrin 1% cream apply to affected area for 10 min and wash off		

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TROPICAL AND OTHER INFECTIONS

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Typhoid fever *Salmonella* Typhi *and Salmonella* Paratyphi			
Uncomplicated enteric fever			
Empirical antibiotic	Cefixime 20 mg/kg/day PO for7-14 days	Azithromycin 1g PO stat on D1 followed by 500mg q24h for total of 5-7 days	Send Blood Culture/ Standard sample 10ml
Fully susceptible	Amoxicillin 1g q8h PO for 7-14 days OR Trimethoprim-sulfamethoxazole DS q12h for 7-14 days	Chloramphenicol 500mg PO q6h for 14 days OR Azithromycin 1g PO stat on D1 followed by 500mg q24h for total of 5-7 days OR Cefixime 20 mg/kg/day PO for7-14 days	Based on C/S reports.
*Multidrug resistant	Ciprofloxacin 500mg PO q12h for 7 days (or 400mg IV q12h)	Cefixime 20 mg/kg/day PO for7-14 days or Azithromycin 20 mg/kg/ day PO for 7 days	Resistant to Chloramphenicol, Amoxicillin and Trimethoprim-sulfamethoxazole
Quinolones resistant	Azithromycin 20 mg/kg/ day PO for 7 days		
Extensively drug resistant	Azithromycin 20 mg/kg/ day PO for 7 days		
Complicated/Severe			

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Empirical antibiotic	Ceftriaxone 50-75 mg/kg/ day IV for 10-14 days		Modify therapy based on C/S data. *Once improvement – switch to oral.
Fully susceptible	Ciprofloxacin 400mg IV q12 for 10-14 days (or 500mg PO q12h)	Ceftriaxone 50-75 mg/kg/ day IV for 10-14 days	
Multidrug resistant	Ciprofloxacin 400mg IV q12 for 10-14 days (or 500mg PO q12h)	Ceftriaxone 50-75 mg/kg/ day IV for 10-14 days	
Quinolones resistant	Ceftriaxone 50-75 mg/kg/ day IV for 10-14 days	Azithromycin 20 mg/kg/ day* IV/PO for 10-14 days	
Extensively drug resistant	Meropenem 60 mg/kg/ day IV for 10-14 days	Azithromycin 20 mg/kg/ day* IV/PO for 10-14 days	
Bowel perforation/ Septic shock/ Mycotic aneurysm	Meropenem 60mg/kg/day IV in 3 divided doses for 10-14days		
Cholera *Vibrio cholerae*			
Tetracycline susceptible	Doxycycline 300mg PO stat	Ciprofloxacin 1gm PO stat	Oral or intravenous hydration is the mainstay of cholera treatment. Antibiotics is recommended for severely ill patients, who are severely or moderately dehydrated and continue to pass a large volume of stool during rehydration treatment, hospitalized patient and moderate to severe cases. *Azithromycin/ Erythromycin: Recommended alternative for pregnant woman.
Tetracycline resistant	*Azithromycin 1gm PO stat	Ciprofloxacin 1gm PO stat	
Scrub typhus *Orientia tsutsugamushi*			
Uncomplicated	Doxycycline 100mg PO q12h for 7 days	*Azithromycin 500mg PO stat	*Azithromycin: Recommended for pregnant woman.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Complicated (ARDS, septic shock, myocarditis, meningoencephalitis, hepatitis, renal failure)	*Azithromycin 500mg IV q24h for 5 days (500mg IV q12h on D1 then q24h)	If not responding to Azithromycin: Rifampicin 600mg PO q24h for 5 days	*Recommend for early IV to Oral switch once symptoms improve or stable.
Brucellosis *Brucella melitensis, Brucella abortus, Brucella suis, Brucella canis*			
Non focal disease	Doxycycline 100mg PO q12h for 6 weeks PLUS Gentamicin 5mg/kg/24h IV for 7 days	Doxycycline 100mg PO q12h for 6 weeks PLUS Rifampicin 600-900mg (15mg/kg) PO q24h for 6 weeks	
Spondylitis/Sacroiliitis	Doxycycline 100mg PO q12h for ≥ 12 weeks PLUS Gentamicin 5mg/kg/24h IV for 7 days PLUS Rifampicin 600-900mg (15mg/kg) PO q24h for ≥ 12 weeks		
Neurobrucellosis	Doxycycline 100mg PO q12h* PLUS Rifampicin 600-900mg(15mg/kg) PO q24h* PLUS Ceftriaxone 2gm IV q12h**		*At least 6 weeks. ** Until CSF returns to normal.
Endocarditis	Rifampicin 600-900mg PO q24h PLUS Doxycycline 100mg PO q12h PLUS Trimethoprim-sulfamethoxazole 160/800mg PO q12h PLUS Gentamicin 5mg/kg/24h IV for 2-4 weeks		Duration: 45 days to 6 months. Surgery needed.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Pregnancy*	Rifampicin 600-900mg (15mg/kg) PO q24h for 6 weeks	Rifampicin 600-900mg (15mg/kg) PO q24h for 4 weeks PLUS Trimethoprim-sulfamethoxazole 160/800mg PO q12h for 4 weeks	*Not much data.
Leptospirosis *Leptospira* spp.			
Mild to Moderate disease	Doxycycline 100mg PO q12h for 5-7 days	Azithromycin 500mg PO q24h for 3 days	
Severe disease (Leptospiral pulmonary syndrome, multiorgan involvement, sepsis)	Ceftriaxone 2gm IV q24h for 7 days (to deescalate to Benzylpenicillin once symptoms improve/ stable) OR Benzylpenicillin 1.5MU IV q6h for 7 days		May consider Methylprednisolone 500-1000mg IV for 3 days if pulmonary hemorrhage present. However, there is insufficient evidence to support the routine use of corticosteroid.
Tetanus			
Causative organism *Clostridium tetani*	Metronidazole 500mg IV q6-8h for 7-10 days PLUS Human Tetanus Immunoglobulin 3000-6000IU IM stat PLUS Tetanus toxoid vaccine IM (initiate age appropriate active immunization at a different site)	Benzylpenicillin 100,000-200,000 unit/kg/24h IV q6h for 7-10 days PLUS Human Tetanus Immunoglobulin 3000-6000IU IM stat PLUS Anti-toxoid vaccine IM (initiate age appropriate active immunization at a different site)	Human Tetanus Immunoglobulin 500IU might be as effective as higher doses of 3,000 to 6,000IU and causes less discomfort. All patients with tetanus should undergo wound debridement to eradicate spores and necrotic tissue.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Melioidosis *Bukholderia pseudomallei*			
Intensive Therapy (Uncomplicated)	Ceftazidime 100-120mg/kg/24h IV q6-8h (in children) Adults: 2gm IV q6h for 10-14 days PLUS *Trimethoprim-sulfamethoxazole (Dose as per eradication therapy below)		*Add on Trimethoprim-sulfamethoxazole in eye, neurologic, testicular, prostatic, pericardium, bone and joint melioidosis. Drainage of abscesses should be attempted wherever appropriate such as pericardial and prostatic abscess, and empyema. Duration of intensive therapy: ▪ Skin, bacteraemia with no foci, mild pneumonia: 2 weeks ▪ Complicated pneumonia, prostatic, deep-seated foci, septic arthritis: 4 weeks ▪ Osteomyelitis: 6 weeks Neurologic/CNS: 8 weeks To use clinical judgement to guide prolongation of intensive phase if improvement is slow/persistent bacteraemia.
Intensive Therapy (Complicated) (Severe melioidosis or neuromelioidosis)	Meropenem 75mg/kg/24h IV q8h (usual dose: 1gm IV q8h; if neurologic, 2gm IV q8h) OR Imipenem 50mg/kg/24h IV q6h (usual dose: 500-1000mg q6h) PLUS *Trimethoprim-sulfamethoxazole (Dose as per eradication therapy below)		
Eradication/Maintenance Therapy	Trimethoprim-sulfamethoxazole <40 kg: 160/800mg PO q12h 40-60kg: 240/1200mg PO q12h >60kg: 320/1600mg PO q12h	For children < 8 years Amoxicillin-clavulanate <60kg: 1250mg (2 tabs of 625mg) PO q8h >60kg: 1875mg (3 tabs of 625mg) PO q8h	Duration of eradication therapy: Osteomyelitis, Neurologic/CNS: 24 weeks Others: minimum 12 weeks
Malaria : Refer to National Guidelines (National Malaria Treatment Protocol 2019)			
SEXUALLY TRANSMITTED INFECTIONS: **Refer to National Guidelines (National Guidelines on Management of Sexually Transmitted Infections 2022)**			
TUBERCULOSIS IN ADULTS: **Refer to National Guidelines (National Tuberculosis Management Guidelines 2019)**			

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HIV INFECTION IN ADULTS

Initiation of Anti-Retroviral Therapy (ART)

As per revised WHO guideline, all People Living with HIV (PLHIV) should be put on ART as soon as they are found positive regardless of CD4 count and clinical stage. This includes all pregnant women irrespective of stage of pregnancy. The basic principle of ART is to use a triple drug fixed dose combination (FDC) from two different classes. In line with the WHO recommendation to use Dolutegravir (DTG) and the findings from the national HIV pretreatment drug resistance (PDR) conducted in 2016 showing more than 10% resistance to NNRTIs, Nepal decided to transition to a DTG-containing regimen as first line ART. Neural tube defects may be associated with use of DTG at conception. Therefore, women of childbearing age or any pregnant woman should receive full information about the risk and benefit of ART and medical guidance that is appropriate to her situation.

Refer to National Guidelines

OPPORTUNISTIC INFECTIONS IN HIV INFECTED PATIENTS

Various co-infections, comorbidities and other health conditions are common among PLHIV. Opportunistic infections (OI) are defined as infections that are more frequent or more severe because of immunosuppression in HIV-infected patients. These are the most important cause of morbidity and mortality in this population.

Cotrimoxazole Prevention Therapy (CPT):
CPT is a cost-effective intervention effective against following infections in HIV positive patients:

- Common bacterial infections, including bacterial pneumonia, septicaemia.
- Diarrhoea, including that caused by Cystoisospora belli.
- Malaria.
- Toxoplasmosis.
- Pneumocystis pneumonia (PCP, primary or recurrent).

CPT for adults should be started for:

- HIV-infected with CD4 count <350 cells/mm3.
- All adults with severe and advanced HIV disease (WHO stage 3 or 4).

The regimen is:

- One DS tablets (160 TMP/800 SMX) every day or
- Two SS tablets (80 TMP/400 SMX) every day

CPT must be discontinued in the following situation:
Severe cutaneous reaction, such as Steven-Johnson syndrome, renal and /or hepatic failure and severe hematological toxicity.

Timing of CPT:

- Cotrimoxazole and ART should not be started at the same time.
- Cotrimoxazole should be started and after 2 weeks ART should be initiated if the individual is stable on Cotrimoxazole and has no rash.

Alternative to Cotrimoxazole
In patients intolerant to Cotrimoxazole, Dapsone 100mg once daily is the first alternative medicine.

Tuberculosis

Among PLHIV, TB is the most frequent life-threatening OIs and a leading cause of death accounting for about a third of all mortality. ART should be provided to all PLHIV with active TB disease.

HIV care setting should implement WHO Three I's strategy:

- Intensified TB case-finding.
- Isoniazid Prevention Therapy (IPT).
- Infection control at all clinical encounters.

Isoniazid Prevention Therapy (IPT)

Preventive therapy against TB is the use of anti-TB drugs in individuals with latent *Mycobacterium tuberculosis* infection regardless of CD4 cell count or ART status in order to prevent progression to active tuberculosis. IPT should only be used in patients whom active tuberculosis has been excluded, active patient follow-up is possible and high-level adherence can be attained and should be provided for 6 months. Cotrimoxazole and ART should not be started at the same time as IPT.

Regimen:

Isoniazid 300mg daily for 6 months. Vitamin B6 25 mg/day (pyridoxine) should be given together with IPT for 6 months.

TB management among PLHIV

- All HIV-infected patients with diagnosis of active TB should be put on TB treatment immediately.
- ATT regimen is same for PLHIV as for non-HIV patients.
- ART should be started in all TB patients, including those with drug resistant TB, irrespective of CD4 count.
- Anti-tubercular treatment should be initiated first, followed by ART as soon as possible within the first 8 weeks of treatment (2 weeks, if CD4 <50 cells).
- In all HIV-infected pregnant women with active TB, ART should be started as early as feasible, both for maternal health and for elimination of vertical transmission of HIV.

(For ART durg choice in TB co-infection refer to National HIV Testing and Treatment Guideline 2020)

Cryptococcal infection

Causative organism

Cryptococcus neoformans

The incidence of cryptococcal meningitis increases as the CD4 count falls below 100 cells/ml and most cases occurs when CD4 count falls below 50 cells/ml. Mostly they present as sub-acute meningitis or meningoencephalitis with the following symptoms

- Fever.
- Malaise.
- Headache.
- Neck stiffness and photophobia (i.e. meningeal symptoms in 25-30%).
- Altered mental status/confusion, personality changes, memory loss.
- Impaired consciousness and coma.
- Focal signs, including cranial nerve palsy.

Infection/Condition and Likely Organism	Treatment		Comments
	Preferred therapy	Alternative therapy	
Induction phase	Cryptococcal meningitis, non CNS extrapulmonary cryptococcosis and diffuse pulmonary disease Amphotericin B IV (0.7-1mg/kg/day) PLUS Flucytosine PO 25mg/kg q6h Non CNS cryptococcosis with mild to moderate symptoms or focal pulmonary cryptococcosis: Fluconazole: 400mg/day (800mg on day 1)	<u>In decreasing order of efficacy</u> <u>Preferred alternative:</u> Amphotericin B IV 0.7-1mg/kg/day PLUS Fluconazole 800mg/day IV or PO <u>Option 2 (less efficient)</u> 5FC (Flucytosine)25mg/kg q6h PLUS Fluconazole 800mg/day IV or PO <u>Option 3 (Least efficient)</u> Fluconazole 1200mg/day	Amphotericin B therapy should be administered in qualified health facilities capable of close clinical and laboratory monitoring. Dosage of Amphotericin B and Flucytosine should be adjusted to creatinine clearance rate. Opening CSF pressure should always be measured at initiation of treatment and when lumbar puncture is performed. Repeat LP are essential to effectively manage raised intra-cranial pressure. Corticosteroids and mannitol are ineffective to decrease intracranial pressure in Cryptococcus meningitis.
Consolidation phase 8 week Followed by maintenance phase	Fluconazole 400mg/day (800mg on day 1)	If induction phase with Fluconazole 1200mg/day: Consolidation with Fluconazole 800mg/day	
Maintenance Phase <u>At least 12 months:</u> Fluconazole can be stopped in patients who have been on ART and have CD4 consistently above100 cell/mm^3 for at least 6 months. If there is fall in CD4 count, Fluconazole should be restarted again.	Fluconazole 200mg/day		

Infection/Condition and Likely Organism	Treatment		Comments
	Preferred therapy	Alternative therapy	
Pneumocystis jirovecii (carinii*) interstitial pneumonia (PJP/PCP)			
Treatment	Trimethoprim-sulfamethoxazole 15-20mg/kg/day (TMP component) IV/PO in 3 to 4 divided doses	For mild to moderate cases: (PO_2 70-80mmHg) Clindamycin 600mg IV/PO q8h PLUS Primaquine 30mg (base) PO q24h OR Dapsone 100mg PO q24h PLUS Trimethoprim 15mg/kg/day PO in 3-4 divided doses For severe cases: (PO_2 < 70mmHg) Pentamidine 4mg/kg/day IV (in 1 pint 5% dextrose or Normal saline (NS) run over 1-2 hours) OR Clindamycin 600mg IV q6h or 900mg IV q8h PLUS Primaquine 30mg (base) PO q24h	Duration 21 days Patients with severe disease should receive corticosteroids as soon as possible (within 72 hours of starting PCP treatment). Prednisolone dose: 40mg PO q12h for 5 days, then 40mg PO q24h for 5 days, then 20mg PO q24h for 11 days (Total duration is 21 days) Trimethoprim-sulfamethoxazole and Clindamycin has excellent bioavailability, may switch to PO after clinical improvement. Patients given dapsone or primaquine should be tested for G6PD deficiency.

Infection/Condition and Likely Organism	Treatment		Comments
	Preferred therapy	Alternative therapy	
Prophylaxis (Primary and secondary) <u>Indications:</u> CD4 count <200 cells/µl CD4 count 200-250 Cells/µl if ART cannot be initiated	Trimethoprim-sulfamethoxazole (80/400mg)	Dapsone 100mg PO q24h OR Aerosolized Pentamidine 300mg monthly via ultrasonic nebulizer	Discontinuation: Can consider when CD4 100-200 cells/µL if HIV RNA is suppressed for 3-6 months with ART. Restarting prophylaxis: CD4 count falls to <200 cells/µL or PCP occurs at a CD4 > 200 cells/µL (lifelong prophylaxis should be considered). Patients receiving Sulfadiazine-Pyrimethamine or Sulfadoxine-Pyrimethamine for treatment or suppression of toxoplasmosis do not require additional prophylaxis for PCP.
Toxoplasma gondii Encephalitis			
Acute Infection (up to 97% patients are Toxoplasma gondii IgG positive)	Trimethoprim-sulfamethoxazole 10mg/kg/day (TMP component) IV/PO in 2 divided doses	*Pyrimethamine 200mg PO loading dose followed by Pyrimethamine: • 50mg PO q24h (if BW≤60kg) • 75mg PO q24h (if BW>60kg) PLUS Folinic acid 10-25mg IV/PO q24h PLUS Clindamycin 600mg IV/PO q6h OR *Sulfadiazine 1gm PO q6h	Duration: At least 6 weeks Adjunctive corticosteroids (E.g. dexamethasone) should be administered when clinically indicated to treat mass effect associated with focal lesions or associated oedema but should be discontinued as soon as clinically feasible. *Pyrimethamine (Sulfadoxine-Pyrimethamine) can be used interchangeably depending on availability.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Suppressive/ Maintenance	Trimethoprim-sulfamethoxazole (80/400mg) 2 tablets PO q12h	Dapsone 100mg PO q24h OR Clindamycin 600mg PO q8h PLUS Pyrimethamine 50mg PO twice-weekly PLUS Folinic acid 10-25mg PO twice-weekly OR Sulfadiazine 0.5-1gm PO q6h PLUS Pyrimethamine 25-50mg PO q24h PLUS Folinic acid 10-25mg PO q24h	Discontinuation: Consider when CD4>200 cells/µL if HIV RNA is suppressed for 6 months with ART.
Primary Prophylaxis Indications: Toxoplasma gondii IgG positive with CD4<100	Trimethoprim-sulfamethoxazole (80/400mg) 2 tablets PO q24h	Dapsone 50mg PO q24h PLUS Pyrimethamine 50mg PO once weekly PLUS Folinic acid 25mg PO once weekly OR Dapsone 200mg PO once weekly PLUS Pyrimethamine 75mg PO once weekly PLUS Folinic Acid 25mg PO once weekly	Discontinuation: CD4>200 cells/µL for > 3months CD4>100 cells/µL, if HIV viral load suppressed for 3 to 6 months

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Mucocutaneous Candidiasis			
Oropharyngeal (oral thrush)	Nystatin suspension 500,000units PO 4-5 times daily OR Fluconazole 100mg PO q24h	*Itraconazole 200mg PO q24h	Duration: 7-14 days Chronic suppressive therapy is usually not recommended. *Itraconazole: Absorption depends on gut acidity. Take capsule with food and acidic beverage (e.g.: Cola drinks). Avoid PPIs and H2 blockers. Significant drug interaction with p450 enzyme inducers (e.g.: Rifampicin). Consider fluconazole if in doubt.
Oesophageal	Fluconazole 200-400mg PO/IV q24h	Itraconazole 200mg PO q24h OR Amphotericin B deoxycholate 0.6mg/kg IV q24h	Duration: 14-21 days Candidiasis is the most common cause of oesophagitis with HIV infection, but CMV, HSV and aphthous ulcerations can present with similar complaints. Endoscopy required with unusual presentations or lack of response to azole within several days.
Vulvovaginal	Refer to Obstetrics and Gynaecology Infections		
Histoplasmosis *(Histoplasma capsulatum)*			
Moderate to severe disseminated disease or CNS involvement	Induction therapy *Amphotericin B deoxycholate 0.7-1.0mg/kg IV q24h for at least 2 weeks Followed by Maintenance therapy Itraconazole 200mg PO q8h for 3 days, then 200mg q12h for at least 12 months		*The lipid formulations of amphotericin B may be used instead if available. All the triazole antifungals have the potential to interact with certain ARV agents and other anti-infective agents.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Mild disseminated disease (Blood culture positive but patient is asymptomatic)	Induction and maintenance therapy *Itraconazole 200mg PO q8h for 3 days, then 200mg POq12h	For patients intolerant to Itraconazole: Fluconazole 800mg PO q24h OR Voriconazole 400mg PO q12h on day 1, then 200mg PO q12h	Duration: At least 12 months *Itraconazole: Absorption depends on gut acidity. Take capsule with food and acidic beverage (e.g.: Cola drinks). Avoid PPIs and H2 blockers.
Chronic Suppressive therapy (Secondary prophylaxis) <u>Indication:</u> Severe disseminated or CNS infection after completion of at least 12 months of treatment Relapsed despite appropriate initial therapy	*Itraconazole 200mg PO q24h	Fluconazole 400mg PO q24h	Discontinuation: Received azole for > 1year, AND Negative fungal blood cultures, AND CD4 count > 150 cells/µL for ≥6 months on ART Restarting secondary prophylaxis: CD4 count < 150 cells/µL *Itraconazole: Absorption depends on gut acidity. Take capsule with food and acidic beverage (e.g. Cola drinks). Avoid PPIs and H2 blockers.
Penicilliosis *(Penicillium/Talaromyces marneffei)*			
Acute infection (Severely-ill patients)	Induction therapy *Amphotericin B deoxycholate 0.6-0.7mg/kg IV for 2 weeks Must be followed by consolidation therapy	Voriconazole 6mg/kg IV q12h on day 1, then 200mg PO q12h for at least 3 days Must be followed by consolidation therapy.	*The lipid formulations of amphotericin B may be used instead if available. All the triazole antifungals have the potential to interact with certain ARV agents and other anti-infective agents. **Itraconazole: Absorption depends on gut acidity: Capsule: Take with food and acidic beverage (e.g.: cola drinks).
	Consolidation therapy **Itraconazole 200mg PO q12h for 10 weeks Must be followed by maintenance therapy	Fluconazole 400mg PO q12h for 10 weeks Must be followed by maintenance therapy	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Acute infection (Mild disease)	**Itraconazole 200mg PO q12h for at least 8-12 weeks Must be followed by maintenance therapy	Fluconazole 400mg PO q12h for at least 8-12 weeks Must be followed by maintenance therapy	Liquid preparation: Take on empty stomach Avoid PPIs and H2 blockers.
Maintenance therapy/ Secondary prophylaxis	**Itraconazole 200mg PO q24h	Fluconazole 400mg PO q24h	Discontinuation: CD4 count>100 cells/µL for ≥6months on ART
Mycobacterium Avium Complex (MAC) Disease			
Treatment	Clarithromycin 500mg PO q12h PLUS Ethambutol 15mg/kg PO q24h **PLUS 3rd/4th drug: Amikacin 10-15gm/kg IV q24h OR Streptomycin 15mg/kg IM q24h OR Levofloxacin 500mg PO q24h OR Ciprofloxacin 500-750mg PO q12h	*Azithromycin 500mg PO q24h PLUS Ethambutol 15mg/kg PO q24h **PLUS 3rd/4th drug: Amikacin 10-15gm/kg IV q24h OR Streptomycin 15mg/kg IM q24h OR Levofloxacin 500mg PO q24h OR Ciprofloxacin 500-750mg PO q12h	Duration: At least 12 months. * Azithromycin: use if drug interaction or intolerance precludes the use of Clarithromycin. **Addition of 3rd/4th drug should be considered for patients with disseminated disease, CD4 count <50 cells/µL or in the absence of effective ART. Discontinuation: Consider if patient is on ART and viral load is suppressed, CD4 > 100 cells/µL >6 months, asymptomatic or MAC, and has completed > 12 months of therapy.
Maintenance/ Secondary Prophylaxis	Same as the treatment regimen		Restarting secondary prophylaxis: CD4 < 100 cells/µL again.
Primary Prophylaxis Indications: CD4 < 50 cells/µL Ruled out active MAC and TB	Azithromycin 1250mg PO once weekly	Clarithromycin 500mg PO q12h	Discontinuation: Consider if patient is on ART AND Viral load is suppressed, CD4 > 100 cells/µL ≥ 3 months

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Cytomegalovirus (CMV) Disease			
Treatment (CMV Retinitis) Immediate Sight Threatening Lesions (Adjacent to the Optic Nerve or Fovea)	Intravitreal injections of Ganciclovir (2mg/injection) biweekly until scarring PLUS Ganciclovir 5mg/kg IV q12h for OR Valganciclovir 900mg PO q12h Followed by maintenance	Intravitreal injections of Foscarnet (2mg/injection) biweekly until scarring PLUS Ganciclovir 5mg/kg IV q12h for OR Valganciclovir 900mg PO q12h Followed by maintenance	Duration: 14-21 days. Immune recovery is essential for successful treatment. Start ART within 2 weeks if possible.
Treatment (CMV Retinitis) (For Small Peripheral Lesions)	Ganciclovir 5mg/kg IV q12h Followed by maintenance	Valganciclovir 900mg PO q12h Followed by maintenance	
Treatment (Extraocular CMV disease) (Oesophagitis, colitis, interstitial pneumonitis, neurological disease)	Ganciclovir 5mg/kg IV q12h Followed by maintenance	May consider switch to Valganciclovir 900mg PO q12h once patient tolerate orally (in CMV oesophagitis and colitis only) Followed by maintenance	Duration: 21-42 days or until signs and symptoms have been resolved. Immune recovery is essential for successful treatment. Start ART within 2 weeks if possible.
Maintenance/ Secondary prophylaxis (CD3 <100 cells/µL)	Ganciclovir 5mg/kg IV q24h 5-7 times weekly	Valganciclovir 900mg PO q24h	Discontinuation: Consider if patient is on ART and viral load well suppressed, CD4 > 100 cells/µL ≥ 3 months after 3-6 months of CMV treatment. Maintenance therapy is generally not necessary; ART offers best hope for prevention of relapses.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Herpes Simplex Virus (HSV) Infections			
Refer to other sections - Oral infection, CNS infection and National STI guidelines			
Varicella-Zoster Virus (VZV Diseases)			
Refer to Skin and Soft Tissue Infection			
Bacterial Enteric Infections			
Salmonellosis Salmonella non-typhi	Ampicillin 2gm IV q4-6h OR Trimethoprim-sulfamethoxazole (80/400mg) 2 tablets PO or 2 ampoules IV q12h	Ciprofloxacin 500-750mg PO or 400mg IV q12h OR Ceftriaxone 2gm IV q24h	Susceptibility profile may help guide final choice. Duration: IF CD4≥200: 7-14 days. If CD4<200 and with bacteraemia: 6 weeks. Longer course with debridement and drainage needed for persistent bacteraemia or metastatic disease.
PML (Progressive Multifocal Leucoencephalopathy)			
Polyoma virus JC virus (JCV)	No effective therapy exists		With ART, some patients improve and others stabilize. Few may deteriorate due to immune reconstitution.
Isospora belli Infection			
Initial Therapy	Trimethoprim-sulfamethoxazole (160/800mg) IV/PO q6h	Pyrimethamine 50-75mg PO q24h PLUS Folinic acid 10-25mg PO q24h OR Ciprofloxacin 500mg PO q12h	Duration: 10 Days.
Cryptosporidiosis			
Cryptosporidium spp.	Symptomatic treatment of dirrhoea For severe or persistent symptoms Nitazoxanide 500mg-1g PO q12h for 2-8 weeks OR Paromomycin 500 mg three times daily for one week		Effective ART (to increase CD4 > 100 cells/μL) can result in complete, sustained clinical, microbiological and histologic resolution.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Microsporidiosis			
Microsporidium spp.	Albendazole 400mg PO q12h for 2-4 weeks PLUS Symptomatic treatment of diarrhea (The best treatment option is ART and fluid support)		Effective ART (to increase CD4 > 100 cells/μL) can result in complete, sustained clinical, microbiological and histologic resolution.
Syphilis (*Treponema pallidum* Infection)			
Refer to National STI guidelines			
Bartonellosis (*Bartonella henselae*)			
For Bacillary Angiomatosis, Peliosis hepatis, Bacteraemia, and Osteomyelitis	Doxycycline 100mg PO q12h OR Erythromycin 500mg PO/IV q6h	Azithromycin 500mg PO q24h OR Clarithromycin 500mg PO q12h	Duration: At least 3 months. If relapse occurs after initial (>3 month) Course of therapy, long-term suppression with Doxycycline or a macrolide is recommended as long as CD4 < 200 cells/μL.
Other Severe Infection (or CNS involvement)	Doxycycline 100mg PO/IV q12h PLUS* Rifampicin 300mg PO/IV q12h OR Erythromycin 500mg PO/IV q6h PLUS* Rifampicin 300mg PO/IV q12h		

References:

1. Consolidated guidelines on HIV prevention, testing, treatment, service delivery and monitoring: recommendations for a public health approach. July 2021.
2. European AIDS Clinical Society Guidelines.
3. Guidelines for the Prevention and Treatment of Opportunistic Infections in HIV-Infected Adults and Adolescents by panel members of National Institutes of Health (NIH), the Centers for Disease Control and Prevention (CDC) and HIV Medicine Association of the Infectious Disease Society of America (HIVMA/IDSA) 2017.
4. National Antimicrobial Guideline, Third Edition. Petaling Jaya: Ministry of Health, Malaysia; 2019.
5. National HIV testing and Treatment. Guideline 2020. Government of Nepal. Ministry of Health. National Centre for AIDS and STD control.
6. The BMJ Best Practices: HIV-related opportunistic infections.
7. The BMJ Best Practices: HIV-related opportunistic infections.
8. The John Hopkins POC-IT ABX Guide 2000-2017.
9. The Sanford Guide to Antimicrobial Therapy (updated 16/02/2018).
10. WHO Guidelines for the Diagnosis, Prevention and Management of Cryptococcal Disease in HIV-Infected Adults, Adolescents and Children, March 2018. (Supplement to the 2016 Consolidated Guidelines on the Use of Antiretroviral Drugs for Treating and Preventing HIV Infection).

INFECTIONS IN PEADIATRIC AGE GROUP

RESPIRATORY TRACT INFECTION

<table>
<tr><th rowspan="2">Infection/Condition and Likely Organism</th><th colspan="2">Suggested Treatment</th><th rowspan="2">Comments</th></tr>
<tr><th>Preferred</th><th>Alternative</th></tr>
<tr><td colspan="4">Pneumonia (for children 2 -59 months)
Causative organism
Streptococcus pneumoniae</td></tr>
<tr><td colspan="4">After revision of Integrated Management of Childhood Illness guideline, revised guideline classifies pneumonia in children below 5 years into following category and plans the treatment for each one of them as follows
<table>
<tr><td rowspan="3">Children aged 2-59 months with cough and or difficulty in breathing</td><td>Cough and cold
No pneumonia</td><td>Home care</td></tr>
<tr><td>Fast breathing or chest indrawing
Pneumonia</td><td>Oral Amoxicillin and home care advice</td></tr>
<tr><td>General danger signs*
Severe or very severe pneumonia</td><td>First dose antibiotic, then refer/ admit for injectable antibiotics/ Supportive therapy</td></tr>
<tr><td colspan="3">*Not able to drink, persistent vomiting, convulsion, lethargic/unconscious, stridor in a calm child, severe malnutrition.</td></tr>
</table></td></tr>
<tr><td>Children aged 2-59 months with fast breathing Pneumonia with no chest indrawing or general danger signs</td><td>Amoxicillin 40mg/kg/dose PO q12h for 5 days</td><td></td><td></td></tr>
<tr><td>Children aged 2-59 months with Pneumonia with chest indrawing</td><td>Amoxicillin 40mg/kg/dose PO q12h for 5 days</td><td></td><td></td></tr>
<tr><td>Children 2-59 months with severe Pneumonia</td><td>Ampicillin 50mg/kg/dose IV q6h for at least 5 days
OR
Benzyl penicillin 50,000U/ kg IM/IV q6h for at least 5 days
PLUS
Gentamicin 7.5mg/kg IM/ IV q24h for at least 5 days</td><td>Ceftriaxone 100mg/kg once then 50mg/kg IV q24h for at least 5 days</td><td></td></tr>
</table>

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Pneumonia (for children >5 years)			
Outpatient Causative organism *Streptococcus pneumoniae* *Haemophilus influenzae* type b Atypical pneumonia *Mycoplasma pneumoniae* *Chlamydia pneumoniae*	Amoxicillin 40mg/kg/dose q12h for 5-7 days If not vaccinated for *Streptococcus pneumoniae* or *Hemophilus influenzae* Amoxicillin-clavulanate 30mg/kg/dose PO q8h PLUS If Atypical pneumonia is considered Azithromycin 10mg/kg PO once then 5mg/kg q24h for 4 days (or 10mg/kg/day q24h for 3 days)	Penicillin allergic Clindamycin 13mg/kg/dose IV q8h for 5-7 days OR Cefuroxime 15mg/kg/dose PO q8h for 5-7 days If not vaccinated for *Streptococcus pneumoniae* or *Haemophilus influenzae* and allergic to penicillin Levofloxacin 10mg/kg/dose PO q24h for 5 days	
Inpatient (uncomplicated or simple pleural effusion) Causative organism *Streptococcus pneumoniae* *Haemophilus influenzae* type b Atypical pneumonia *Mycoplasma pneumoniae* *Chlamydia pneumoniae*	Ampicillin 50mg/kg/dose IV q6h (max: 2 g/dose) 5-7 days Penicillin allergic Clindamycin 13mg/kg/dose IV q8h (max:900mg/dose) If not vaccinated for *Streptococcus pneumoniae* or *Haemophilus influenzae* or failed high dose Amoxicillin Ceftriaxone 100mg/kg once then 50mg/kg/dose IV q24h (max: 2 gm/dose) Alternative to Ceftriaxone if severe Penicillin/Cephalosporin allergy Levofloxacin10mg/kg/dose daily (max: 750mg/dose) PLUS If atypical pneumonia is to be considered Azithromycin 10mg/kg PO once then 5mg/kg q24h for 4 days (or 10mg/kg/day q24h for 3 days)	Ceftriaxone 100mg/kg once then 50mg/kg/dose IV q24h (max: 2gm/dose)	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Complicated and/or severe pneumonia (empyema, abscess, necrosis, pneumonia requiring ICU care including those with severe sepsis) Causative organisms *Streptococcus pneumoniae* *Staphylococcus aureus* *Streptococcus pyogenes* Anaerobes *Haemophilus influenzae* type b Atypical pneumonia *Mycoplasma pneumoniae* *Chlamydia pneumoniae*	Ceftriaxone 100mg/kg once then 50mg/kg/dose IV q12h (max: 2g/dose) PLUS Vancomycin 15mg/kg/dose IV q6h Severe penicillin/cephalosporin allergy Levofloxacin 10mg/kg/dose IV/PO q24h (max: 750mg) PLUS Vancomycin 15mg/kg/dose IV q6h PLUS If abscess or necrotizing pneumonia Metronidazole 10mg/kg/dose IV/PO q8h (max: 500mg/dose) to either of the regimen PLUS If Atypical pneumonia is considered Azithromycin 10mg/kg PO/IV once then 5mg/kg q24h for 4 days (or 10mg/kg/day q24h for 3 days)		Duration 7 days from afebrile period. Longer duration may be required for empyema and abscess.

References:

1. Bradley JS et al. The Management of Community-Acquired Pneumonia in infants and children older than 3 months of age: Clinical Practice Guideline by Pediatric Infectious Diseases Society And Infectious Diseases Society of America. Clin Infect Dis. 2011 Oct:53(7):616-30.
2. Revised WHO Classification and treatment of childhood pneumonia at health facilities. WHO 2014.

CARDIOVASCULAR SYSTEM INFECTIONS

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Acute Myocarditis			
Viral (Most common cause) Enteroviruses (Coxsackie and EV71) Adenovirus Influenza HIV	Treatment mainly supportive.		For severe HFMD with cardiopulmonary failure stage, IVIG may be considered
Acute pericarditis			
Viral (Most common cause) Bacterial: *Staphylococcus aureus* *Haemophilus influenzae* *Salmonella* spp.	Treatment mainly supportive. Empiric for purulent pericarditis: Cloxacillin 200mg/kg/day IV in 4-6 divided doses PLUS Cefotaxime 200-300mg/kg/day IV in 4 divided doses	Penicillin allergy: Cefazolin 100mg/kg/day IV in 3 divided doses (max. 6gm/day) 2nd line Vancomycin 60mg/kg/day IV in 2-3 divided doses (max. 2gm/day)	Pericardial fluid Gram Stain (G/S) and C&S. Consider surgical drainage for tamponade, pre-tamponade and ineffective conservative management. Duration of therapy: 4 weeks
Infective Endocarditis			
Empirical therapy for infective endocarditis			
Community-acquired organisms: *Streptococcus, Enterococcus* HACEK Gram-negative organisms	Ampicillin 200-300mg/kg/day in 4-6 divided doses PLUS Gentamicin 3mg/kg q24h	PLUS* *Cloxacillin 200mg/kg/day IV in 4-6 divided doses	*For acute presentation, need to cover for MSSA since Streptococcus, Enterococcus, HACEK presentations are usually sub-acute.
Healthcare-associated organisms: MRSA Non-HACEK Gram-negative organisms *Enterococcus* spp.	Vancomycin 60mg/kg/day IV in 2-3 divided doses (max. 2gm/day) PLUS Gentamicin 3mg/kg q24h PLUS* Rifampicin 20mg/kg/day in 3 divided doses (max. 900mg/day)		*Rifampicin is ONLY for prosthetic valve AND added after 3-5 days after Vancomycin and Gentamicin. If non-HACEK Gram-negative organism like *Pseudomonas* spp. is suspected, add Cefepime 50mg/kg/dose IV q8h until cultures are known.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Specific Organisms:			
Infective Endocarditis *(Streptococcus viridans)*			
Strains fully susceptible to penicillin (MIC<0.125mg/l)	Benzylpenicillin 200,000-300,000 units/kg/day IV in 4-6 divided doses (up to 12-18MU/day)	Ampicillin 300mg/kg/day IV in 4-6 divided doses (max. 12gm/day) OR Ceftriaxone 100mg/kg/day IV in 1-2 divided doses (max. 4gm/day) OR Penicillin allergy **Vancomycin 40mg/kg/day IV in 2-3 divided doses (max. 2gm/ day)	Duration: 4 weeks for native valve 6 weeks for prosthetic valve Vancomycin dose adjusted for trough concentration of 10-15mg/kg. *Vancomycin therapy is recommended only for patients with immediate type penicillin hypersensitivity. For this (MIC>0.125mg/l): Antibiotic of choice is either penicillin with Gentamicin or Ceftriaxone with Gentamicin.
Strains with MIC>0.125 mg/l to 2 mg/l	PLUS Gentamicin 3mg/kg q24h for 2 weeks (add to first line regimen of Penicillin/Ceftriaxone)		
Infective Endocarditis *(Enterococcus* spp.*)*			
Penicillin-susceptible (MIC≤ 8mg/l)	Ampicillin 200-300mg/kg/day IV in 4-6 divided doses for *4-6 weeks PLUS Gentamicin 3mg/kg q24h for *2-6 weeks	Ampicillin 200-300mg/kg/day IV in 4-6 equally divided doses PLUS Ceftriaxone 100mg/kg/day IV in 1-2 divided doses	*Duration: If symptoms less than 3 months and native valve: Ampicillin for 4 weeks and Gentamicin for 2 weeks. If symptoms more than 3 months: Ampicillin and Gentamicin for 6 weeks. Ampicillin plus Ceftriaxone alone since enterococcus is intrinsically resistant to this drug. This combination is NOT ACTIVE against *Enterococcus faecium*. **Maximum dose of Vancomycin: 2gm/day unless not able to achieve therapeutic range. Aim for serum trough of 10-20mg/l.
Sensitive to penicillin and Vancomycin but high-level resistance to Gentamicin (MIC>500mg/l)	Ampicillin 300mg/kg/day IV in 4-6 divided doses PLUS Ceftriaxone 100mg/kg/day IV in 1-2 divided doses (max. 4gm/day) Duration: 6 weeks		
Resistant to penicillin but susceptible to Vancomycin and Gentamicin	**Vancomycin 40mg/kg/day IV in 2-3 divided doses PLUS Gentamicin 3mg/kg q24h Duration: 6 weeks		

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Infective Endocarditis *(Staphylococcus aureus)*			
MSSA (left-sided)	Cloxacillin 200-300mg/kg/day IV in 4-6 divided doses for 4-6 weeks	Penicillin allergy Cefazolin 100mg/kg/day IV in 3 divided doses for 4-6 weeks OR Vancomycin 60mg/kg/day IV in 2-3 divided doses for 4-6 weeks	If allergy to penicillin but not immediate type hypersensitivity, use Cefazolin. Methicillin-susceptible (right sided): Can shorten duration to 2 weeks if: good response no metastatic sites no cardiac or extracardiac complications size of vegetation less than 20mm.
MSSA (right-sided)	Cloxacillin 200-300mg/kg/day IV in 4-6 divided doses for 4 weeks		
MRSA (left and right)	Vancomycin 60mg/kg/day IV in 2-3 divided doses (max. 2gm/day) for 4-6 weeks	Daptomycin 10mg/kg IV daily for 4-6 weeks	Daptomycin is superior to Vancomycin for MRSA bacteremia with MIC>1mg/l.
MSSA (prosthetic valve)	Cloxacillin 200-300mg/kg/day IV in 4-6 divided doses for ≥6 weeks PLUS Gentamicin 3mg/kg q24h for 2 weeks PLUS *Rifampicin 20mg/kg/day PO in 3 divided doses for ≥ 6 weeks		*Rifampicin has better penetration but to protect against development of resistance, use only after 3-5 days of Cloxacillin and/or bacteremia has been cleared. MRSA (prosthetic valve): Vancomycin * Rifampicin for 6 weeks or more.
MRSA (prosthetic valve)	Vancomycin 60mg/kg/day in 2-3 divided doses ≥ 6 weeks PLUS Gentamicin 3mg/kg q24h for 2 weeks PLUS *Rifampicin 20mg/kg/day PO in 3 divided doses ≥6 weeks		

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Culture-negative endocarditis	Ampicillin-sulbactam 300mg/kg/day IV in 4-6 divided doses for 4-6 weeks PLUS Gentamicin 3mg/kg q24h for 4-6 weeks		Culture-negative endocarditis (CNE) is diagnosed when a child has clinical and echocardiogram evidence of IE but persistent negative cultures. This is in individuals with no prior antimicrobial use. If fungi or fastidious organism is suspected, need to ask microbiologist to prolong incubation.

References:

1. American Academy of Paediatrics. Committee on Infectious Diseases. Red Book: Report of the Committee on Infectious Diseases (2018).
2. National Antimicrobial Guideline, Third Edition. Petaling Jaya: Ministry of Health, Malaysia; 2019.

CENTRAL NERVOUS SYSTEM INFECTIONS

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Meningitis empirical treatment Age groups: 1-3 months: Group B streptococcus (GBS), *Escherichia coli, Streptococcus pneumoniae and Neisseria meningitidis* >3 months: *Streptococcus penumoniae, Haemophilus influenzae* type b, *Escherichia coli, Salmonella and Neisseria meningitidis*	Cefotaxime 200-300mg/kg/day IV in 4 divided doses (max. 2gm/dose) OR Ceftriaxone 100mg/kg/day IV in 1-2 divided doses (max. 2gm/dose; 4gm/day) PLUS Vancomycin 60mg/kg/day IV in 2-3 divided doses (max. 2gm/day)		For children below 3 months of age: Cefotaxime is the preferred third generation cephalosporin since less drug-drug interactions (in terms of interaction with calcium-containing infusion and bilirubin displacement). Once organism is known, please refer below to adjust antibiotics.
Specific Organisms			
Haemophilus influenzae	Ampicillin 300mg/kg/day q6h (if MIC <1mcg/ml)	Cefotaxime 200-300mg/kg/day IV in 4 divided doses (max. 2gm/dose) OR Ceftriaxone 100mg/kg/day IV in 1-2 divided doses (max. 2gm/dose; 4gm/day)	Duration: 10 days.
Neisseria meningitidis	Benzylpenicillin 300,000-400,000 units/kg/day; (max. 12 MU/day) IV in 4-6 divided doses for 7 days	Cefotaxime 200-300mg/kg/day IV in 4 divided doses (max. 2gm/dose) for 7 days OR Ceftriaxone 100mg/kg/day IV in 1-2 divided doses (max. 2gm/dose; 4gm/day) for 7 days	Prophylaxis for all household contacts and health care workers involved in unprotected contact during intubation and suctioning of airway/mouth-to-mouth resuscitation.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Streptococcus pneumoniae			
Penicillin-susceptible (MIC≤0.06 mcg/ml)	Benzylpenicillin 300,00-400,000 units/kg/day in 4-6 divided doses (max. 24MU/day)		Duration: 14 days.
Penicillin-resistant (MIC≥0.12 mcg/ml) and Cefotaxime/ Ceftriaxone-susceptible (MIC ≤0.5 mcg/ml)	Cefotaxime 200-300mg/kg/day IV in 4 divided doses (max. 2gm/dose) OR Ceftriaxone 100mg/kg/day IV in 1-2 divided doses (max. 2gm/dose; 4gm/day)		
Penicillin and Cefotaxime/ Ceftriaxone resistant (MIC ≥2.0 mcg/ml) (drug-resistant *Streptococcus pneumoniae,* DRSP)	Cefotaxime 300mg/kg/day OR Ceftriaxone 100mg/kg/day PLUS Vancomycin 60mg/kg/day in 4 divided doses		
Cryptococcal meningitis *Cryptococcus neoformans*	Induction therapy: Amphotericin B 1.0mg/kg/day IV q24h PLUS* 5-flucytosine 25mg/kg/dose (max. 2gm/dose) PO q6h for 2-4 weeks		Duration of induction with 5-flucytosine (5-FU) is at least 2 weeks and until CSF repeat culture is NEGATIVE.
	Consolidation Therapy: Fluconazole 6mg/kg/dose (max. 400mg/dose) IV/PO q12h for 8 weeks		
Herpes simplex encephalitis	4 months to 12 years old: Acyclovir 30-45mg/kg/day slow IV infusion in 3 divided doses		Duration: 14-21 days. Doses of 60mg/kg/day OR dosing exceeding 15mg/kg or 500mg/m^2 is associated with acute kidney injury.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Brain abscess	(Flu)Cloxacillin 200mg/kg/day IV in 4-6 divided doses PLUS Cefotaxime 200-300mg/kg/day IV in 4 divided doses (max. 2gm/dose) OR Ceftriaxone 100mg/kg/day IV in 1-2 divided doses (max. 2gm/dose; 4 gm/day) PLUS Metronidazole 15mg/kg IV stat then 7.5mg/kg IV q8h	If secondary to head trauma or post-neurosurgical procedure: Vancomycin 60mg/kg/day IV in 2-3 divided doses (max. 2gm/day) PLUS Cefotaxime 200-300mg/kg/day IV in 4 divided doses (max. 2gm/dose) OR Ceftriaxone 100mg/kg/day IV in 1-2 divided doses (max. 2gm/dose; 4 gm/day)	Surgical drainage may be indicated if appropriate. Duration: 6-8 weeks, depending on response based on neuroimaging and clinical presentations.

References:

1. American Academy of Paediatrics. Committee on Infectious Diseases. Red Book: Report of the Committee on Infectious Diseases (2018).
2. National Antimicrobial Guideline, Third Edition. Petaling Jaya: Ministry of Health, Malaysia; 2019.
3. Sanford Guide to antimicrobial therapy 2018.

OCULAR INFECTIONS

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Preseptal cellulitis *Streptococcus pneumoniae* *Staphylococcus aureus* *Streptococcus pyogenes* *Haemophilus influenzae*	Mild: Amoxicillin-clavulanate 45mg/kg/day PO in 2 divided doses Systemically unwell: Cloxacillin 200mg/kg/day (max. 2g/dose) IV in 4 divided doses PLUS Cefotaxime 150-200mg/kg/day (max. 2gm/dose) IV in 3 divided doses OR Ceftriaxone 50mg/kg/dose (max. 2gm/dose) IV q12h	Cephalexin 25-50mg/kg/day PO in 2 divided doses for 10 days	Failure to respond within 24-48 hours may indicate orbital cellulitis or underlying sinus disease. When improving and no organism identified, change to Amoxicillin-clavulanate and complete for 7 days.
Orbital cellulitis/abscess *Streptococcus pyogenes* *Streptococcus pneumoniae* *Staphylococcus aureus* *Haemophilus influenzae*	Ceftriaxone 50mg/kg/dose (max. 2gm) IV q12h for 7-14 days PLUS Cloxacillin 200mg/kg/day (max. 12gm) IV in 4 divided doses for 7-14 days Inpatient: 48-72 hours IV antibiotic, then oral to complete 14 days following good response or positive culture)	Penicillin allergy: Clindamycin 30-40mg/kg/day PO in 3 or 4 divided doses Also for CA-MRSA (adjust accordingly with antiviogram)	It is a surgical emergency and requires immediate consultation with ENT surgeon and ophthalmologist. Urgent CT scan needed to exclude associated abscess and intracranial extension. Urgent surgical drainage of the ethmoid sinuses or of an orbital, subperiosteal or intracranial abscess may be needed.

References:

1. American Academy of Paediatrics. Committee on Infectious Diseases. Red Book: Report of the committee on Infectious Diseases (2018).
2. Clinical Practice Guideline: Periorbital and orbital cellulitis; The Royal Children's Hospital, Melbourne. Last updated 25 August 2013.
3. National Antimicrobial Guideline, Third Edition. Petaling Jaya: Ministry of Health, Malaysia; 2019.
4. Periorbital and Orbital Cellulitis: Emergency Management in Children; Queensland Health Hospital, 2017.
5. The Sanford Guide to Antimicrobial therapy 2018.

OTORHINOLARYNGOLOGICAL INFECTIONS

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Tonsillitis/Pharyngitis Group A *Streptococcus*	Phenoxymethylpenicillin (penicillin V) 25-50mg/kg/day PO in 4 divided doses (max. 2g/day) for 10 days OR Amoxicillin 50mg/kg/day PO in 3 divided doses (max. 1000-1200mg) for 10 days	Penicillin allergy (non-anaphylaxis): Cephalexin 25-50mg/kg/day PO in 2 divided doses for 10 days OR Erythromycin ethylsuccinate 40- 50mg/kg/day PO in 3 to 4 divided doses for 10 days	
Rhinosinusitis *Streptococcus pneumoniae* *Haemophilus influenzae* *Moraxella catarrhalis* Group A *Streptococcus*	Amoxicillin 45-90mg/kg/day in 2 divided doses PO for 10 days* Second line: Amoxicillin-clavulanate 45mg/kg/day PO in 2 divided doses Failing Amoxicillin-clavulanate: Clindamycin 30-40mg/kg/day PO in 3 divided doses AND Cefuroxime 30mg/kg/day PO in 2 divided doses Inpatient (severe): Ampicillin-sulbactam 100-200mg/kg/day of Ampicillin component IV in 4 divided doses (max. 8g/day)	Penicillin allergy: Clindamycin 30-40mg/kg/day PO in 3 or 4 divided doses. Inpatient: Ceftriaxone 50mg/kg/dose IV daily	The most common causes are viral infections. Acute bacterial sinusitis is suspected when child with URI presents with: ▪ Persistent illness (nasal discharge or daytime cough or both for ≥10 days without improvement) Worsening course Severe onset (concurrent fever and purulent discharge for 3 days) For rhinosinusitis, most experts recommend using high dose Amoxicillin (90mg/kg/day).
Acute otitis media *Streptococcus pneumoniae* *Haemophilus influenzae* *Moraxella catarrhalis*	Amoxicillin 80-90mg/kg/day in 2 divided doses <2 years old: 10 days 2-5 years old: 7 days >5 years old: 5 days. For clinical failure, history of using Amoxicillin in the last 30 days and has concurrent purulent conjunctivitis: Amoxicillin-clavulanate 45mg/kg/day PO in 2 divided doses	Penicillin allergy: Erythromycin ethylsuccinate 15-20mg/kg/dose PO q12h OR Clarithromycin 7.5mg/kg/dose PO q12h OR Azithromycin 10mg/kg/dose PO on Day 1 (max. 500mg/day), followed by 5mg/kg/dose PO q24h on Day 2-Day 5 (max. 250mg/day) OR Azithromycin 10mg/kg/dose PO q24h for 3 days	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Acute otitis externa *Pseudomonas aeruginosa* *Staphylococcus aureus*	Mild to moderate: Topical antibiotic with/ without topical steroids. E.g. Gentamicin 0.3% ear drops: 3-4 drops 3 times/ day for 7 days Polymyxin B sulphate 10,000 U, Neomycin sulphate 5mg and hydrocortisone10 g ear drops: 4 drops 3 or 4 times/day for 7 days Ofloxacin 0.3% otic solution Instill 5 drops into affected ear(s) once daily for 7 days Indication: for 1-12 years old	In Severe Cases: As for Moderate PLUS Flucloxacillin 25 to 50mg/ kg/day in 3 to 4 divided doses	Ototoxic agents like Gentamicin or Neomycin should not be used in the presence of tympanostomy tubes or perforated tympanic membrane. Clinical response should be seen within 48 to 72 hours but full response may take upto 6 days. Non-response should prompt an evaluation for obstruction, presence of foreign body, non-adherence or an alternative diagnosis.

References:

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2. Charles PS Hui: Canadian Paediatric Society. Paediatr Child Health 2013:18(2):96-98.
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GASTROINTESTINAL TRACT INFECTIONS

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Acute gastroenteritis Usually viruses e.g. rotavirus	Antibiotics not recommended		Oral rehydration is the cornerstone of treatment. Antibiotic therapy may prolong carriage state of salmonellosis.
Dysentery			
Dysentery *Shigella* spp., *Escherichia coli, Campylobacter*	Most are mild infections which resolve spontaneously without antibiotics		
Mild or uncomplicated	No treatment required	Ampicillin 100mg/kg/day PO in 4 divided doses for 5-7 days for hospitalized children	Amoxicillin,Trimethoprim-sulfamethoxazole, Ciprofloxacin and Azithromycin resistance are in the rise. Duration : 3 days. For immunocompromised : 7- 10 days. Reserve fluoroquinolone only for isolate where there is no other antibiotic option.
Severe illness (hospitalisation, invasive or other complications) or immunocompromised patients	Empiric: Ceftriaxone 50-75mg/kg/day IV q24h for 5 days	Ciprofloxacin 20-30mg/kg/day IV in 2 divided doses for 3 days OR Azithromycin 10mg/kg/dose IV q24h (max. 500mg/dose)	
Dysentery Amoebiasis	Metronidazole 30-50mg/kg/day PO in 3 divided doses for 7-10 days		Similar dosage for extraintestinal disease.
Giardiasis	Metronidazole 15mg/kg/day PO (max. 250mg) in 3 divided doses for 5-7 days		
Hospital acquired diarrhea *Clostridium difficile*	Metronidazole 30mg/kg/day PO in 4 divided doses for 10 days	In severe diseases Vancomycin 40mg/kg/day PO in 4 divided doses for 10 days PLUS Metronidazole 30mg/kg/day PO in 4 divided doses for 10 days	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Typhoid Fever			
Typhoid fever *Salmonella* Typhi *Salmonella* Paratyphi A and B	Empirical treatment: Ceftriaxone 50-75mg/kg/day IV q24h (max. 2gm) for 7-14 days OR Azithromycin 20mg/kg/day (1g/day) for 7 days		Adjust antibiotic once C&S results are known. Duration of antibiotics: 7 days (uncomplicated) to 14 days (severe disease or if using Ampicillin or Trimethoprim-sulfamethoxazole).
Mild or uncomplicated	Azithromycin 20mg/kg/day (1g/day) for 7 days OR Ciprofloxacin 20-40mg/kg/day (max. 1.5gm per day) PO in 2 divided doses for 5-7 days OR Cefixime 20mg/kg/day in 2 divided doses for 7 days	Chloramphenicol 50-100mg/kg/day PO in 4 divided doses for minimum 14 days	
Severe infection or suspected resistant organism	Ceftriaxone 60-80mg/kg/day IV q24h for 7-14 days	Ciprofloxacin 20-30mg/kg/day IV (max. 0.8-1.2gm/day) in 2 divided doses for 7-10 days	Choice of antibiotics and duration depends on disease, C&S results and whether oral route is preferred. Fluoroquinolones need to be used with caution in children due to possible arthropathy and rapid development of resistance. Ampicillin and Trimethoprim-sulfamethoxazole may be considered for susceptible strain.
Chronic carrier state (> 1 year)	Ampicillin 100mg/kg/day PO in 4 divided doses for 6 weeks OR Amoxicillin 100mg/kg/day PO in 2 divided doses for 6 weeks OR Trimethoprim-sulfamethoxazole 8mg (TMP)/kg/day PO in two divided doses for 6 weeks	Ciprofloxacin 20-30mg/kg/day PO in 2 divided doses for 4 weeks. OR Ampicillin 200-300mg/kg/day IV maximum in 4-6 divided doses. (If oral therapy not tolerated and strain is susceptible)	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Cholera *Vibrio cholerae*	Azithromycin 20mg/kg/day PO in a single dose (max. 1gm) OR Erythromycin ethylsuccinate 12.5mg/kg/dose PO q6h for 3 days (max. 250mg/dose) (Watch group preferred due to lesser adverse effects)	Doxycycline 4.4mg/kg/day (max. 200mg/day) PO daily (children> 8 years old) OR Tetracycline 12.5mg/kg/dose PO in q6h (max. 500mg/dose) for 3 days (children > 8 years old)	Oral or IV rehydration is the cornerstone of treatment. Antimicrobials should be considered for moderately to severely ill. Avoid using Tetracycline or Doxycycline for young children. Use of Doxycycline should be considered in an epidemic caused by susceptible isolate. Fluoroquinolones - not approved for children < 18 years for this indication.
Liver abscess (amoebic) *Entamoeba histolytica*	Metronidazole 35-50mg/kg/day PO in 3 divided doses for 7-1 0 days		Amoebic abscess tends to be solitary lesion. Consider surgical drainage if needed.
Liver abscess (pyogenic). *Klebsiella* spp., *Escherichia coli, Streptococcus,* anginosus group, other Gram-negative organisms, anaerobes, *Staphylococcus aureus*	Cefotaxime 200mg-300mg/kg/day IV in 4 divided doses (max. 2gm/dose) OR Ceftriaxone 100mg/kg/day IV in 1-2 divided doses (max. 2gm/dose; 4gm/day) PLUS Metronidazole 22.5-40mg/kg/day IV in 3 divided doses max. 4 mg/day	Piperacillin-tazobactam 300mg/kg/day (of piperacillin component) IV in 3-4 divided doses (max. 16gm/day) ESBL-*Klebsiella* spp. Ertapenem 30mg/kg/day in 2 divided doses (max. 1gm/day) (above 3 months of age)*	Surgical drainage is needed in most cases. Duration: 4-6 weeks *If available

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Acute cholangitis Gram-positive and Gram-negative organisms, anaerobes	Ampicillin-sulbactam 200-300mg/kg/day (of Ampicillin component) IV in 4-6 equally-divided doses	Cefotaxime 200mg-300mg/kg IV in 4 divided doses (max. 2gm/dose) OR Ceftriaxone 100mg/kg/day IV in 1-2 divided doses (max. 2gm/dose; 4gm/day) PLUS Metronidazole 22.5-40mg/kg/day IV in 3 divided doses (max. 4gm/day) OR Piperacillin-tazobactam 300mg/kg/day (of piperacillin component) in 3-4 divided doses IV (max. 16gm/day)	Duration - 7 days. Outcome is similar with less than 7 days to those with longer duration >7 days in patients treated with percutaneous cholecystectomy. In treatment failure, need source control.
Peritonitis Gram-positive and Gram-negative organisms, anaerobes	Primary/spontaneous bacterial peritonitis Cefotaxime 200mg -300mg/kg IV in 4 divided doses (max. 2gm/dose) Secondary (nosocomial) peritonitis Piperacillin-tazobactam IV 300mg/kg/day in 3- 4 divided doses (max. 16gm/day)	Ampicillin 100mg/kg/day PO in 4 divided doses PLUS Gentamicin 5mg/kg/day IV q24h PLUS Metronidazole 7.5mg/kg/dose IV 8h for 7-14 days	May omit Metronidazole in primary peritonitis. In immunocompetent patient with mild to moderate peritonitis and source control, suggest 5 days of therapy.
	If culture proven ESBL: Imipenem-cilastatin 60-100mg/kg/day IV in 4 divided doses Meropenem 60-100mg/kg/day IV in 3 divided doses		De-escalate treatment to Ertapenem 30mg/kg/day IV in 2 divided doses (max. 1gm/day) once patient is stable.

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SURGICAL INFECTIONS IN CHILDREN

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
A. General Surgery			
Empyema thoracis (lung empyema) *Staphylococcus aureus* *Streptococcus pneumoniae* Empirical treatment needs to cover organisms mentioned above. Other bacteria implicated: *Streptococcus pyogenes, Haemophilus influenzae* and other Gram-negative organisms in immunocompromised individuals If patient is not responding to treatment, need to rule out TB.	Cefuroxime 100-200mg/kg/day IV in 3 divided doses PLUS Cloxacillin 200-300mg/kg/day IV in 4-6 divided doses Duration: 4-6 weeks	*Staphylococcus aureus* methicillin-susceptible): Cloxacillin 200-300mg/kg/day IV in 4-6 divided doses for 4-6 weeks *Streptococcus pneumoniae* (penicillin-susceptible): Benzylpenicillin 200,000-300,00units/kg/day IV in 4-6 divided doses *Streptococcus pneumoniae* (penicillin-resistant, use result of C&S): Cefotaxime 200-300mg/kg/day IV in 4 divided doses OR Ceftriaxone 100mg/kg/day IV in 1-2 divided doses (max. 2gm/dose; 4gm/day)	Based on C&S of pleural fluid/tissue or blood culture. Pneumatocoele on chest X-ray indicate *Staphylococcus aureus* BUT they can also be seen in pneumococcal disease. There is NO need for routinely use a macrolide antibiotic but its use should be considered in children whom *Mycoplasma pneumoniae* is thought to be the cause (Mycoplasma usually causes effusion, not empyema). Duration: 4-6 weeks total.
Enterocolitis Enterobacteriaceae, Enterococci, Bacteroides	Ampicillin 200mg/kg/day IV in 4-6 divided doses (max. 12gm/day) PLUS Metronidazole 15mg/kg loading dose, followed by 7.5mg/kg/dose IV q8h	Cefotaxime 200mg/kg/day IV in 4 divided doses PLUS Metronidazole 15mg/kg loading dose, followed by 7.5mg/kg/dose IV q8h	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
B. Bone And Joint Infections			
Septic arthritis (SA) and Osteomyelitis (OM) <u>Common organisms:</u> 0-2 months old: *Staphylococcus aureus* *Streptococcus agalactiae* Gram-negative enteric organism <u>Less than 5 years old:</u> *Staphylococcus aureus* *Streptococcus pyogenes* *Streptococcus pneumoniae* Non-typeable *Haemophilus* spp. *Kingella kingae* <u>Older than 5 years:</u> *Staphylococcus aureus* *Streptococcus pyogenes*	0-2 months old: Cloxacillin 200mg/kg/day IV in 4-6 divided doses PLUS Cefotaxime 200mg/kg/day IV in 4 divided doses		Empiric antibiotics should be started based on clinical diagnosis of SA or OM. Surgical debridement often not required in OM. Urgent wash out and drainage is needed in SA in hip and other joints to reduce pressure on growth plate. *IV antibiotics can be switched to oral if no concurrent bacteremia when: Child afebrile and pain-free for at least 24 hours and CRP <20mg/L or CRP decreased by ≥2/3 of the highest value. Duration of antibiotics: SA: total of 3-4 weeks OM: 4-6 weeks In complex disease (multifocal, significant bone destruction, immunocompromised host and resistant/unusual pathogens), prolonged intravenous antibiotics are needed and duration might exceed 6 weeks.
	Less than 5 years old: Cefuroxime 100-200mg/kg/day IV in 3 divided doses (monotherapy)	Cefazolin 100-150mg/kg/day IV in 3 divided doses (Can be used in children with suspected *Staphylococcus aureus* or *Streptococcus pyogenes*. Less hypersensitivity reaction compared to Cloxacillin and more convenient dosing) *Kingella kingae: Uncommon organism causing infection in <5 years old; susceptible to β-lactam antibiotics e.g. Cefuroxime or Amoxicillin-clavulanate.	
	More than 5 years old: Cloxacillin 200mg/kg/day IV in 4-6 divided doses		

References:

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URINARY TRACT INFECTIONS

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Urinary Tract Infection (UTI) *Escherichia coli* *Proteus* spp. *Klebsiella* spp. *Enterobacter* spp.	0-2 months old: Ampicillin 50mg/kg/dose IV <1week of age: q12h >1week of age: q8h PLUS Gentamicin 5mg/kg/dose IV < 30 weeks of CGA: q48h > 30-34 week of CGA: q36h ≥ 35 week CGA: q24h >2 months old: Uncomplicated UTI Cefixime 8-10mg/kg/day in 2 divided doses OR Cotrimoxazole (Trimethoprim 8mg/kg) In 2 divided doses	0-2 months old: Cefotaxime 50mg/kg/dose q8h >2 months old: Complicated UTI Cefotaxime 100-150mg/kg/day IV in 3 divided doses (max. 8gm/day) OR Ceftriaxone 100mg/kg AND/OR Gentamicin 5mg/kg/dose IV daily	Duration: 10-14 days. >2 months old: Duration: 7-14 days. Switch to oral therapy when improving and able to tolerate oral therapy.
Prophylaxis for UTI for infants and children with recurrent UTI	Trimethoprim 1-2mg/kg PO at night	Nitrofurantoin 1-2mg/kg at night OR Cephalexin 10mg/kg/dose at night	

References:

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4. The Sanford guide to antimicrobial therapy 2018.
5. UTI Clinical Practice Guideline, Pediatrics 2011.

NEONATAL INFECTIONS

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Congenital and Perinatal Infections			
Meningitis GBS *Escherichia coli* *Listeria* spp. Other Gram-negative bacilli/rod (GNR)	Empirical therapy. < 1 week of age: Ampicillin 200-300mg/kg/day IV in 3 divided doses >1 week of age: Ampicillin 300mg/kg/day IV in 4 divided doses PLUS Cefotaxime 50mg/kg/dose IV < 1 week of age: q12h >1 week of age: q8h		
Necrotising enterocolitis (NEC) *Klebsiella* spp., *Escherichia coli,* *Clostridia,* Coagulase-negative *Staphylococci, Enterococci,* Bacteroides	Ampicillin 50mg/kg/dose IV <1 week of age: q12h >1 week of age: q8h PLUS Gentamicin 5mg/kg/dose IV < 30 weeks of CGA: q48h 30-34 weeks of CGA: q36h ≥35 weeks CGA: q24h PLUS Metronidazole IV dose: <34 weeks of age: 7.5mg/kg/dose IV q12h 35-40 weeks of age: 7.5mg/kg/dose IV q8h >40 weeks of age:10mg/kg/dose IV q8h		Use Vancomycin if CoNS/MRSA is suspected (substitute Ampicillin with Vancomycin). Duration: 10-14 days.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Early onset sepsis (<48 hrs) Group B *Streptococcus* (GBS), *Listeria* spp., *Streptococcus* spp., *Escherichia coli,* *Haemophilus influenzae,* *Klebsiella* spp. *etc.*	< 1 week of age: Ampicillin 200-300mg/kg/day IV in 3 divided doses >1 week of age: Ampicillin 200-300mg/kg/day IV in 4 divided doses PLUS Gentamicin 5mg/kg/dose IV <30 weeks of CGA: q48h 30-34 weeks of CGA: q36h ≥35 weeks CGA: q24h		If negative blood culture, initial clinical suspicion not strong and reassuring baby's condition with low CRP, consider stopping antibiotics at 48 hours. If positive blood culture or strong clinical suspicion of sepsis but negative culture, may give 5-7 days of antibiotics. Consider antibiotics for more than 5-7 days if baby not fully recovered and based on pathogen identified on blood culture. In this empiric therapy - meningitis is not a consideration.
Late onset sepsis >48 hours MSSA/MRSA, Coagulase-negative Staphylococci (CoNS), Gram-negative rods	First line: (Flu)cloxacillin 50mg/kg/dose IV <1 week of age: q12h >1 week of age: q8h OR Cefotaxime 50mg/kg/dose IV <1 week of age: q12h >1 week of age: q8h PLUS Gentamicin 5mg/kg/dose IV < 30 weeks of CGA: q48h 30-34 weeks of CGA: q36h ≥35 weeks of CGA: q24h	Second line: Piperacillin-tazobactam IV PMA < 30 weeks: 100mg/kg/dose q8h PMA > 30 weeks: 80mg/kg/dose q6h Other options: Cefepime GA < 36 weeks: 30mg/kg/dose q12h GA ≥ 36 weeks: 50mg/kg/dose q12h OR Meropenem GA <32 weeks: 20mg/kg/dose IV PNA < 14 days: q12h PNA ≥ 14 days: q8h GA ≥ 32 weeks: PNA < 14 days: 20mg/kg/dose IV q8h PNA ≥ 14 days: 30mg/kg/dose IV q8h OR Imipenem-cilastatin 25mg/kg/dose IV PNA < 1 week: q12h PNA ≥ 1 week q8h	Piperacillin-tazobactam is a good second line option in pneumonia and intraabdominal sepsis (non-CONS sepsis with good coverage against Gram positive, Gram-negative and anaerobes)

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Congenital syphilis *Treponena pallidum*	Benzylpenicillin (Penicillin G) 50,000 units/kg/dose IV for first 7 days of life: q12h thereafter: q8h Duration: 10 days If diagnosed with congenital syphilis after one month of age: Benzylpenicillin (Penicillin G): 200,000-300,000units/kg/day IV in 4-6 divided doses for 10-14 days.	Benzathine penicillin G 50,000 Unit/kg/dose single dose IM	In infants considered less likely to have syphilis and normal CSF examination including normal physical examination and long bone radiograph: Benzathine penicillin G 50,000units/kg/dose IM in a single dose can be given.
Congenital toxoplasmosis *Toxoplasma gondii*	Pyrimethamine-sulfadoxine Pyrimethamine (1.25mg/kg/dose PO every 10 days) PLUS Sulfadoxine (25mg/kg/dose PO every 10 days) PLUS Folinic acid 50mg PO every 7 days for 12 months	Pyrimethamine 1mg/kg/day PO for 2 months, followed by 0.5mg/kg/day PO for 10 months PLUS Sulfadiazine 100mg/kg/day PO in 2 divided doses for 12 months PLUS Folinic Acid 50mg PO every 7 days for 12 months	Prednisolone 0.5mg/kg (max. 20mg/dose) q12h can be added if CSF protein ≥ 1g/dL or active severe chorioretinitis. Steroids given till CSF protein <1g/dL or resolution of severe chorioretinitis.
Herpes simplex Neonatal Localised skin, eye and mouth (SEM) Central nervous system (CNS) with or without SEM Disseminated disease involving multiple organs	Acyclovir 60mg/kg/day IV in 3 divided doses All infants surviving neonatal HSV infection of any classification should receive oral acyclovir suppression at 300mg/m^2/dose administered 3 times daily for 6 months after completion of parenteral therapy.		Duration: SEM: 14 days CNS/disseminated: ≥ 21 days For CNS disease: Repeat lumbar puncture at end of therapy for HSV PCR. If PCR remains positive, continue IV acyclovir for another one week.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Tetanus neonatorum *Clostridium tetani*	Metronidazole PMA ≤ 34 weeks: 7.5mg/kg/dose IV q12h PMA 35-40 weeks: 7.5mg/kg/dose IV q8h PMA >40 weeks: 10mg/kg/dose IV q8h	Benzylpenicillin (Penicillin G) GA<34 weeks: 100,000units/kg/dose IV postnatal age <7 days: q12h postnatal age > 7 days: q8h GA >34 weeks: 100,000units/kg/dose IV postnatal age <7 days: q8h postnatal age > 7 days: q6h	Duration : 10 days.
Congenital gonococcal ophthalmitis /conjunctivitis	Immediate and frequent saline eye irrigation. Non-disseminated disease: Cefotaxime 1 00mg/kg/dose IV in a single dose. May need to continue for 48-72 hours until systemic infection has been ruled out Disseminated disease: Cefotaxime 50mg/kg/dose IV < 1 week of age: q12h > 1 week of age: q8h	If penicillin-susceptible: Benzylpenicillin GA <34 weeks: 100,000units/kg/dose IV postnatal age <7 days: q12h postnatal age >7 days: q8h GA >34 weeks: 100,000units/kg/dose IV postnatal age <7 days: q8h postnatal age >7 days: q6h	For 7 days, with a duration of 10-14 days, if meningitis is documented. Evaluate for signs of disseminated infection (e.g. sepsis, arthritis and meningitis). Screen mother and baby for chlamydial infection. Screen for other STDs. Investigate and treat parents.
Chlamydia trachomatis conjunctivitis	Erythromycin ethylsuccinate 10mg/kg/dose PO <1 week of age: q12h >1 week of age: q8h	Azithromycin 20mg/kg/day PO, once daily for 3 days.	Duration: 14 days. Local eye toilet until discharge stops Re-swab after treatment; 20-30% will need a second course to clear infection.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
GBS *Streptococcus agalactiae*			
Sepsis	< 1 week of age: Ampicillin 200-300mg/kg/day IV in 3 divided doses >1 week of age: Ampicillin 300mg/kg/day IV in 4 divided doses PLUS Gentamicin 5mg/kg/dose IV < 30 weeks of CGA: q48h > 30-34 weeks of CGA: q36h ≥35 weeks of CGA: q24h		Duration of treatment for GBS: Uncomplicated: 14 days (Bacteremia without a defined focus). Meningitis: 21 days. Gentamicin can be discontinued once the infection is under control.
Meningitis	Ampicillin <1 week of age: 200-300mg/kg/day IV in 3 divided doses >1 week of age: 300mg/kg/day IV in 4 divided doses PLUS Gentamicin 5mg/kg/dose IV < 30 weeks of CGA: q48h >30-34 weeks of CGA: q36h ≥ 35 weeks CGA: q24h		Duration for treatment. Meningitis: 21 days. Doses of penicillin for meningitis is higher as recommended by experts (as high as 500,000 unit/kg/day (> 7 days of age).
Escherichia coli Sepsis/Meningitis	Cefotaxime 50mg/kg/dose IV < 1 week of age: q12h > 1 week of age: q8h Cefotaxime 50mg/kg/dose IV GA<32weeks PNA < 14 days: q12h PNA ≥ 14 days: q8h GA ≥32 weeks PNA ≤7 days: q12h PNA >7 days: q8h PLUS Gentamicin 5mg/kg/dose IV < 30 weeks of CGA: q48h > 30-34 weeks of CGA: q36h ≥ 35 weeks CGA: q24h		Duration in bacteremia: 14 days. Duration for meningitis: 21 days. All cases of bacteremia need lumbar puncture to exclude meningitis.

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CHEMOPROPHYLAXIS: SURGICAL

Timing:

Administration of antimicrobial agent is recommended within 60 minutes before surgical incision to ensure adequate tissue concentration at the start of the procedure. Agents that require longer administration time such as Vancomycin should be given within 120 minutes before surgery begins.

Adequate antimicrobial concentration should be maintained throughout the surgical procedures and in most instances, single dose of antimicrobial agent is sufficient and the duration of prophylaxis after any procedure should not exceed 24 hours.

- Intra-operative dosing is required if the duration of the procedure is greater than two times the half-life of the antimicrobial agent or if there is excessive blood loss.
- Re-dosing timings are calculated from the initiation of pre-operative dose.

Antimicrobial	Recommended Re-dosing Interval in Adults with Normal Renal Function (From Initiation of Preoperative Dose in hours)
Cefazolin	4
Cefuroxime	4
Ampicillin-sulbactam	2
Flucloxacillin	4
Clindamycin	6
Cefotaxime	3
Gentamicin	NA
Amoxicillin-clavulanate	4

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Cardiac Surgery			
Staphylococcus epidermidis, Staphylococcus aureus, Corynebacterium spp., Enteric Gram-negative bacilli	Cefazolin 30mg/kg IV; max. 2gm	β-lactam Allergy: Clindamycin 10mg/kg IV; max 900mg	If known to have MRSA/ MRSE colonization, use Vancomycin 15mg/kg IV
Thoracic surgery			
Non-cardiac including lobectomy, pneumonectomy, lung resection and thoracotomy	Cefazolin 30mg/kg IV; max. 2gm	Ampicillin-sulbactam 50mg/kg (of Ampicillin component) IV Re-dosing : every 2 hours β-lactam Allergy: Clindamycin 10mg/kg IV; max 900mg	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Abdominal Surgery			
Gastroduodenal	Cefazolin 30mg/kg IV; max. 2gm	Ampicillin-sulbactam 50mg/kg (of Ampicillin component) IV β-lactam Allergy: Clindamycin 10mg/kg IV; max 900mg AND Gentamicin 2.5mg/kg IV	
Biliary tract (Open procedure/ Laparoscopic procedure/ Appendectomy/Small intestine/Hernia repair (hernioplasty and herniorrhaphy) / Colorectal)	Cefazolin 30mg/kg IV; max. 2gm OR Ampicillin-sulbactam 50mg/kg (of Ampicillin component) IV	Ceftriaxone 50-75mg/kg IV; max. 2gm OR Cefotaxime 50mg/kg; max. 1gm PLUS Metronidazole 15mg/kg IV (For neonates less than 1200gm, to give 7.5mg/kg) β-lactam Allergy: Clindamycin 10mg/kg IV; max 900mg PLUS Gentamicin 2.5mg/kg IV	
Head and neck			
Clean (tonsillectomy, adenoidectomy, tracheostomy, thyroglossal cyst excision, preauricular sinus, dermoid cyst, brachial anomaly, thyroidectomy, parotidectomy, lymph node biopsy etc.)	No antibiotic routinely		
Clean with placement of prosthesis (excludes tympanostomy tubes)	Cefazolin 30mg/kg IV; max. 2gm	Ampicillin-sulbactam 50mg/kg (of Ampicillin component) IV OR Cefuroxime 50mg/kg IV; max. 1.5gm β-lactam Allergy: Clindamycin 10mg/kg IV; max 900mg	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Clean-contaminated procedures with the exception of tonsillectomy and functional endoscopic sinus procedure	Cefazolin 30mg/kg IV; max. 2gm PLUS Metronidazole 15mg/kg IV	Ampicillin-sulbactam 50mg/kg (of Ampicillin component) IV OR Cefuroxime 50mg/kg IV; max. 1.5gm PLUS Metronidazole 15mg/kg IV β-lactam Allergy: Clindamycin 10mg/kg IV; max 900mg	
Clean-contaminated cancer surgery	Cefazolin 30mg/kg IV; max. 2gm PLUS Metronidazole 15mg/kg IV	Ampicillin-sulbactam 50mg/kg (of Ampicillin component) IV OR Cefuroxime 50mg/kg IV; max. 1.5gm PLUS Metronidazole 15mg/kg IV β-lactam Allergy: Clindamycin 10mg/kg IV; max 900mg	
Neurosurgery			
Elective craniotomy and cerebrospinal fluid-shunting procedures	Cefazolin 30mg/kg IV; max. 2gm	β-lactam Allergy: Clindamycin 10mg/kg IV; max 900mg	If known to have MRSA/ MRSE colonization, use Vancomycin 15mg/kg IV.
Orthopaedics			
Clean operations involving hand, knee, or foot and not involving implantation of foreign materials	None		
Spinal procedure with or without instrumentation / hip surgery / Implantation of internal fixation devices (e.g. nails, screws, plates, wires)	Cefazolin 30mg/kg IV; max. 2gm	β-lactam Allergy: Clindamycin 10mg/kg IV; max 900mg	
Urology			
Low tract instrumentation with risk factors for infections	Trimethoprim 2mg/kg PO; max. 150mg	Cefazolin 30mg/kg IV; max. 2gm β-lactam Allergy: Gentamicin 2.5mg/kg IV	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Clean without entry into urinary tract/clean with entry into urinary tract (e.g. hypospadias surgery)	Cefazolin 30mg/kg IV; max. 2gm	Amoxicillin-clavulanate 30mg/kg IV; max 1.2gm	UTI should be treated before procedure when possible.
Clean-contaminated (entering gastrointestinal tract)	Cefazolin 30mg/kg IV; max. 2gm PLUS Metronidazole 15mg/kg IV	Amoxicillin-clavulanate 30mg/kg IV; max 1.2gm β-lactam Allergy: Gentamicin 2.5mg/kg IV	
Plastic Surgery			
Elective soft tissue surgery	No prophylaxis unless complete prolonged procedure If complex, Flucloxacillin 25mg/kg IV; max 1gm		
Elective hand or foot surgery involving bone	Flucloxacillin 25mg/kg IV; max 1gm	β-lactam Allergy: Clindamycin 10mg/kg IV; max 900mg	
Cleft lip and palate surgery	Amoxicillin-clavulanate 30mg/kg; max. 1.2gm		
Excision and grafting surgery	Amoxicillin-clavulanate 30mg/kg; max. 1.2gm		
Interventional radiology			
Percutaneous endoscopic gastrostomy (PEG) or jejunostomy (PEJ) or nephrostomy tube placement	Cefazolin 30mg/kg IV; max. 2gm	Amoxicillin-clavulanate 30mg/kg; max. 1.2gm	
Micturating cystourethrogram (MCUG)	Trimethoprim 2mg/kg PO; max. 150mg (if patient is already on existing antibiotic UTI prophylaxis, increase antibiotic to therapeutic dose for a single dose prior procedure)		
Tenkhoff peritoneal dialysis catheter insertion	Cefazolin 30mg/kg IV; max. 2gm	Amoxicillin-clavulanate 30mg/kg; max. 1.2gm	
Burns	No prophylaxis required		

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1. Antibiotic Prophylaxis for Paediatric Surgery. Royal Hospital for Children Glasgow. 2018.
2. Clinical Practical Guideline for Antimicrobial Prophylaxis for Surgery 2013. American Society of Hospital Pharmacists (ASHP) guideline, IDSA, Surgical Infection Society (SIS) and Society of Healthcare Epidemiology of America (SHEA). Bratzler DW, Dellinger EP, Olsen KM, Perl TM, Auwaerter PG, Bolon MK, Fish DN, Napolitano LM, Sawyer RG, Slain D, Steinberg JP, Weinsterin RA. American Journal of Health-system Pharmacy 2013. 70(3): 195-283.
3. National Antimicrobial Guideline, Third Edition. Petaling Jaya: Ministry of Health, Malaysia; 2019.

CHEMOPROPHYLAXIS: NON-SURGICAL

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Rheumatic fever (Secondary Prevention)	Benzathine penicillin G 1.2MU (>27kg); 0.6MU (≤27kg) IM every 3-4 weeks	Phenoxymethyl-penicillin (penicillin V) 250mg PO q12h Penicillin allergy: Erythromycin ethylsuccinate 15-20mg/kg/dose PO q12h	Duration: 1. With carditis and residual heart disease (persistent valvular disease): 10 years since the last episode of ARF or 40 years of age whichever is longer. Consider lifelong prophylaxis. 2. With carditis but no residual heart disease (no valvular disease): 10 years since the last episode of ARF or 21 years of age whichever is longer. 3. Without carditis: 5 years since last ARF or until 21 years of age whichever is longer.
Infective Endocarditis (IE)	Amoxicillin 50mg/kg PO 30-60 minutes before procedure OR Ampicillin 50mg/kg IV 30-60 minutes before procedure	Penicillin allergy: Clindamycin 20mg/kg IV/PO 30-60 minutes before procedure Other alternative: Cefazolin 50mg/kg IV (cephalosporin should not be used in children with anaphylaxis, angioedema or urticaria)	IE prophylaxis is recommended for patients with the highest risk cardiac conditions undergoing procedures likely to result in bacteremia with microorganism that has the potential ability to cause bacterial endocarditis. Prophylaxis always required for: 1. Dental procedures that involve • Extraction. • Periodontal procedure including surgery. • Sub-gingival scaling. • Root planning. • Re-planting avulsed teeth. • Other surgical procedure e.g. implant placement and apicectomy. 2. Incision and drainage of local abscess in the brain, skin, subcutaneous tissue (boils and carbuncle, eye (dacryocystitis), epidural, lung, orbital area, per rectal area, liver (pyogenic liver), tooth and surgical procedure through infected skin). 3. Percutaneous endoscopic gastrostomy. • Prophylaxis is required in some circumstances. • Maintenance of optimal oral hygiene may reduce the incidence of bacteremia from daily activities and is more important than prophylactic antibiotics for a dental procedure to reduce the risk of IE.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Post splenectomy At risk for Pneumococcus, Meningococcus, *Haemophilus* spp.	Phenoxymethylpenicillin (Penicillin V) 125mg PO q12h for ≤5 years old 250mg PO q12h for >5 years old Duration of chemoprophylaxis: • Minimum 3 years post splenectomy or until 18 years of age OR at least 1 year post splenectomy Asplenia attributable to other causes unknown most expert recommend throughout childhood and into adulthood	Amoxicillin 20mg/kg/day (250-500mg PO q12h; 500mg daily if poor compliance i.e. adult dose) Penicillin allergy: Erythromycin ethylsuccinate 15-20mg/kg/dose PO q12h	Risk of sepsis is lifelong but especially high in the first 2 years after splenectomy. Important adjunct: Immunization against *Pneumococcus, Haemophilus, Meningococcus* at least 14 days prior to splenectomy (if not possible then as soon as possible, 14 days or more after surgery). Yearly influenza vaccine is also recommended. Not all pneumococcal isolates are susceptible to these antibiotics. Limitation stressed to parents so that all febrile illness in this group of children are taken seriously since initial signs and symptoms of fulminant septicaemia can be subtle.
Haemophilus influenzae type b exposure	Rifampicin < 1month of age: 10mg/kg/dose PO q24h for 4 days Children: 20mg/kg/dose PO q24h for 4 days		Chemoprophylaxis is indicated for: 1. ALL household contacts in the following circumstances (household contact is defined as a person who resides with the index patient or who spent ≥4 hours with the index patient for at least five of the seven days before the day of hospital admission of the index case): • Household with at least one contact <4 years old who is unimmunized or incompletely immunized. • Household with a contact who is an immunocompromised child, regardless of that child's Hib immunization status.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
			• Household with a child younger than 12 months who has not completed the primary Hib series. 2. Nursery Contact For ALL attendees in childcare and preschool (regardless of age or vaccination status) when unimmunized or incompletely immunized children attend the facility and two or more cases of Hib invasive disease have occurred within 60 days. 3. Index case Prior to discharge if did not receive at least ONE dose of Cefotaxime/ Ceftriaxone and infants younger than 2 years. For contacts <2 years old who are not immunized: complete immunization.
Meningococcal exposure	Rifampicin <1month old: 5mg/kg/dose PO q12h for 2 days ≥1 month old: 15-20mg/kg/dose (max. 600mg) PO q12h for 2 days	Ceftriaxone IM <15 years old: 125mg stat > 15 years old: 250mg stat	Chemoprophylaxis is provided to close contact at HIGH RISK which include: - All household especially children younger than 2years old. - Childcare or preschool contact at any time during 7 days before onset of illness. - Direct exposure to index patient's secretion through kissing or through sharing toothbrushes or eating utensils at any time during 7 days before onset of illness. - Frequently slept in same place as index patient during 7 days before onset of illness.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
			Healthcare staff Routine prophylaxis is not recommended unless there is intimate exposure to respiratory secretion during mouth-to- mouth resuscitation, unprotected contact during intubation/ suctioning at any time 7 days before onset of illness or within 24 hours of initiation of effective antimicrobial therapy. Give chemoprophylaxis to index case prior to discharge if treated with regimens other than Cefotaxime or Ceftriaxone. Chemoprophylaxis is ideally initiated within 24 hours after index patient is identified; prophylaxis is not indicated more than 2 weeks after exposure.
Neonatal Group B *Streptococcus* infection	Intrapartum maternal prophylaxis: Benzylpenicillin 5MU IV loading, then 2.5-3.0MU IV q6h till delivery	Ampicillin 2gm IV loading, then 1gm q6h till delivery Penicillin allergy: *Clindamycin 2gm IV loading, then 1gm IV q8h till delivery (according to susceptibility)	Treat during labour if previously delivered infant with invasive GBS, GBS bacteriuria or antenatal screening swabs positive OR if GBS status is not known AND any of the following: - Preterm <37 weeks - PROM >18 hours - Intrapartum temperature >38°C *For high risk of anaphylaxis from β-lactam antibiotics.
Malaria prophylaxis	*Mefloquine 5mg/kg once a week to maximum 250mg.	**Atovaquone/ Proguanil (Malarone) comes in pediatric preparation of 62.5/25mg once a day.	.*To start 2-3 weeks before arrival and continue for 4 weeks after leaving malaria-risk area. **To start 1-2 days prior to travel and continue for 1 week after visit to malaria-risk area.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Pertussis (Post-exposure prophylaxis, PEP)	<1 month old: Azithromycin 10mg/kg/day in a single dose q24h for 5 days 1-5 months old: Azithromycin 10mg/kg/day as single dose q24h for 5 days. 6 months and older: Erythromycin ethylsuccinate 15-20mg/kg/dose PO q12h for 14 days. OR Azithromycin 10mg/kg/day in a single dose on Day 1, then 5mg/kg/dose on Day 2 - Day 5.	Erythromycin is not preferred in young infants. *Use only if Azithromycin is not available Erythromycin ethylsuccinate: 15-20mg/kg/dose PO q12h for 14 days. 2 months and older: Trimethoprim-sulfamethoxazole 8mg/kg/day in 2 divided doses for 14 days.	Drug of choice for PEP and treatment is a macrolide. Azithromycin is the preferred macrolide. *Association between orally administered Azithromycin and Erythromycin with infantile hypertrophic pyloric stenosis (especially in infant <6 weeks) has been reported but Azithromycin remains the drug of choice in very young infants because the risk of developing severe disease outweighs the potential risk. Antimicrobial prophylaxis is recommended for: 1. ALL household contacts of the index cases and other close contacts, including children in childcare, regardless of immunisation status. When considering borderline degree of exposure for a non-household contact, PEP should be administered if contact personally is at high risk or lives in a household with person at high risk of severe disease (e.g. young infant, pregnant women, person who has contact with infants). Close contacts who are unimmunised or underimmunised should have pertussis immunisation initiated or continued using age-appropriate products according to the recommended schedule as soon as possible (this include off-label TaP in children 7-9 years old who did not complete TaP series.) 2. High risk: Infant, women at third trimester of pregnancy and people with pre-existing health conditions that may be exacerbated by pertussis infection (not limited to immunocompromised individuals and those with moderate to severe asthma).

<table>
<tr><th rowspan="2">Infection/Condition and Likely Organism</th><th colspan="2">Suggested Treatment</th><th rowspan="2">Comments</th></tr>
<tr><th>Preferred Treatment</th><th>Alternative Treatment</th></tr>
<tr><td>Chicken pox (Post-exposure prophylaxis)</td><td colspan="2">Potential interventions for people without evidence of immunity exposed to varicella (chicken pox) following significant exposure.

Exposure is significant if:
1. Household: Residing in the same household
2. Playmate: Face-to-face indoor play ≥ 1hour
3. Hospital: In same 2 to 4-bed room or adjacent beds in large ward, face-to-face contact with an infectious staff member or patients, or visit by a person deemed contagious
4. Newborn infant</td><td></td></tr>
<tr><td>1. Vaccine</td><td colspan="2">Varicella vaccine:
Within 3-5 days of exposure for susceptible healthy adult/child 12 months old or older (followed by a second dose at age-appropriate interval)</td><td rowspan="3">Susceptible hosts include:
1. Immunocompromised children.
2. Pregnant women.
3. Newborns of mothers with Varicella shortly before or after delivery (i.e. 5 days before or within 2 days after delivery).
4. Premature infants born at ≥28 weeks of gestation who are exposed during their hospitalization and whose mothers do not have evidence of immunity.
5. Premature infants born at <28 weeks of gestation or birth weight ≤1000 g regardless of their mothers' immunity.</td></tr>
<tr><td>2. When indicated and available, Varicella zoster immune globulin (VZIG)</td><td rowspan="2">For patients who are at high risk for severe infection and complications and significant exposure (and have contraindications to vaccine):
VZIG dose as per product information;
weight-based as soon as possible after exposure up to 10 days after
OR
IVIG (400mg/kg) IV once if VZIG not available

OR
Acyclovir 20mg/kg/dose PO q6h (max.3200mg of daily dose) beginning 7-10 days after exposure and continue for 7 days.</td><td rowspan="2">Patients receiving monthly high dose IVIG (≥400mg/kg) are likely to be protected and probably do not require VZIG if most recent dose of IVIG was administered ≤3 weeks before exposure.</td></tr>
<tr><td>3. When VZIG not available</td></tr>
</table>

References:

1. American Academy of Pediatrics. Committee on Infectious Diseases. Red Book: Report of the committee on Infectious Diseases (2018).
2. Davies JM, Lewis MP, and Wimperis J et al. Review of guidelines for the prevention and treatment of infection in patients with an absent or dysfunctional spleen: prepared on behalf of the British Committee for Standards in Hematology by a working party of the Haemato-Oncology taskforce. Br J Haematol. 2011; 155:308-17.
3. Gardner P. Clinical practice. Prevention of meningococcal disease. N Engl J Med. 2006; 355:1466.
4. Guidance for the public health management of meningococcal disease in the UK. Updated February 2018. Public Health England.
5. National Antimicrobial Guideline, Third Edition. Petaling Jaya: Ministry of Health, Malaysia; 2019.
6. National Malaria Treatment Protocol. 2019. MoHP. Gov Nepal.
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8. The Sanford Guide to Antimicrobial therapy 2018.
9. Updated recommendations for use of VariZIG-United States, 2013. Centers for Disease Control and Prevention (CDC). MMWR Morb Mortal Wkly Rep. 2013;62(28):574.
10. Verani JR, McGee L, Schrag SJ, Division of Bacterial Diseases, National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention (CDC). Prevention of perinatal group B streptococcal disease--revised guidelines from CDC, 2010. MMWR Recomm Rep 2010; 59:1.
11. WHO Malaria Treatment Guideline 2015.

SKIN AND SOFT TISSUE INFECTIONS

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Abscess *Staphylococcus aureus*	Mild: *Cloxacillin 25-50mg/kg/day PO in 4 divided doses (max. 1gm/day) for 5-7 days	Cephalexin 25-50mg/kg/day PO in 2 divided doses for 5-7days	Incision and drainage (landD) is the MAINSTAY of therapy. Needle aspiration is inadequate, can sent pus obtained during landD for C&S. Use parenteral route for severe infections. Consider CA-MRSA if poorly resolving. *Doses recommended in previous columns are for children weighing less than 25kg. For children weighing more than 25kg, use adult dosage (500mg PO q6h).
	Severe: Cloxacillin 200mg/kg/day IV in 4 divided doses (max. 12gm/day) for 5-7 days		
	CA-MRSA: Clindamycin 30-40mg/kg/day PO in 3-4 divided doses for 5-7 days OR Trimethoprim-sulfamethoxazole 8-10mg/kg/day (TMP dose) PO in 2 divided doses for 5-7 days		
Animal bites *Pasteurella multocida, Staphylococcus* spp., *Streptococcus* spp., *Capnocytophaga* spp., anaerobes	Amoxicillin-clavulanate 45mg/kg/day PO in 2 divided doses for 5- 7 days	Amoxicillin-clavulanate 30mg/kg/dose IV q8h (max. 1.2gm)	Consider rabies prophylaxis.
Cellulitis *Staphylococcus aureus* *Streptococcus pyogenes*	Cloxacillin 200mg/kg/day IV in 4 divided doses (max. 12gm/day) for 5-7 days	Amoxicillin 25-50mg/kg/day PO in 3 divided doses for 7 days OR Cephalexin 25-50mg/kg/day PO in 2 divided doses for 5-7days	Administer using parenteral route for extensive lesions. Total treatment until 3 days after acute inflammation disappears.
Hansen's Disease (leprosy) in children	Paucibacillary: 10-14 years old: Rifampicin 450mg PO monthly PLUS Dapsone 50mg PO daily <10 years old: Rifampicin 10mg/kg PO monthly PLUS Dapsone 2mg/kg PO q24h		Duration of treatment: 6 months Surveillance: 5 years

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
	Multibacillary: 10-14 years old: Rifampicin 450mg PO monthly PLUS Dapsone 50mg PO q24h PLUS Clofazimine 150mg PO monthly and 50mg q48h <10 years old: Rifampicin 10mg/kg PO monthly PLUS Dapsone 2mg/kg PO q24h PLUS Clofazimine 6mg/kg PO monthly and 1mg/kg PO q48h		Duration of treatment: 1-2 years.
Impetigo *Staphylococcus aureus* *Streptococcus pyogenes*	Localised: Topical 2% Fusidic acid 2-3 times daily for 7 days outpatient Generalised: Cloxacillin 25-50mg/kg/day PO (max. 1gm/day) in 4 divided doses for 5-7 days	Cephalexin 25-50mg/kg/day PO in 2 divided doses for 5-7 days	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Necrotising fasciitis *Streptococcus* spp.*:* Group A *Streptococcus* (GABHS) Other *Streptococcus* spp. Staphylococcal*:* *Staphylococcal aureus* (MSSA and CAMRSA)	Streptococcal necrotising fasciitis: Benzylpenicillin 200,000-300,000units/kg/day IV in 4-6 divided doses PLUS Clindamycin 20-40mg/kg/day IV in 3-4 divided doses max. 2.7gm/day)		50% of patients have associated streptococcal toxic shock syndrome (STSS). Aggressive surgical debridement of the deep-seated infection is the mainstay of therapy. Combination therapy is needed with Clindamycin to block toxin production whether or not patient manifests toxic shock syndrome. Tissues should be sent for Gram staining and C&S. IVIG can be used as an adjunct, typically at 1 gm/kg on Day 1, followed by 0.5mg/kg on 1-2 subsequent days.
	Staphylococcal necrotising fasciitis: Cloxacillin 200mg/kg/day IV in 4-6 divided doses PLUS Clindamycin 20-40mg/kg/day IV (max. 2.7gm/day) in 3-4 divided doses	If CA-MRSA is suspected: Vancomycin 60mg/kg/day IV in 3-4 divided doses (max. 2gm/day)	
Staphylococcal Scalded skin syndrome (SSSS) *Staphylococcus aureus*	For children < 25kg Cloxacillin 200mg/kg/day IV in 4-6 divided doses <u>Step down</u> Cloxacillin 25-50mg/kg/day PO in 4 divided doses (max. 1gm/day) For children > 25 kg Use adult dosage		Duration: 7-10 days If no positive blood culture associated with SSSS, then IV therapy can be stopped following clinical improvement and switch to oral.

References:

1. American Academy of Paediatrics Committee on Infectious Diseases. Red Book: Report of the committee on Infectious Diseases (2018).
2. Guidelines for the diagnosis and management of skin and soft tissue infections: 2014 Update by the Infectious Diseases Society of America (IDSA): Clin Infect Dis 2014;59:e10.
3. National Antimicrobial Guideline, Third Edition. Petaling Jaya: Ministry of Health, Malaysia; 2019
4. The Sanford guide to Antimicrobial therapy 2018.

TROPICAL AND OTHER INFECTIONS

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Scrub Typhus **Orientia tsutsugamushi**			
Uncomplicated	Doxycycline Child <45kg 2-4 mg/kg/day PO q12h for 7 days Child> 45 kg use adult dose.	*Azithromycin 20mg/kg PO stat	
Complicated (ARDS, septic shock, myocarditis, meningoencephalitis, hepatitis, renal failure)	*Azithromycin 10-15mg/kg/day q24h for 5 days	If not responding to Azithromycin: Rifampicin 10-15mg/kg q24h for 5 days	*Recommend for early IV to Oral switch once symptoms improve or stable.
Brucellosis ***Brucella melitensis, Brucella abortus, Brucella suis, Brucella canis***			
Non focal disease	Doxycycline 2-4mg/kg/day PO q12h for 6 weeks PLUS Gentamicin 5mg/kg/24h IV for 7 days	Doxycycline 2-4mg/kg/day PO q12h for 6 weeks PLUS Rifampicin 600-900mg max (15mg/kg) PO q24h for 6 weeks	
Spondylitis/Sacroiliitis	Doxycycline 2-4mg/kg/day PO q12h for ≥ 12 weeks PLUS Gentamicin 5mg/kg/24h IV for 7 days PLUS Rifampicin 15mg/kg PO q24h for ≥ 12 weeks		
Neurobrucellosis	Doxycycline 2-4mg/kg/day PO q12h* PLUS Rifampicin 15mg/kg PO q24h* PLUS Ceftriaxone 100mg/kg/day IV q12h**		*At least 6 weeks ** Until CSF returns to normal.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
Endocarditis	Rifampicin 15mg/kg q24h for 5 days PLUS Doxycycline 2-4mg/kg/day q12h (for child >8yr old) PLUS Trimethoprim-sulfamethoxazole 8mg/kg/day of TMP PO q12h PLUS Gentamicin 5mg/kg/24h IV for 2-4 weeks		Duration: 45 days to 6 months. Surgery Needed.
Pregnancy*	Rifampicin 600-900mg (15 mg/kg) PO q24h for 6 weeks	Rifampicin 600-900mg (15 mg/kg) PO q24h for 4 weeks PLUS Trimethoprim-sulfamethoxazole 8-10mg/kg (of trimethoprim) in 2-4 divided doses for 4 weeks	*Not much data.
LEPTOSPIROSIS ***Leptospira* spp.**			
Mild to Moderate disease	Doxycycline 100mg PO q12h for 5-7 days	Azithromycin 10mg/kg/day stat on D1 followed by 5mg/kg/day for total of 5 days	
Severe disease *(Leptospiral pulmonary syndrome, multiorgan involvement, sepsis)*	Ceftriaxone 75-100 mg/kg/day q24h for 7 days (to deescalate to Benzylpenicillin once symptoms improve/stable) OR Benzylpenicillin 25-50 mg/kg/dose q6h for 7 days		May consider Methylprednisolone 500-1000 mg IV for 3 days if pulmonary hemorrhage present. However, there is insufficient evidence to support the routine use corticosteroid.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred Treatment	Alternative Treatment	
TETANUS			
Causative organism *Clostridium tetani*	Metronidazole 10mg/kg/dose q6-8h for 7-10 days PLUS Human Tetanus Immunoglobulin 3000-6000IU IM stat PLUS Anti-tetanus toxoid vaccine IM (initiate age appropriate active immunization at a different site)	Benzylpenicillin 25-50 mg/kg/dose q6h for 7 days PLUS Human Tetanus Immunoglobulin 3000-6000IU IM stat PLUS Anti-toxoid vaccine IM (initiate age appropriate active immunization at a different site)	Human Tetanus Immunoglobulin 500IU might be as effective as higher doses of 3,000 to 6,000IU and causes less discomfort. All patients with tetanus should undergo wound debridement to eradicate spores and necrotic tissue.
Melioidosis ***Bukholderia pseudomallei***			
Intensive Therapy (Uncomplicated)	Ceftazidime 100-120mg/kg/24h IV q6-8h (in children) Adults: 2gm IV q6h for 10-14 days PLUS *Trimethoprim-sulfamethoxazole (Dose as per eradication therapy below)		*Add on Trimethoprim-sulfamethoxazole in eye, neurologic, testicular, prostatic, pericardium, bone and joint melioidosis. Drainage of abscesses should be attempted wherever appropriate such as pericardial and prostatic abscess, and empyema. Duration of intensive therapy: ▪ Skin, bacteraemia with no foci, mild pneumonia: 2 weeks ▪ Complicated pneumonia, prostatic, deep-seated foci, septic arthritis: 4 weeks ▪ Osteomyelitis: 6 weeks Neurologic/CNS: 8 weeks To use clinical judgement to guide prolongation of intensive phase if improvement is slow/ persistent bacteraemia
Intensive Therapy (Complicated) (Severe melioidosis or neuromelioidosis)	Meropenem 75mg/kg/24h IV q8h if neurologic, 120mg/kg/day q8h) OR Imipenem 50mg/kg/24h IV q6h PLUS *Trimethoprim-sulfamethoxazole (Dose as per eradication therapy below)		
Eradication/Maintenance Therapy	Trimethoprim-sulfamethoxazole 8-10mg/kg (of trimethoprim) in 2-4 divided doses for 4 weeks	Amoxicillin-clavulanate 35-50mg/kg/day in 2-3 divided doses	Duration of eradication therapy: ▪ Osteomyelitis, Neurologic/CNS: 24 weeks ▪ Others: minimum 12 weeks
MALARIA : Refer to National Guidelines			

Infection/Condition and Likely Organism	Treatment		Comments
	Preferred therapy	Alternative therapy	
OPPORTUNISTIC INFECTIONS IN HIV PATIENTS			
Various co-infections, comorbidities and other health conditions are common among PLHIV. Opportunistic infections (OI) are defined as infections that are more frequent or more severe because of immunosuppression in HIV-infected patients. These are the most important cause of morbidity and mortality in this population. Cotrimoxazole Prevention Therapy (CPT): ▪ CPT is a cost-effective intervention effective against following infections in HIV positive patients: ▪ Common bacterial infections, including bacterial pneumonia, septicaemia. ▪ Diarrhoea, including that caused by Cystoisospora belli. ▪ Malaria. ▪ Toxoplasmosis. ▪ Pneumocystis pneumonia (PCP, primary or recurrent). CPT for children should be started for: ▪ age 6wk -1 year with any CD4 count ▪ 1-2 year <750 CD4 count ▪ 2-5yr <500 CD4 count ▪ >5yr <200 CD4 count ▪ All with severe and advanced HIV disease (WHO stage 3 or 4) ▪ All aged 6 weeks and born to HIV infected mothers till HIV is ruled out. The regimen is: 150 mg TMP/m2/day PO divided q12hr for 3 days a week or alternate days or daily. Continuation of CPT should be as follow: Lifelong (irrespective of CD4 count) if client is not in ART CPT must be discontinued in the following situation Severe cutaneous reaction, such as Steven-Johnson syndrome, renal and /or hepatic failure and severe hematological toxicity. Timing of CPT: Cotrimoxazole and ART should not be started at the same time. Cotrimoxazole should be started and after 2 weeks ART should be initiated if the individual is stable on Cotrimoxazole and has no rash. Alternative to Cotrimoxazole In patients intolerant to Cotrimoxazole, Dapsone 100 mg once daily is the first alternative medicine.			

Infection/Condition and Likely Organism	Treatment		Comments
	Preferred therapy	Alternative therapy	
Tuberculosis			
Among PLHIV, TB is the most frequent life-threatening OIs and a leading cause of death accounting for about a third of all mortality. ART should be provided to all PLHIV with active TB disease. HIV care setting should implement WHO Three I's strategy: Intensified TB case-finding. Isoniazid Preventive Therapy (IPT). Infection control at all clinical encounters. Isoniazid Preventive Therapy (IPT) Preventive therapy against TB is the use of anti-TB drugs in individuals with latent Mycobacterium tuberculosis infection regardless of CD4 cell count or ART status in order to prevent progression to active tuberculosis. IPT should only be used in patients whom active tuberculosis has been excluded, active patient follow-up is possible and high-level adherence can be attained and should be provided for 6 months. Cotrimoxazole and ART should not be started at the same time as IPT. Regimen: Isoniazid 300 mg daily for 6 months. Vitamin B6 25 mg/day (pyridoxine) should be given together with IPT for 6 months. TB management among PLHIV: All HIV-infected patients with diagnosis of active TB should be put on TB treatment immediately. ATT regimen is same for PLHIV as for non-HIV patients. ART should be started in all TB patients, including those with drug resistant TB, irrespective of CD4 count. Anti-tubercular treatment should be initiated first, followed by ART as soon as possible within the first 8 weeks of treatment (2 weeks, if CD4 <50 cells). In all HIV-infected pregnant women with active TB, ART should be started as early as feasible, both for maternal health and for elimination of vertical transmission of HIV. (For ART dug choice in TB co-infection refer to National HIV Testing and Treatment guideline 2020)			
Cryptococcal infection Causative organism *Cryptococcus neoformans*			
The incidence of cryptococcal meningitis increases as the CD4 count falls below 100 cells/ml and most cases occur when CD4 count falls below 50 cells/ml. Mostly they present as sub-acute meningitis or meningoencephalitis with the following symptoms: ■ Fever. ■ Malaise. ■ Headache. ■ Neck stiffness and photophobia (i.e. meningeal symptoms in 25-30%). ■ Altered mental status/confusion, personality changes, memory loss. ■ Impaired consciousness and coma. ■ Focal signs, including cranial nerve palsy.			

Infection/Condition and Likely Organism	Treatment		Comments
	Preferred therapy	Alternative therapy	
Induction phase	Cryptococcal meningitis, non CNS extrapulmonary cryptococcosis and diffuse pulmonary disease Amphotericin B IV (0.7-1 mg/kg/day) PLUS Flucytosine PO 25 mg/kg q6h Non CNS cryptococcosis with mild to moderate symptoms or focal pulmonary cryptococcosis: Fluconazole: 6-12 mg/kg q24h IV or PO	In decreasing order of efficacy Preferred alternative: Amphotericin B IV 0.7-1 mg/kg/day PLUS Fluconazole 6-12 mg/kg q24h IV or PO Option 2 (less efficient) 5FC (Flucytosine)25 mg/kg q6h PLUS Fluconazole 6-12 mg/kg q24h IV or PO Option 3 (Least efficient) Fluconazole 1200 mg/day	Amphotericin B therapy should be administered in qualified health facilities capable of close clinical and Laboratory monitoring. Dosage of Amphotericin B and Flucytosine should be adjusted to creatinine clearance rate. Opening CSF pressure should always be measured at initiation of treatment and when lumbar puncture is performed. Repeat LPs are essential to effectively manage raised intracranial pressure. Corticosteroids and mannitol are ineffective to decrease intracranial pressure in Cryptococcus meningitis.
Consolidation phase 8 week Followed by maintenance phase	Fluconazole 6-12 mg/kg q24h IV or PO	If induction phase with Fluconazole 1200 mg/day: Consolidation with Fluconazole 800 mg/day	
Maintenance Phase At least 12 months: Fluconazole can be stopped in patients who have been on ART and have CD4 consistently above100 cells/mm^3 for at least 6 months. If there is fall in CD4 count, Fluconazole should be restarted again	Fluconazole 6-12mg/kg/day		

Infection/Condition and Likely Organism	Treatment		Comments
	Preferred therapy	Alternative therapy	
Pneumocystis jiroveci (carinii*) interstitial pneumonia (PJP/PCP)			
Treatment	Trimethoprim-sulfamethoxazole 15-20mg/kg/day [TMP component] IV/PO in 304 divided doses	<u>For mild to moderate cases:</u> (PO_2 70-80mmHg) Clindamycin 10-40mg/kg/day in 3 divided doses PLUS Primaquine 0.25mg/kg/day q24h OR Dapsone 1-2 mg/kg/day q24h PLUS Trimethoprim 15 mg/kg/day PO in 3-4 divided doses	Duration 21 days Patients with severe disease should receive corticosteroids as soon as possible (within 72 hours of starting PCP treatment): <u>Prednisolone dose:</u> 40 mg PO q12h for 5 days, then 40mg PO q24h for 5 days, then 20 mg PO q24h for 11 days (Total duration is 21 days)
		For severe cases: (PO_2 < 70mmHg) Pentamidine 4 mg/kg/day IV (in 1 pint D5% or NS run over 1-2 hours) OR Clindamycin 10-40mg/kg/day in 3 divided doses PLUS Primaquine 0.25mg/kg/day q24h	Trimethoprim-sulfamethoxazole and Clindamycin has excellent bioavailability, and may switch to PO after clinical improvement. Patients given dapsone or primaquine should be tested for G6PD deficiency.

Infection/Condition and Likely Organism	Treatment		Comments
	Preferred therapy	Alternative therapy	
Prophylaxis (Primary and secondary) Indications: CD4 count <200 cells/µl CD4 count 200-250 Cells/µl if ART cannot be initiated	Trimethoprim-sulfamethoxazole 20-50mg/kg/day in 2 or 3 divided doses for 7-14 days	Dapsone 1-2 mg/kg/day q24h OR Aerosolized Pentamidine 4mg/kg/dose monthly via ultrasonic nebulizer	Discontinuation: Can consider when CD4 100-200 cells/µL if HIV RNA is suppressed for 3-6 months with ART. Restarting prophylaxis: CD4 count falls to <200 cells/µL or PCP occurs at a CD4 > 200 cells/µL (lifelong prophylaxis should be considered). Patients receiving Sulfadiazine-Pyrimethamine or Sulfadoxine-Pyrimethamine for treatment or suppression of toxoplasmosis do not require additional prophylaxis for PCP.
Toxoplasma gondii Encephalitis			
Acute Infection (up to 97% patients are Toxo IgG +ve)	Trimethoprim-sulfamethoxazole 10mg/kg/day (TMP component) IV/PO in 2 divided doses	Pyrimethamine: 2 mg/kg loading dose for 2 days followed by 1mg/kg/day for 4 weeks PLUS Folinic acid 10-25 mg IV/PO q24h PLUS Clindamycin 10-40mg/kg/day in 3 divided doses OR *Sulfadiazine 100-200mg/kg/day in 4 divided doses	Duration: At least 6 weeks Adjunctive corticosteroids (E.g. dexamethasone) should be administered when clinically indicated to treat mass effect associated with focal lesions or associated oedema but should be discontinued as soon as clinically feasible. *Pyrimethamine and (Sulfadoxine-Pyrimethamine) can be used interchangeably depending on availability;

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Suppressive/Maintenance	Trimethoprim-sulfamethoxazole 8-10 mg/kg (of trimethoprim) in 2-4 divided doses for 4 weeks	Dapsone 1-2 mg/kg/day q24h OR Clindamycin 10-40mg/kg/day in 4 divided doses PLUS Pyrimethamine 2 mg/kg loading dose for 2 days followed by 1 mg/kg daily for 4 weeks PLUS Folinic acid 10-25 mg PO twice-weekly OR Sulfadiazine 0.5-1 gm PO q6h PLUS Pyrimethamine 25-50 mg PO q24h PLUS Folinic acid 10-25 mg PO q24h	Discontinuation: Consider when CD4>200 cells/µL if HIV RNA is suppressed for 6 months with ART.
Primary Prophylaxis Indications: Toxoplasma IgG +ve with CD4<100	Trimethoprim-sulfamethoxazole 8-10 mg/kg (of trimethoprim) in 2-4 divided doses for 4 weeks	Dapsone 1-2mg/kg/day PLUS Pyrimethamine 50 mg PO once weekly PLUS Folinic acid 25 mg PO once weekly OR Dapsone 200 mg PO once weekly PLUS Pyrimethamine 75 mg PO once weekly PLUS Folinic Acid 25 mg PO once weekly	Discontinuation: CD4>200 cells/µL for > 3 months. CD4>100 cells/µL, if HIV viral load suppressed for 3 to 6 months.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Mucocutaneous Candidiasis			
Oropharyngeal (oral thrush)	Nystatin suspension 500,000units PO 4-5 times daily OR *Itraconazole Oral Clotrimazole mouth paint locally twice daily for 5-7 days	Fluconazole 6 mg/kg loading dose followed by 3 mg/kg q24h for 7-10 days	Duration: 7-14 days. Chronic suppressive therapy is usually not recommended. *Itraconazole: Absorption depends on gut acidity. Take a capsule with food and acidic beverages (e.g.: Cola drinks). Avoid PPIs and H2 blockers. Significant drug-drug interaction with p450 enzyme inducers (e.g.: Rifampicin). Consider fluconazole if in doubt.
Oesophageal	Itraconazole 3-5 mg/kg q24h	Fluconazole 6 mg/kg loading dose followed by 3 mg/kg q24h for 7-10 days OR Amphotericin B deoxycholate 0.6mg/kg IV q24h	Duration: 14-21 days. Candidiasis is the most common cause of oesophagitis with HIV infection, but CMV, HSV and aphthous ulcerations can present with similar complaints. Endoscopy required with unusual presentations or lack of response to azole within several days.
Histoplasmosis (Histoplasma capsulatum)			
Moderate to severe disseminated disease or CNS involvement	Induction therapy *Amphotericin B deoxycholate 0.7-1.0mg/kg IV q24h for at least 2 weeks Followed by Maintenance therapy Itraconazole 200 mg PO q8h for 3 days, then 200 mg q12h for at least 12 months		*The lipid formulations of amphotericin B may be used instead if available. All the triazole antifungals have the potential to interact with certain ARV agents and other anti-infective agents.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Mild disseminated disease (Blood culture positive but patient is asymptomatic)	Induction and maintenance therapy *Itraconazole 3-5 mg/kg q24h	For patients intolerant to Itraconazole: Fluconazole 6 mg/kg loading dose followed by 3 mg/kg q24h for 7-10 days OR Voriconazole 400 mg PO q12h on day 1, then 200 mg PO q12h	Duration: At least 12 months *Itraconazole: Absorption depends on gut acidity. Take a capsule with food and acidic beverages (e.g.: Cola drinks). Avoid PPIs and H2 blockers.
Chronic Suppressive therapy (Secondary prophylaxis) <u>Indication:</u> Severe disseminated or CNS infection after completion of at least 12 months of treatment Relapsed despite appropriate initial therapy	*Itraconazole 3-5 mg/kg q24h	Fluconazole 6 mg/kg loading dose followed by 3 mg/kg q24h for 7-10 days	Discontinuation: Received azole for > 1 year, AND Negative fungal blood cultures, AND CD4 count > 150 cells/µL for ≥6 months on ART Restarting secondary prophylaxis: CD4 count < 150 cells/µL *Itraconazole: Absorption depends on gut acidity. Take a capsule with food and acidic beverages (e.g. Cola drinks). Avoid PPIs and H2 blockers.
Penicilliosis (Penicillium/Talaromyces marneffei)			
Acute infection (Severely-ill patients)	Induction therapy *Amphotericin B deoxycholate 0.6-0.7mg/kg IV for 2 weeks Must be followed by consolidation therapy	Voriconazole 6 mg/kg IV q12h on day 1, then 200 mg PO q12h for at least 3 days Must be followed by consolidation therapy.	*The lipid formulations of amphotericin B may be used instead If available. All the triazole antifungals have the potential to interact with certain ARV agents and other anti-infective agents. **Itraconazole: Absorption depends on gut acidity: Capsule: Take with food and acidic beverage (e.g.: cola drinks).
	Consolidation therapy **Itraconazole 3-5mg/kd/day PO q12h for 10 weeks Must be followed by maintenance therapy	Fluconazole 6 mg/kg loading dose followed by 3 mg/kg q24h for 10 weeks Must be followed by maintenance therapy	

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Acute infection (Mild disease)	**Itraconazole 3-5mg/kd/day for at least 8-12 weeks Must be followed by maintenance therapy	Fluconazole 6 mg/kg loading dose followed by 3 mg/kg q24h for at least 8-12 weeks Must be followed by maintenance therapy	Liquid preparation: Take on empty stomach. Avoid PPIs and H2 blockers.
Maintenance therapy/ Secondary prophylaxis	**Itraconazole 3-5mg/kd/day	Fluconazole 6 mg/kg loading dose followed by 3 mg/kg q24h	Discontinuation: CD4 count>100 cells/µL for ≥6 months on ART.
Mycobacterium Avium Complex (MAC) Disease			
Treatment	Clarithromycin 15mg/kg/day in 2 divided doses PLUS Ethambutol 15 mg/kg PO q24h **PLUS 3rd/4th drug: Amikacin 10-15gm/kg IV q24h OR Streptomycin 15 mg/kg IM q24h OR Levofloxacin 500 mg PO q24h OR Ciprofloxacin 500-750 mg PO q12h	*Azithromycin 20mg/kg q24hr PLUS Ethambutol 15 mg/kg PO q24h **PLUS 3rd/4th drug: Amikacin 10-15gm/kg IV q24h OR Streptomycin 15 mg/kg IM q24h OR Levofloxacin 500 mg PO q24h OR Ciprofloxacin 20 mg/kg/day for 7 days	Duration: At least 12 months. * Azithromycin: use if drug interaction or intolerance precludes the use of Clarithromycin. **Addition of 3rd/4th drug should be considered for patients with disseminated disease, CD4 count <50 cells/µL or in the absence of effective ART. Discontinuation: Consider if the patient is on ART and viral load is suppressed, CD4 > 100 cells/µL >6 months, asymptomatic or MAC, and has completed > 12 months of therapy.
Maintenance/ Secondary Prophylaxis	Same as the treatment regimen		Restarting secondary prophylaxis: CD4 < 100 cells/µL again.
Primary Prophylaxis Indications: CD4 < 750 cells/µL in<1yr CD4<500 cells/µL1-2yr CD4<75 cells/µL2-6 yr CD4<50 cells/µL>6yr or previous infection. Ruled out active MAC and TB	Azithromycin 20 mg/kg PO once weekly	Clarithromycin 15mg/kd/day PO q12h	Discontinuation: Consider if patient is on ART AND Viral load is suppressed, CD4 > 100 cells/µL ≥ 3 months

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Cytomegalovirus (CMV) Disease			
Treatment (CMV Retinitis) (Immediate Sight Threatening Lesions (Adjacent to the Optic Nerve or Fovea)	Intravitreal injections of Ganciclovir (2mg/injection) biweekly until scarring PLUS Ganciclovir 5 mg/kg IV q12h for OR Valganciclovir 14-16 mg/kg/dose q12h Followed by maintenance	Intravitreal injections of Foscarnet (2mg/injection) biweekly until scarring PLUS Ganciclovir 5 mg/kg IV q12h for OR Valganciclovir 14-16 mg/kg/dose PO q12h Followed by maintenance	Duration: 14-21 days Immune recovery is essential for successful treatment. Start ART within 2 weeks if possible
Treatment *(CMV Retinitis)* (For Small Peripheral Lesions)	Ganciclovir 5mg/kg IV q12h Followed by maintenance	Valganciclovir 14-16 mg/kg/dose PO q12h Followed by maintenance	
Treatment *(Extraocular CMV disease)* (Oesophagitis, colitis, interstitial pneumonitis, neurological disease)	Ganciclovir 5mg/kg IV q12h Followed by maintenance	May consider switch to Valganciclovir 14-16mg/kg/dose PO q12h once patient tolerate orally (in CMV oesophagitis and colitis only) Followed by maintenance	Duration: 21-42 days or until signs and symptoms have been resolved. Immune recovery is essential for successful treatment. Start ART within 2 weeks if possible.
Maintenance/ Secondary prophylaxis (CD3 <100 cells/µL)	Ganciclovir 5mg/kg IV q24h 5-7 times weekly	Valganciclovir 14-16 mg/kg/dose PO q12h	Discontinuation: Consider if the patient is on ART and viral load well suppressed, CD4 > 100 cells/µL ≥ 3 months after 3-6 months of CMV treatment. Maintenance therapy is generally not necessary; ART offers best hope for prevention of relapses.
Herpes Simplex Virus (HSV) Infections			
Refer to other sections - Oral infection, CNS infection and National STI guidelines			
Varicella-Zoster Virus (VZV Diseases)			
Refer to Skin and Soft Tissue Infection			

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Bacterial Enteric Infections			
Salmonellosis Salmonella non-typhi	Ampicillin 100-200mg/kg/day IV q4-6h OR Trimethoprim-sulfamethoxazole 20-50mg/kg/day in 2 or 3 divided doses for 7-14 days	Ciprofloxacin 20 mg/kg/day for 7 days OR Ceftriaxone 75 mg/kg/day q24h for 7 days	Susceptibility profile may help guide final choice. Duration: IF CD4≥200: 7-14 days. If CD4<200 and with bacteraemia: 6 weeks. Longer course with debridement and drainage needed for persistent bacteraemia or metastatic disease.
PML (Progressive Multifocal Leukoencephalopathy)			
Polyomavirus JC virus (JCV)	No effective therapy exists		With ART, some patients improve and others stabilize. Few may deteriorate due to immune reconstitution.
Isospora belli Infection			
Initial Therapy	Trimethoprim-sulfamethoxazole 15-20bmg/kg/day of TMP in 2 or 3 divided doses for 7-14 days	Pyrimethamine 50-75 mg PO q24h PLUS Folinic acid 10-25 mg PO q24h OR Ciprofloxacin 20 mg/kg/day for 7 days	Duration: 10 Days.
Cryptosporidiosis			
Cryptosporidium spp.	Symptomatic treatment of diarrhea		Effective ART (to increase CD4 > 100 cells/μL) can result in complete, sustained clinical, microbiological and histologic resolution.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Microsporidiosis			
Microsporidium spp.	Albendazole 10-15mg/kg/day PO q12h for 2-4 weeks PLUS Symptomatic treatment of diarrhea (The best treatment option is ART and fluid support)		Effective ART (to increase CD4 > 100 cells/µL) can result in complete, sustained clinical, microbiological and histologic resolution.
Syphilis (Treponema pallidum Infection) Refer to National STI guidelines			
Bartonellosis			
For Bacillary Angiomatosis, Peliosis hepatis, Bacteraemia, and Osteomyelitis	Doxycycline 4 mg/kg stat OR Erythromycin 30-50mg/kg/day PO/IV q6h 30-50mg/kg/day in 3-4 divided doses	Azithromycin 10mg/kg/day stat on D1 followed by 5mg/kg/day for total of 5 days OR Clarithromycin 15mg/kg/day in 2 divided doses	Duration: At least 3 months. If relapse occurs after initial (>3 month) Course of therapy, long-term suppression with Doxycycline or a macrolide is recommended as long as CD4 < 200 cells/µL.
Other Severe Infection (or CNS involvement)	Doxycycline 4mg/kg stat PLUS* Rifampicin 10-15mg/kg q24h for 5 days OR Erythromycin 60-100mg/kg/day PO/IV q6h PLUS Rifampicin 10-15mg/kg q24h for 5 days		

INFECTIONS IN IMMUNOCOMPROMISED PATIENTS

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
First line: Febrile neutropenia Fever 38ºC, neutrophil<500mm^3 Enterobacteriaceae *(Klebsiella* spp.*, Escherichia coli etc.), Pseudomonas* spp., aerobic Grampositive *(Staphylococci, Streptococci)*	Cefepime 50mg/kg/dose IV in q8h	Piperacillin-tazobactam 300mg/kg/day IV in 3-4 divided doses (max. 16gm/day of piperacillin component)	Use monotherapy with an anti-pseudomonal β-lactam agents.
Second line: Persistent fever > 72 hours* Enterobacteriaceae *(Klebsiella* spp.*, Escherichia coli etc.),* Pseudomonas, aerobic Gram positive *(Staphylococci, Streptococci), Enterococci* or other resistant organisms *DO NOT MODIFY INITIAL COVERAGE BASED SOLELY ON PERSISTENCE OF FEVER	Meropenem 60-120mg/kg/day IV in 3 divided doses (max. 6gm/day) PLUS* Vancomycin 60mg/kg/day in 3-4 divided doses (max. 2gm/day)		Escalate to second line if patient unstable to cover resistant Gram-negative, Gram-positive and anaerobes. Consider adding Vancomycin in suspected catheter-related infections, positive blood culture for Gram-positive cocci, hypotensive patients and patients who are known to be colonised with MRSA. In patients responding to initial empiric antibiotic therapy, discontinue double coverage (empirical Vancomycin, if initiated) or double gram negative after 24-72 hours if there is no specific microbiologic indication to continue combination therapy.

Infection/Condition and Likely Organism	Suggested Treatment		Comments
	Preferred	Alternative	
Third line: Fever > 4-7 days with no identified source of fever Candida spp., Aspergillus spp., Fusarium spp. Viral: Respiratory viruses are the most common, HSV, VZV	Imipenem-cilastatin 60-100mg/kg/day IV in 4 divided doses (max. 4gm/day) PLUS Amphotericin B 0.5mg/kg/dose IV q24h and gradually escalate by (0.25- 1mg/kg/dose q24h (max. 1.5mg/kg/day) OR Lipid formulation of amphotericin B 3-5mg/kg/day	Imipenem-cilastatin 60-100mg/kg/day IV in 4 divided doses (max. 4gm/day) PLUS Caspofungin 70mg/m^2/dose IV q24h at Day 1, then 50mg/m2/dose IV q24h	1/3 of febrile neutropenic patients with persistent fever >1 week have systemic fungal infections. In patients at high risk of invasive fungal disease with prolonged (≥96 hours) febrile neutropenia unresponsive to broad spectrum antibacterial agents, initiate antifungal. Amphotericin based anti-fungal is considered more broad spectrum than echinocandin (e.g. Caspofungin)

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Appendix- 1

AWaRe Classification- WHO (updated on 2021)

Access Group

This group includes antibiotics that have activity against a wide range of commonly encountered susceptible pathogens while also showing lower resistance potential than antibiotics in the other groups. Selected Access group antibiotics are recommended as essential first or second choice empiric treatment options for infectious syndromes reviewed by the EML Expert Committee and are listed as individual medicines on the Model Lists of Essential Medicines to improve access and promote appropriate use.

Antibiotic	Class	Adverse reactions
Amikacin	Aminoglycosides	Ototoxicity (Neurotoxicity – vestibular and permanent bilateral auditory ototoxicity), Nephrotoxicity, Neuromuscular blockade
Amoxicillin	Penicillins	Antibiotic-associated diarrhea (Non-Clostridioides difficile) diarrhea, nausea, vomiting, Clostridioides difficile infection (CDI) – CDAD and colitis, hypersensitivity reactions (immediate and delayed)- skin rash/anaphylaxis, SJS, TEN, DRESS
Amoxicillin-clavulanate	Beta-lactam/beta-lactamase-inhibitor	Antibiotic-associated diarrhea (Non-Clostridioides difficile) diarrhea, nausea, vomiting, Clostridioides difficile infection (CDI) – CDAD and colitis, hypersensitivity reactions (immediate and delayed)- skin rash/anaphylaxis, SJS, TEN, DRESS, DILI (Cholestatic hepatitis)
Ampicillin	Penicillins	Hypersensitivity, brain disease (penicillin induced),GI side effects, agranulocytosis
Ampicillin-sulbactam	Beta-lactam/beta-lactamase-inhibitor	Pain at injection site, phlebitis, skin rash, diarrhea
Benzathine penicillin G	Penicillins	NOT FOR IV or DO NOT mix with other IV solutions, Allergy, CDAD, increased risk of seizures, Nicolau syndrome (tissue necrosis at injection site)
Benzylpenicillin	Penicillins	Thrombophlebitis, hypersensitivity , CDAD, neutropenia, Jarisch-Herxheimer reaction, increased risk of seizure in renal impairment, electrolyte imbalance in high doses
Cefadroxil	First-generation-cephalosporins	Diarrhea, hypersensitivity, CDAD
Cephalexin	First-generation-cephalosporins	CDI, hemolytic anemia, hypersensitivity reactions, dose adjustment in severe renal impairment
Cefazolin	First-generation-cephalosporins	Hypersensitivity reactions, CDI, hypotension, GI side effects, vulvovaginal pruritus, oral candidiasis
Cefradine	First-generation-cephalosporins	Diarrhea, flu like symptoms, hypersensitivity reactions

Chloramphenicol	Amphenicols	Blood dyscrasias, Gray baby syndrome, confusion, delirium, rash, diarrhea, hypersensitivity reactions, optic neuritis, caution in G6PD deficient
Clindamycin	Lincosamides	CDAD, colitis, AAD, hypersensitivity reactions, hypotension, renal impairment, thrombophlebitis (IV)
Cloxacillin	Penicillins	GI side effects, hypersensitivity reactions, hypotension, thrombophlebitis, melanoglossia, agranulocytosis
Doxycycline	Tetracyclines	Bone growth suppression, esophageal injury (PO), skin photosensitivity, skin hyperpigmentation, dental discoloration, diarrhea, hypersensitivity
Flucloxacillin	Penicillins	Nausea, diarrhea, hypersensitivity reaction, thrombophlebitis
Gentamicin	Aminoglycosides	Nephrotoxic, neurotoxicity/otoxicity, phlebitis, neuromuscular blockade, edema, CDAD, dyselectrolytemia
Metronidazole	Imidazoles	Carcinogenic in mice and rats, CNS (peripheral neuropathy, aseptic meningitis, ataxia), disulfiram like reaction, nausea, vaginitis, headache, genital pruritus, metallic taste
Nitrofurantoin	Nitrofuran-derivatives	Nausea, vomiting, CDI, DILI, peripheral neuropathy, pulmonary toxicity, headache, dizziness, loss of appetite
Ornidazole	Imidazoles	Headache, nausea, vomiting, dizziness, poor coordination, taste disturbances, skin reactions
Phenoxymethylpenicillin	Penicillins	Melanoglossia, diarrhea, nausea, oral candidiasis, vomiting, hypersensitivity
Procaine-Benzylpenicillin	Penicillins	Hypersensitivity, CNS toxicity, fibrosis/atrophy at injection site, methemoglobinemia, procaine neuropsychiatric reactions
Secnidazole	Imidazoles	Carcinogenicity in mice, nausea, dysgeusia, vulvovaginal candidiasis
Sulfadiazine	Sulfonamides	Blood dyscrasias, dermatologic reactions, hepatic necrosis, 'sulfa' allergy, superinfection
Tetracycline	Tetracyclines	Increased BUN, intracranial hypertension, photosensitivity, superinfection, rash, epigastric discomfort, pericarditis, HSP, anogenital lesion, hepatotoxicity, exacerbation of SLE, nail discoloration, enamel hypoplasia and discoloration of permanent tooth in infants and young children, aplastic anemia, abnormal bone growth, conjunctival discoloration
Tinidazole	Imidazoles	Carcinogenicity likely, seizures and peripheral neuropathy, menorrhagia, GI side effects, dysuria, pelvic pain, vulvovaginal disease, dysgeusia, fatigue, hairy tongue, thrombocytopenia, bronchospasm

Trimethoprim	Trimethoprim-derivatives	Rash, diarrhea, vomiting, photo toxicity, pruritus, hyperkalemia, hyponatremia, transaminitis, methemoglobinemia, cytopenia, eosinophilia, megaloblastic anemia, glossitis, fever, hypersensitivity reactions
Trimethoprim-sulfamethoxazole	Sulfonamide-Trimethoprim-combinations	CDI, DILI, blood dyscrasias, hyperkalemia, hypoglycemia, hyponatremia, hypersensitivity reactions, kernicterus, GI side effects, toxic nephrosis (oliguria/anuria), tinnitus, fever, pulmonary injury

Watch Group

Antibiotic	Class	Adverse reactions
Azithromycin	Macrolides	QT prolongation, CDI, DILI, hypersensitivity reactions, otoxicity, diarrhea, nausea, abdominal pain, vaginitis, pain at injection site (in IV), caution in Myasthenia gravis
Cefepime	Fourth-generation-cephalosporins	CDI, hypersensitivity, neurotoxicity, positive DCT (without hemolysis), GI side effects, hypophosphatemia, phlebitis, eosinophilia, transaminitis
Cefixime	Third-generation-cephalosporins	Diarrhea, dyspepsia, Immune-mediated hemolytic anemia, dermatologic reactions, hypersensitivity, superinfection
Cefoperazone	Third-generation-cephalosporins	GI side effects, hypersensitivity, neutropenia, transaminitis, transient rise in creatinine, seizure in renal impairment, superinfection
Cefotaxime	Third-generation-cephalosporins	Arrhythmia, granulocytopenia, allergy, superinfection, GI side effects, eosinophilia, phlebitis, fever
Cefpodoxime	Third-generation-cephalosporins	Diaper rash, diarrhea, nausea, abdominal pain, vaginitis, allergy, headache
Ceftazidime	Third-generation-cephalosporins	Elevated INR, hemolytic anemia, hypersensitivity, superinfection, increased LDH/GGT, eosinophilia, positive DCT, transaminitis, phlebitis, blood dyscrasias, seizure, increased serum creatinine
Ceftriaxone	Third-generation-cephalosporins	Ceftriaxone-calcium precipitation, CDI, hemolytic anemia, hypersensitivity reactions, kernicterus (displaces bilirubin from albumin- Do not use in hyperbilirubinemic neonates), local skin tightness in IM, flushing, diaphoresis, pruritus, GI side effects, vaginitis, casts in urine, blood dyscrasias, transaminitis, candidiasis, phlebitis, chills, headache, dizziness, increased serum creatinine
Cefuroxime	Second-generation-cephalosporins	Elevated INR, hypersensitivity, superinfection, diarrhea (duration dependent), phlebitis, diaper rash, nausea, vomiting, unpleasant taste, vaginitis, decreased hemoglobin, eosinophilia, transaminitis, Jarisch-Herxheimer reaction
Ciprofloxacin	Fluoroquinolones	Tendinopathy and tendon rupture, peripheral neuropathy, CNS effects, exacerbation of myasthenia gravis, aortic aneurysm/aortic dissection, arthropathy/arthralgia, CDI, dysglycemia, hepatotoxicity, hypersensitivity reactions, skin photosensitivity, QT prolongation, GI side effects, fever
Clarithromycin	Macrolides	Arrhythmia, QT prolongation, hepatitis, hypersensitivity, superinfection, headache, insomnia, dysgeusia, GI side effects, increased BUN

Ertapenem	Carbapenems	Hypersensitivity reactions, CNS effects, superinfection, diarrhea, arrhythmias, phlebitis, dermatitis, dyselectrolytemia, GI side effects, hematuria, proteinuria, blood dyscrasias, transaminitis, arthralgia, bronchoconstriction, fever
Erythromycin	Macrolides	Arrhythmia, QT prolongation, superinfection, seizure, skin rash, hypersensitivity, GI side effects, hearing loss, interstitial nephritis
Imipenem-cilastatin	Carbapenems	Hematological abnormalities, transaminitis, proteinuria and seizures in children, phlebitis, GI side effects, CNS effects, hypersensitivity
Levofloxacin	Fluoroquinolones	Tendinopathy and tendon rupture, peripheral neuropathy, CNS effects, exacerbation of myasthenia gravis, aortic aneurysm/aortic dissection, arthropathy/arthralgia, CDI, dysglycemia, hepatotoxicity, hypersensitivity reactions, skin photosensitivity, QT prolongation, GI side effects, cytopenia
Meropenem	Carbapenems	CNS toxicity, CDI, hypersensitivity reactions, peripheral vascular disease, pruritus, hypoglycemia, GI side effects, anemia, hypervolemia, jaundice, asthenia, backache, pharyngitis, phlebitis
Moxifloxacin	Fluoroquinolones	Tendinopathy and tendon rupture, peripheral neuropathy, CNS effects, exacerbation of myasthenia gravis, aortic aneurysm/aortic dissection, arthropathy/arthralgia, CDI, dysglycemia, hepatotoxicity, hypersensitivity reactions, skin photosensitivity, QT prolongation, GI side effects, fever
Ofloxacin	Fluoroquinolones	Tendinopathy and tendon rupture, peripheral neuropathy, CNS effects, exacerbation of myasthenia gravis, aortic aneurysm/aortic dissection, arthropathy/arthralgia, CDI, dysglycemia, hepatotoxicity, hypersensitivity reactions, skin photosensitivity, QT prolongation, GI side effects, fever
Piperacillin-tazobactam	Beta-lactam/beta-lactamase-inhibitor	CDI, DITP, myelosuppression, hypersensitivity reactions, nephrotoxicity (more if used with vancomycin), neurotoxicity, diarrhea, phlebitis, pruritus, rash, GI side effects, headache, insomnia, myalgia, fever, positive DCT, consider sodium content in patients requiring sodium restriction
Rifampicin	Rifamycins	Hepatotoxicity, CDI, blood dyscrasias, disorder of hemostasis, hypersensitivity reactions, pulmonary toxicity, facial edema, flushing, adrenocortical insufficiency, GI side effects, hematuria, ataxia, psychosis, myasthenia, myopathy, paradoxical reaction, fever, staining of tooth
Rifaximin	Rifamycins	Peripheral edema, nausea, ascites, dizziness, fatigue, pruritus, skin rash, abdominal pain, anemia, depression, headache, arthralgia, muscle spasm, myalgia, dyspnea, nasopharyngitis, fever
Roxithromycin	Macrolides	GI side effects, hypersensitivity reactions, abdominal pain, vaginitis, headache, anorexia
Spiramycin	Macrolides	Arrhythmias, paresthesia, pruritus, rash, urticarial, GI side effects, hepatotoxicity, hypersensitivity, HSP
Streptomycin	Aminoglycosides	Neuromuscular blockade and respiratory paralysis, neurotoxicity, nephrotoxicity, hypotension, fever, dermatitis, eosinophilia, cytopenia, arthralgia, amblyopia, hypersensitivity reactions
Teicoplanin	Glycopeptides	Phlebitis, fever, hypersensitivity reactions, dizziness, headache, diarrhea, vomiting, nausea, otoxicity

Vancomycin (IV)	Glycopeptides	Hypersensitivity (Anaphylaxis, delayed), CDI, Drug induced ITP (DITP), Nephrotoxicity, cytopenia, otoxoxicity, Vancomycin infusion reaction, myalgia, HSP

Reserve Group

This group includes antibiotics and antibiotic classes that should be reserved for treatment of confirmed or suspected infections due to multi-drug-resistant organisms. Reserve group antibiotics should be treated as "last resort" options.

Antibiotic	Class	Adverse reactions
Colistin (IV)	Polymyxins	Nephrotoxicity, neurotoxicity, hypersensitivity, paresthesia, seizures, respiratory distress, fever, superinfection
Daptomycin	Lipopeptides	CDI, Eosinophilic pneumonia, hypersensitivity reactions, myopathy, rhabdomyolysis, peripheral neuropathy, vomiting, chest pain, edema, hypertension, diaphoresis, pruritus, vomiting, diarrhea, pharyngolaryngeal pain, fever, headache, insomnia
Linezolid	Oxazolidinones	CDI, lactic acidosis, myelosuppression, neuropathy (peripheral and optic), serotonin syndrome, diarrhea, leukopenia, increase lipase, GI side effects, transaminitis, dizziness, DO NOT USE within 2 weeks of MAO inhibitors use
Minocycline (IV)	Tetracyclines	Pruritus, dizziness, fatigue, skin photosensitivity, rash, tooth discoloration, enamel hypoplasia, autoimmune syndromes, benign intracranial hypertension, hepatotoxicity
Polymyxin-B	Polymyxins	Use only in hospitalized, nephrotoxicity, neurotoxicity, Neuromuscular blockade, Safety not established in pregnancy, thrombophlebitis, CDAD, facial flushing, hypocalcemia, hypochloremia, hypokalemia, hyponatremia
Tigecycline	Glycylcyclines	Increased risk of mortality, Use with caution, Diarrhea, Nausea, vomiting, phlebitis, anemia, transaminitis, hypersensitivity reaction, headache, dizziness

Appendix- 2

Antibiotics not recommended (WHO List- 2021)

The use of the fixed-dose combinations of multiple broad-spectrum antibiotics listed here is not evidence-based, nor recommended in high-quality international guidelines. WHO does not recommend their use in clinical practice.

Antibiotic Combination
acetylspiramycin/metronidazole
amikacin/cefepime
amoxicillin/bacillus coagulans/cloxacillin
amoxicillin/bacillus coagulans/dicloxacillin
amoxicillin/clavulanic acid/lactic ferments
amoxicillin/clavulanic acid/lactobacillus acidophilus
amoxicillin/clavulanic acid/nimesulide
amoxicillin/cloxacillin
amoxicillin/cloxacillin/lactic acid
amoxicillin/cloxacillin/lactobacillus acidophilus/serrapeptase
amoxicillin/cloxacillin/lactobacillus lactis
amoxicillin/cloxacillin/serrapeptase
amoxicillin/dicloxacillin
amoxicillin/dicloxacillin/saccharomyces boulardii
amoxicillin/flucloxacillin
amoxicillin/flucloxacillin/lactobacillus acidophilus
amoxicillin/metronidazole
amoxicillin/pivsulbactam
amoxicillin/sulbactam
ampicillin/bacillus coagulans/cloxacillin
ampicillin/cloxacillin
ampicillin/cloxacillin/lactobacillus acidophilus
ampicillin/cloxacillin/saccharomyces boulardii
ampicillin/dicloxacillin
ampicillin/dicloxacillin/lactobacillus acidophilus
ampicillin/flucloxacillin
ampicillin/lidocaine/sulbactam
ampicillin/oxacillin
ampicillin/sultamicillin
ascorbic acid/metamizole sodium/penicillin g /streptomycin
azithromycin/cefixime
azithromycin/cefixime/lactobacillus acidophilus
azithromycin/cefpodoxime proxetil
azithromycin/fluconazole/secnidazole

azithromycin/levofloxacin
azithromycin/ofloxacin
benzyl penicillin/streptomycin
bromelains/doxycycline/lactobacillus reuteri/lactobacillus rhamnosus/ornidazole
bromhexine/sulfamethoxazole/trimethoprim
cefaclor/clavulanic acid
cefadroxil/clavulanic acid
cefadroxil/trimethoprim
cefalexin/trimethoprim
cefdinir/clavulanic acid
cefepime/sulbactam
cefepime/tazobactam
cefixime/cefpodoxime proxetil
cefixime/clavulanic acid
cefixime/clavulanic acid/lactobacillus acidophilus
cefixime/cloxacillin
cefixime/cloxacillin/lactobacillus acidophilus
cefixime/dicloxacillin
cefixime/lactobacillus acidophilus/ofloxacin
cefixime/levofloxacin
cefixime/linezolid
cefixime/moxifloxacin
cefixime/ofloxacin
cefixime/ornidazole
cefoperazone/sulbactam
cefoperazone/tazobactam
cefotaxime/sulbactam
cefpodoxime proxetil/clavulanic acid
cefpodoxime proxetil/cloxacillin/lactobacillus acidophilus
cefpodoxime proxetil/dicloxacillin
cefpodoxime proxetil/dicloxacillin/lactobacillus acidophilus
cefpodoxime proxetil/levofloxacin
cefpodoxime proxetil/ofloxacin
cefpodoxime proxetil/sulbactam
ceftazidime/sulbactam
ceftazidime/tazobactam
ceftazidime/tobramicin
ceftibuten/clavulanic acid
ceftriaxone/sulbactam
ceftriaxone/tazobactam

ceftriaxone/vancomycin
cefuroxime axetil/clavulanic acid
cefuroxime axetil/linezolid
cefuroxime axetil/sulbactam
cefuroxime/clavulanic acid
cefuroxime/sulbactam
chloramphenicol/tetracycline
ciprofloxacin/metronidazole
ciprofloxacin/ornidazole
ciprofloxacin/tinidazole
doxycycline/tinidazole
erythromycin/sulfamethoxazole/trimethoprim
erythromycin/trimethoprim
fosfomycin/trimethoprim
gatifloxacin/ornidazole
kanamycin/penicillin g
levofloxacin/metronidazole
levofloxacin/ornidazole
meropenem/sodium/sulbactam
meropenem/sulbactam
metronidazole/norfloxacin
metronidazole/spiramycin
metronidazole/tetracycline
mezlocillin/sulbactam
ofloxacin/ornidazole
oleandomycin/tetracycline
piperacillin/sulbactam
rifampicin/trimethoprim
sulfadiazine/sulfamethoxazole/trimethoprim

Appendix- 3

Adverse Drug Reactions Reporting Form

Government of Nepal
Ministry of Health and Population
Department of Drug Administration

Adverse Drug Reactions Reporting Form

Hospital record No. or chart No. or patient ID No.....

Patient's Name:..... Sex: F/ M Age .....

Description of the adverse reaction/s: Onset date of reaction: .....

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.....

Information on Suspected Medicine				
Medicines (Brand and Generic Name, Manufacturer, Batch No., Dosage Form)	**Daily dosage**	**Date started**	**Date stopped**	**Reason for use**

Additional relevant information (eg. medical history, test result, known allergies, drug interactions)

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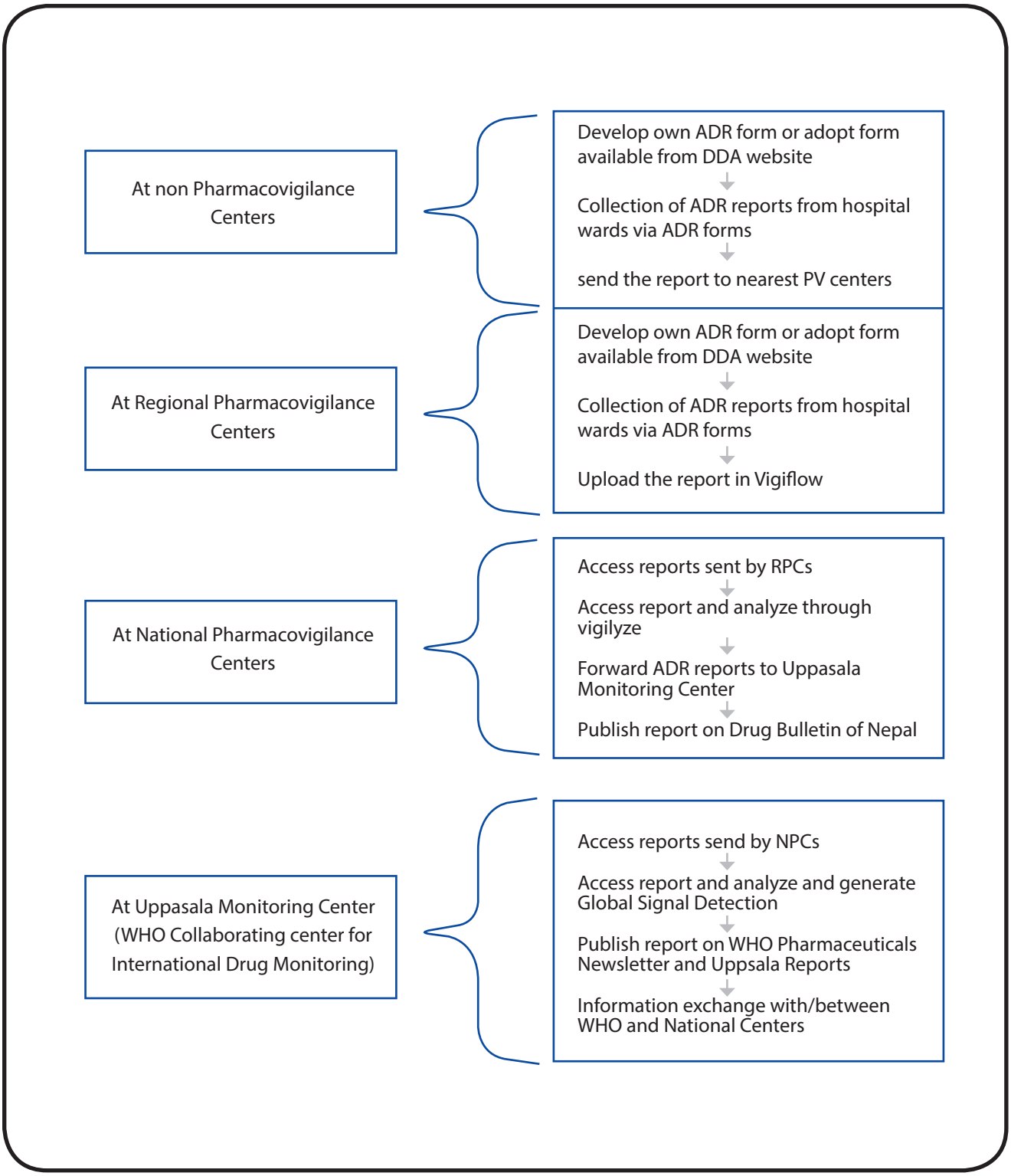
.....

.....

Reported by: Name: ..... Hospital / Department:.....

Date:..... Signature:.....

Please return this form to your local Drug Information Unit or Hospital Pharmacy. Thank you for taking the time to fill in this report!


At non Pharmacovigilance Centers
Develop own ADR form or adopt form available from DDA website
Collection of ADR reports from hospital wards via ADR forms
send the report to nearest PV centers
At Regional Pharmacovigilance Centers
Develop own ADR form or adopt form available from DDA website
Collection of ADR reports from hospital wards via ADR forms
Upload the report in Vigiflow
At National Pharmacovigilance Centers
Access reports sent by RPCs
Access report and analyze through vigilyze
Forward ADR reports to Uppasala Monitoring Center
Publish report on Drug Bulletin of Nepal
At Uppasala Monitoring Center (WHO Collaborating center for International Drug Monitoring)
Access reports send by NPCs
Access report and analyze and generate Global Signal Detection
Publish report on WHO Pharmaceuticals Newsletter and Uppsala Reports
Information exchange with/between WHO and National Centers

Appendix- 4

Useful links of national and international guidelines

(As these guidelines are updated regularly, please check if these have been updated)

National HIV Testing and Treatment Guidelines, August 2022 https://www.ncasc.gov.np/publications/254
National Tuberculosis Management Guidelines 2019 https://nepalntp.gov.np/wp-content/uploads/2019/10/National-Tuberculosis-Management-Guidelines-2019_Nepal.pdf
National Guideline on Kala-azar Elimination Program (Updated) 2019 http://www.edcd.gov.np/resources/download/national-guideline-on-kala-azar-elimination-program-2019
Leprosy Operational Guideline 2075 http://www.edcd.gov.np/resource-detail/leprosy-operational-guideline-2075
National Malaria Treatment Protocol 2019 http://www.edcd.gov.np/resources/download/national-malaria-treatment-protocol-2019
Guidelines for the management of symptomatic sexually transmitted infections, 2021, WHO https://www.who.int/publications/i/item/9789240024168
National Guidelines on Case Management of STI, December 2014 https://www.ncasc.gov.np//uploaded/publication/National_Guidelines_on_Case_Management_of_STI__Final_December_2014.pdf
National Guidelines for Screening, Care and Treatment of Hepatitis C Infection in Nepal https://www.aidsdatahub.org/sites/default/files/resource/nepal-guidelines-hepatitis-2020.pdf
Infectious Disease Control Guideline, 2016 http://www.edcd.gov.np/resources/download/infectious-disease-control-guideline

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9. Nepal Anaesthesiologists Society
10. Nepalese Association of Clinical Microbiologist
11. Nepal Association of TB and Chest Physicians
12. Nepal Dental Association
13. Nepal Medical Association
14. Nepal Medical Council
15. Nepal Orthopedic Association
16. Nepal Pediatric Society
17. Nepal Society Of Obstetricians and Gynecologists
18. Nepal Society of Critical Care Medicine
19. Nepalese Respiratory Society
20. Nepalese Society of Emergency Physicians
21. Nepalese Society of Neurosurgeons
22. Nursing Association of Nepal
23. Psychiatrists Association of Nepal
24. Society of Anaesthesiologists of Nepal
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