LAGOS UNIVERSITY
TEACHING HOSPITAL

2024

ANTIBIOTIC POLICY AND GUIDELINES

LAGOS UNIVERSITY TEACHING HOSPITAL

ANTIBIOTIC POLICY AND GUIDELINES VERSION 2

JULY 2024

LUTH ANTIMICROBIAL STEWARDSHIP COMMITTEE

Next review: June 2026

FOREWORD

The increasing antimicrobial resistance of pathogens, especially the hospital acquired is today a cause of great concern. Resistance is emerging as a result of the selective pressure of antibiotic use, which allows the bacterial subpopulations harbouring genes for resistance mutations or determinants such as plasmids and transposons to flourish. Resistance becomes widespread as a result of dissemination of such genetic determinants, which are also directly favored by the intensity and homogeneity of antibiotic exposure in a patient population. The modification of the endogenous flora by antibiotics enhances their substitution with drug resistant flora. Extensive use of antibiotics in the hospital is usually associated with increasing resistance rates. Studies have linked the emergence of colonization and infection of patients with antibiotic-resistant pathogens to specific risk factors, including exposure to broad-spectrum antibiotics, prolonged antibiotic therapy and under-dosing. Surveillance of resistance rates in hospitals has likewise revealed a direct correlation between the amount of broad-spectrum antibiotics used and local prevalence of resistant strains during outbreaks. Reduction in antibiotic use has been followed by a reduction of resistance. This has been achieved either by reducing total consumption by restrictive antibiotic control programs or by a drastic shift in the type of drugs used for empiric therapy.

To manage and monitor antibiotic use in our hospital, this antibiotic policy, which is essentially for prophylaxis, empirical and definitive therapy, has been developed. it was written based on local data, the antibiotic guidelines therein based on the infectious diseases syndromes we have encountered in our hospital over the years, the spectra of activities of various antimicrobials, their pharmacokinetics/pharmacodynamics, cost and our local antibiograms.

This document is the combined effort of antibiotic management teams in various departments and the hospital antimicrobial stewardship committee. The antibiotic guidelines were prepared with significant input from the prescribers. It will be reviewed periodically with new and relevant information

Prof. Lanre Wasiu Adeyemo
Chief Medical Director

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LIST OF ABBREVIATIONS

A&E	Accident and Emergency
ACNO	Assistant Chief Nursing Officer
AMS	Antimicrobial Stewardship
AMSC	Antimicrobial Stewardship Committee
AMST	Antimicrobial Stewardship Team
AMR	Antimicrobial resistance
APIN	AIDS Prevention Initiative Nigeria
CMAC	Chairman Medical Advisory Committee
CMD	Chief Medical Director
DNS	Director Nursing Services
DDNS	Deputy Director Nursing Services
HAI	Healthcare/Hospital Acquired Infection
HCW	Health Care Worker
IDSR	Integrated Disease Surveillance & Response
IDU	Infectious Disease Unit
IPC	Infection Prevention & Control
LUTH	Lagos University Teaching Hospital
MAC	Medical Advisory Committee
MCS	Microscopy culture and sensitivity
MDR	Multi Drug Resistance
MDRO	Multi Drug Resistant Organisms
NCDC	Nigerian Centre for Disease Control
PAIF	Prospective audit with intervention and feedback
SSI	Surgical Site Infection
WHO	World Health Organisation

LUTH ANTIMICROBIAL STEWARDSHIP COMMITTEE

Prof O. O. Oduyebo	Chairman
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Dr A. Opawoye	Medicine
Dr O. T. Aribaba	Ophthalmology
Dr C. Oluwarotimi	Oral & Maxillofacial Surgery
Mrs D. Unuas	Medical Records
Mr T. Olukoya	Secretary
Dr A. Oluwole	Chairman, Medical Advisory Committee

POLICY FOR GOOD PRESCRIBING PRACTICE

Introduction

Infectious diseases have been a threat to humanity from the dawn of time and in the pre-antimicrobial era, these diseases accounted for the high morbidity and mortality throughout history. Organisms with high virulence and propensity for transmission have been responsible for outbreaks and epidemics, even pandemics that have changed the course of history, affected the outcomes of wars and conflicts, and even impacted human migration and settlements. From the discovery of the first antimicrobial in 1943, the world emerged from the scourge of infections and patients were now effectively cured of many life-threatening diseases. Over the next three decades, many new and effective antimicrobials were rapidly discovered and developed; however, from 1970 onwards, the pace of development of new antimicrobials has slowed considerably, and this has coincided with medical practitioners being called upon to treat more and varied infections with the existing arsenal of antimicrobials.

The increasing antimicrobial resistance of hospital pathogens is of great public health concern both globally and locally, to both clinicians and microbiologists. While the spontaneous natural process of development of antimicrobial resistance is slow, the frequent and inappropriate use of newly discovered antimicrobials causes alterations in the pathophysiology of microbes as a survival strategy. This increases the selection pressure by killing off the susceptible micro-organisms and allowing the selective replication of the drug-resistant bacteria. There is a lot of research evidence of multiple antibiotic-resistant strains of Gram-positive and negative organisms that are causing increasing epidemics of hospital-acquired infections (HAI). This coupled with the evidence of very high use of antimicrobials in the community makes it imperative that good prescribing practices are entrenched in clinical practice. Infections caused by antimicrobial resistant organisms are associated with increased morbidity, mortality and healthcare costs through longer hospital stays. Selection and spread of resistant micro-organisms are facilitated by the unregulated use of antimicrobials by way of self-medication and misuse. Global point prevalence surveys have estimated that as much as 50% of hospital antimicrobial use is inappropriate. Global reduction in the development of antimicrobial resistance is dependent of a two-pronged strategy of antimicrobial stewardship and control of HAI. This means that in the race against time to develop newer antimicrobials, it is crucial to develop and strengthen antimicrobial resistance containment policies.

There is urgent need for increased education and change in clinical practice regarding antimicrobial resistance among the public and healthcare professionals. To this end, the Lagos University Teaching Hospital under the national programme for antimicrobial stewardship has prepared this policy document with guidelines for use in the different departments of Paediatrics, Surgery, Medicine and Obstetrics & Gynaecology.

Using these guidelines

These guidelines list the recommended treatments for common infectious diseases that are based on scientific evidence, literature review and are consistent with the already existing international guidelines and formulated with the collective opinion of a wide group of recognised national and international experts. This document covers empiric treatment choices for different infections, in different specialties and offers antimicrobial choices for multi-drug resistant micro-organisms, by adjusting and monitoring the use of antimicrobials.

It is emphasised that antimicrobials should be prescribed only when they are necessary for treatment following a clear diagnosis. Not all patients need antibiotics; non-drug treatment may be suitable, and this has been emphasized in these guidelines.

In all cases, the benefit of administering the medicine should be considered in relation to the risk involved. The content of these treatment guidelines will be continuously reviewed based on evidence. Comments or suggestions for improvement are welcome and can be sent to Prof Oyinlola Oduyebo at ooduyebo@unilag.edu.ng

APPROACH TO MANAGEMENT OF COMMON INFECTIONS

Principles of Antimicrobial Prescribing

Therapeutic decisions regarding the prescription of antibiotics will be made based on the best available clinical evidence. Empirical antimicrobial therapy or prophylactic therapy will be prescribed according to these guidelines.

As much as possible, aim the antibiotic at a pathogen and not at an infection. To lower the risk of developing antibiotic resistance, choose antibiotics which are likely to be bactericidal to the pathogen at the site of infection. They should be used in adequate doses and for an adequate duration. However, to prevent unnecessary use, antibiotics must be prescribed for the shortest duration likely to be effective.

Indication for antimicrobial therapy must be written in patients' case notes. For all infections, the prescriber must document clearly in the medical notes the specific diagnosis/focus of infection, and the indicators for making the diagnosis (a biomarker, raised white blood cells (WBC), temperature >38°C, or microbiology culture results). Where definitive or a clear diagnosis is not made yet, the specific reason for the antibiotic prescribed must be written in the case note.

- In case of prophylactic use (surgical or medical), the specific indication for prophylaxis must be clearly written in the patient's notes.
- For surgical prophylaxis use a single dose of antibiotic wherever appropriate. Where prophylaxis is to be continued for longer than 24 hours, document the reasons clearly in the notes.

If at surgery there is evidence of infection then document the details of antibiotic required, route and review date or duration. *Do not confuse prophylaxis and treatment.*

All antimicrobial prescriptions must have the duration or date of review clearly indicated in the patient's notes

- Review all sensitivity results daily and always change to the sensitive antibiotic with the narrowest spectrum.
- All antibiotic prescriptions must be for a defined duration only. The prescriber may need to review the patient and extend the duration of treatment if clinically necessary, but again for a defined period only.
- Intravenous antibiotics should be reviewed after 48 to 72 hours (earlier if appropriate), unless prescribed for a high risk or deep-seated infection requiring longer intravenous treatment.

- A review or stop date should always be indicated on the treatment sheet by the prescriber for all antibiotics.

*Antibiotic doses should **not be missed** unless unavoidable. Missed doses are everyone's responsibility and should be investigated and the treatment route or dose reviewed as necessary to ensure administration and compliance*.

Categories of antibiotics

To address the issues of growing antimicrobial resistance, the WHO developed a framework based on three main categories which are Access, Watch and Reserve – which all together forms the AWaRe categorization of antibiotics. 'Access' antibiotics are first- or second-line treatments for common infections. They should be widely accessible. Antibiotics in the 'Watch' category should be applied only to a limited group of well-defined syndromes. Their use should be closely monitored. 'Reserve' antibiotics should be applied as a last resort to treat multi- or extensively-drug resistant bacteria. They are a valuable and non-renewable resource. In line with the global framework, this policy directs the following levels of prescriber responsibilities:

- ACCESS – can be prescribed by all prescribers including house officers
- WATCH - can be prescribed only by prescribers at the level of consultants or senior registrars in line with the approved antibiotic guidelines of the department. They can be prescribed by medical officers in strategic areas in line with antibiotic guidelines if they possess membership or have passed the Part 1 fellowship examinations of the either of the Postgraduate Medical Colleges.
- RESERVE – should not be stocked by the hospital pharmacy but procured as required for patients by the pharmacy in accordance with hospital protocol. They can be prescribed by only consultants.

Restriction of antibiotics

To control use¸ decrease costs and limit antimicrobial resistance, dispensing of some targeted antibiotics is *restricted according to approved criteria*.

LUTH RESTRICTED ANTIBIOTICS

	Antibiotic	Indication	Service/Remarks
1	Carbapenem e.g. Meropenem	Severe infections where indicated	-Microbiology to give approval -Pharmacy to dispense
2	Cephazolin	Clean, Clean-contaminated and Contaminated surgeries where indicated	Pharmacy to dispense
3	Reserved antibiotics -Colistin -Polymixin B -Tigecyline -Fosfomycin -Linezolid -Meropenem-vaborbactam -Ceftazidime-avibactam	**MDROs**	-**Consultants (ONLY) to prescribe** -Microbiology to give approval, and for sensitivity results -Pharmacy to procure

Intravenous-to-oral switch therapy

Intravenous-to-oral (IV-to-PO *[per oral]*) switch therapy refers to the process of converting the administration of medication from intravenous to oral. When patients on admission are given intravenous antibiotic therapy initially, it is beneficial to step down to oral therapy as early as possible.

Advantages of a prompt switch to oral therapy include:

- Reduction in the likelihood of healthcare-associated bacteraemia and phlebitis
- The patient is more likely to receive antibiotics at the correct time
- Improvement of patient's comfort and mobility with the possibility of earlier hospital discharge
- Saves both medical and nursing time
- Potential to reduce treatment costs significantly

Considerations for an early switch:

- Clinical improvement observed
- Oral route not compromised (e.g. vomiting, severe diarrhoea, swallowing disorder, coma).
    - NG/PEG feeding option available.
    - Suitable oral antibiotic option available.
- Markers show a trend towards normal

- Temperature >36^{0}C and <38^{0}C (preferably normal for at least 24 hours)
- BP stable, RR and HR normal for age
- White blood cell count where available shows a trend towards normal. *The absence of such should not impede the switch if all other criteria are met.*

Considerations for delayed switch:

Certain infections may appear to respond promptly but warrant prolonged IV therapy to optimise response and minimise risk of relapse. Please follow the antibiotic guidelines for such conditions as considered below:
For deep-seated infections an initial two weeks of IV therapy may be needed, examples include:

- Liver abscess
- Osteomyelitis
- Septic arthritis
- Empyema
- Cavitating pneumonia
- Staphylococcus aureus bacteraemia
- Severe or necrotising soft tissue infections
- Severe infections during chemotherapy-related neutropenia
- Infected implants/prosthetics
- Meningitis
- Intracranial abscesses
- Mediastinitis
- Endocarditis
- Inadequately drained abscesses and empyema
- Intra-abdominal sepsis

Role of the Prescriber

The prescribers must ensure strict adherence to the following:

- Prescriptions should be signed in both the patients' notes and on the treatment charts.
- All antimicrobial prescriptions should be in line with the approved antibiotic guidelines of the department.
- Relevant fluid/tissue samples should be collected and transferred to the microbiology laboratory before, or as the first dose of the antibiotic is being administered for all patients on antibiotics.

- Ensure the indication for prescription is clearly documented in the medical notes together with the intended duration of therapy and any other information on plans e.g. awaiting sensitivity results.
- Always state either a stop date (if known) or review date (48 hours is usually a reasonable initial duration).
- For most IV antibiotics and for some conditions treated orally, a review date will be required.
- Antibiotics should be reviewed and stopped earlier than the documented date, if clinically indicated.
- Prescriptions should be within the approved antibiotic list for the hospital (or the formulary). *In case of non-availability, approval to buy outside should be sought from the management, and the pharmacy department should be involved in procuring the antibiotic for the patient.*
- Prescribers should be aware of the antimicrobial stewardship strategy of their department, or the hospital and they are mandated to adhere to it.

Role of the Nurse

The nursing staff are vital members of the antimicrobial stewardship team. All the nursing staff are enjoined to ensure strict adherence to the following:

- The indications for antibiotic prescriptions as well as the stop/review dates are clearly written in the medical charts.
- All prescriptions beyond the review date are brought to the attention of the doctor but, whilst awaiting review, continue to administer the antibiotic.
- All prescriptions beyond the stop date are brought to the attention of the doctor but, whilst awaiting instructions, continue to administer the antibiotic.
- Compliance with the prescribed regimen.
- Ensure prompt collection of all fluid and tissue samples and transfer the laboratory.
- If the patient has missed any antibiotic doses, ask the doctor to review the patient treatment sheet and add a new stop/review date if appropriate on the treatment chart.
- IV antibiotics should be administered by nurses with instructions on what to do in case of anaphylactic reactions clearly included in the prescriptions and treatment sheets.
- Ensure appropriate precautionary measures are in place to take care of adverse events to antibiotics.
- Emergency tray: drugs should not be OS, and should be well monitored and checked weekly by the nurses to ensure completeness and that they are not expired.

- All nursing staff must be aware of the antimicrobial strategy of the department or the hospital and are mandated to participate.
- Include appropriate antibiotic use and self-medication in their education and awareness as health talks to patients and relatives.

Role of the Pharmacist

Pharmacists play an important role in tackling antimicrobial resistance. All pharmacists are expected to:

- Ensure that for all antibiotic prescriptions the stop/review date is clearly documented on the treatment sheet.
- Ensure antimicrobials on the essential medicines list are available in the hospital *(except those on reserve list*).
- Be members of the antibiotic teams to identify unavailable antibiotics for procurement.
- Take part in scheduled AMS activities of the wards.
- Perform antibiotic consumption calculations for the hospital
- Monitor patient medication profiling to identify and flag potential drug interactions, allergies and duplication and flag to prescribers
- In case of out-of-stock (OS) antibiotics, pharmacy may procure on the patient's behalf from carefully chosen pharmacies approved by management.
- Educate and counsel patients on the prescriptions before them.

Role of the Laboratory

The microbiology laboratory plays a critical role in antimicrobial stewardship by providing culture and susceptibility data to optimise individual antimicrobial management and by assisting infection control efforts in the surveillance of resistant organisms and the molecular epidemiologic investigation of HAI outbreaks. All microbiology staff are expected to participate in "Diagnostic Stewardship"

Hospital AMS strategies

Antimicrobial stewardship refers to a set of coordinated strategies that focus on promoting appropriate antibiotic use in inpatient healthcare settings while improving patient outcomes, ensuring patient safety, reducing pharmacy costs for antibiotics, and decreasing antimicrobial resistance and the spread of infections. Typically, this is a hospital-based programme which ensures that patients receive the right antibiotic, at the right dose, at the right time and for the right duration. For effectiveness, there must be committed leadership and necessary human, financial

and information technology resources. Research has reported that AMS can only be successful if it meets the specific needs of the healthcare facility it is designed for.

In LUTH the following strategies have been applied and will be scaled up to all the departments.

1. Global Point Prevalence Survey (GLOBAL-PPS)[1] is a study tool of unprecedented international scope, which use began in 2015, with the aim of providing key information about the use of antibiotics and antimicrobial resistance in hospitals worldwide. The GLOBAL-PPS provides baseline data and makes it possible to measure the impact of the implementation of antimicrobial stewardship programmes designed to reinforce appropriate antibiotic use in the hospital.
2. Prospective audit with intervention and feedback (PAIF)[2] The PAIF strategy consists of a case-by-case review of inpatients on antibiotic therapy. Cases are reviewed for antibiotic appropriateness and feedback is delivered directly to the prescriber caring for the patient, with the goal of improving antibiotic use while minimizing unintended consequences such as bacterial resistance and adverse effects. This will be performed daily in departments with medical students as auditors.
3. There will be short presentations at every clinical meeting in departments to reinforce AMS principles and policy for good antibiotic prescribing.
4. There will be weekly meetings of AMSTs in departments.
5. Any other activity introduced by departments may be added as required

Diagnostic stewardship

This refers to coordinated guidance and interventions to improve appropriate use of microbiological diagnostics to guide therapeutic decisions. It should promote appropriate, timely diagnostic testing, including specimen collection, pathogen identification and accurate, timely reporting of results to guide patient treatment.
The objectives are:

- Patient management guided by timely microbiological data to deliver safer and more effective and efficient patient care.

[1] https://amr.biomerieux.com/en/our-commitment/global-point-prevalence-survey/
[2] Roberts AA, Fajolu I, Oshun P, Osuagwu C, Awofeso O, Temiye E, Oduyebo OO. Feasibility study of prospective audit, intervention and feedback as an antimicrobial stewardship strategy at the Lagos University Teaching Hospital. Niger Postgrad Med J. 2020 Jan-Mar;27(1):54-58. doi: 10.4103/npmj.npmj_115_19. PMID: 32003363.

- Accurate and representative AMR surveillance data to inform treatment guidelines, and AMR control strategies.

Monitoring and Evaluation

Monitoring and evaluation activities will include

1. Monthly antibiotic consumption rates calculation (by pharmacy)
2. Monthly antimicrobial resistance rates (by Microbiology) and reports to be sent to AMSC
3. Correlation of items 1 and 2 by AMSC
4. Reports of quality indicators by Microbiology department as shown by Global PPS
5. Reports of compliance rates to antibiotic guidelines and interventions by various clinical departments
6. Annual dissemination of findings to the hospital community by the AMSC
7. Periodic review of the policy and guidelines will be carried out based in evidence from the monthly antimicrobial resistance rates. Next review of these guidelines are January 2023.

DEPARTMENT OF SURGERY

Surgical prophylaxis

Procedure	Likely organism	Preferred agent	Comments
Head and neck (including ear, nose, and throat procedures)	*S. aureus*	Clean contaminated IV Cephazolin – 2g stat *(adult)* 25mg/kg *(paed)* Metronidazole – IV 500mg stat *(adult)* 7.5mg/kg *(paed)* Contaminated IV Cephazolin –2g stat *(adult)* 25mg/kg *(paed)* IV Metronidazole – 500mg *(adult)* 7.5mg/kg *(paed)*	Vancomycin 1g stat + metronidazole Vancomycin1g stat + metronidazole
Neurosurgery	Gram negative bacilli, *S. aureus* *S. epidermidis*	IV Cefepime 1g stat *(adult)* 50mg/kg *(paed)*	
Thoracic	*S. aureus*	IV Cephazolin – 2g stat *(adult)* 25mg/kg *(paed)*	Vancomycin – 1g stat *(adult)* 10mg/kg *(paed)*
Cardiac surgery/ vascular	*S. aureus* *S. epidermidis*	IV Cephazolin – 2g stat *(adult)* 25mg/kg *(paed)*	Vancomycin - 1g stat *(adult)* 10mg/kg *(paed)*
Abdominal	Gram-positive cocci Enteric gram-negative bacilli Anaerobes	IV Cefepime 1g *(adult)* 50mg/kg *(paed)* IV Metronidazole – 500mg *(adult)* 15mg/kg *(paed)*	Levofloxacin (500mg stat- *adult*, 250mg- *paed)* + Metronidazole 500mg *(adult)* 15mg/kg *(paed)*
Other general surgery (e.g., herniorrhaphy, breast surgery, etc)	*S. aureus*	IV Cephazolin – 2g stat *(adult)* 25mg/kg *(paed)*	Vancomycin - 1g stat *(adult)* 10mg/kg *(paed)*

Orthopaedics	*S. aureus*	IV Cephazolin – 2g *(adult)*stat 25mg/kg *(paed)* (Give cefoperazone if surgery will involve the perineal region)	Vancomycin - 1g *(adult)* 10mg/kg *(paed)*
Plastic surgery	*S. aureus*	IV Cephazolin – 2g stat *(adult)* 25mg/kg *(paed)* (Give cefoperazone if surgery will involve the perineal or anal region)	Vancomycin - 500mg *(adult)* 10mg/kg *(paed)*
Urology	*S. aureus* Gram negative bacilli, anaerobes	▸ Clean contaminated (involving entry into bowel) – IV Cephazolin – 2g stat *(adult)* 25mg/kg *(paed)* IV Metronidazole – 500mg *(adult)* 15mg/kg *(paed)* ▸ Contaminated IV Cephazolin – 2g stat *(adult)* 25mg/kg *(paed)* Metronidazole – 500mg *(adult)* 15mg/kg *(paed)*	Vancomycin 500mg *(adult)* 10mg/kg *(paed)* **Plus** Metronidazole 500mg *(adult)* 15mg/kg *(paed)*

Empiric therapy for surgical infections

Choice of empirical therapy is based on:

- The site of infection
- Common organisms isolated
- Antibiogram and resistance patterns
- Formulary availability

Specimen collection should be done before commencement of antibiotics and choice of antibiotics must be of narrow coverage to the microbiologically confirmed pathogens.

Bone and joint infections

Diagnosis	**Common pathogen**	**Drugs of first choice**	**Comments**
Septic arthritis	*S. aureus*, Enterobacteriaceae (occasionally)	Levofloxacin IV (500mg/day)	Screen for MRSA *(especially if hospital acquired)*
Osteomyelitis	*S. aureus* Gram negative bacilli (e.g., *E. coli*)	Levofloxacin IV (500mg/day)	Screen for MRSA *(especially if hospital acquired)*

Chest/lung infections

Diagnosis	**Common pathogen**	**Drug of first choice**	**Alternative therapy**
Pleural effusion, empyema, and lung abscess	Gram positive cocci Gram negative bacilli Anaerobes	Piperacillin/tazobactam IV 4.5g 6 hourly	Levofloxacin IV 500mg daily (add metronidazole in suspected anaerobic infection)

Central nervous system infections

Diagnosis	**Common pathogen**	**Drugs of first choice**	**Alternative drug(s)**
Cerebral abscess	Enterobacteriaceae Anaerobes	Meropenem IV (1g 8hourly- adult, 40mg/kg 8 hourly paediatric)	Piperacillin/tazobactam IV 5g 6 hourly (4.5g 6 hourly adult, 90mg/kg 6 hourly paediatric)
Shunt infection	Gram negative rods	Piperacillin/tazobactam IV 90mg/kg 6 hourly	Meropenem IV 40mg/kg 8 hourly

Intra-abdominal infections

Diagnosis	Common pathogen	Drugs of first choice	Alternative drug(s)
Community acquired (mild to moderate) intra-abdominal abscess	*E. coli* *Klebsiella spp* Other gram-negative bacilli	Amikacin IV (15mg/kg/day) **plus** Metronidazole IV (500mg 8 hourly-adult, 7.5mg/kg-paediatric)	Piperacillin/tazobactam IV (4.5g 6hourly–adult, 90mg/kg 6 hourly paediatric)
Fungal (IV Fluconazole) coverage to be considered in high-risk patients: critically ill with heavy colonization and recurrent bowel perforation			
Healthcare associated (mild to moderate) intra-abdominal abscess	*E. coli*, *Klebsiella spp*, *S. aureus*, *Enterococcus spp*, Anaerobes	Piperacillin/tazobactam IV (4.5g 6hourly–adult, 90mg/kg 6 hourly paediatric)	Levofloxacin IV 500mg daily **plus** Metronidazole IV (500mg 8 hourly)
Fungal (IV Fluconazole) coverage to be considered in high-risk patients: critically ill with heavy colonization and recurrent bowel perforation			
Severe peritonitis or multiple abscess (patient in shock)	Enterobacteriaceae *Pseudomonas aeruginosa*, *S. aureus*, *Enterococcus spp*, Anaerobes	Meropenem IV (1g 8hourly- adult, 40mg/kg 8 hourly paediatric)	Piperacillin/tazobactam IV (4.5g 6hourly–adult, 90mg/kg 6 hourly paediatric)
Fungal (IV Fluconazole) coverage to be considered in high-risk patients: critically ill with heavy colonization and recurrent bowel perforation			

Urinary tract infection

Diagnosis	Common pathogens	Drugs of first choice	Alternative drug(s)
Healthcare/catheter associated UTI	Enterobacteriaceae, Pseudomonas aeruginosa	Levofloxacin IV 500mg daily	Amikacin IV (once daily regimen-15mg/kg
Microbiology result important in antibiotic management			

Sepsis

Diagnosis	Common pathogens	Drugs of first choice	Alternative drug(s)
Severe sepsis/ septic shock	Enterobacteriaceae *S. aureus* *Pseudomonas aeruginosa*	Meropenem IV (1g 8hourly- adult, 40mg/kg 8 hourly paediatric)	Piperacillin/tazobactam IV (4.5g 6 hourly–adult, 90mg/kg 6 hourly paediatric)

Skin and soft tissue infections

Diagnosis	Common pathogen	Drugs of first choice	Alternative drug(s)
Cellulitis	*S. aureus* MRSA	Mild – Doxycycline oral (100mg 12 hourly) Moderate to severe Clindamycin IV (300mg 6 hourly- adult, 16mg/kg/day- paediatric)	
Incision and drainage required with antibiotic therapy			
Necrotizing soft tissue infections	Gram positive Gram negative organisms Anaerobes	Piperacillin/tazobactam IV (4.5g 8hourly- adult, 40mg/kg 8 hourly paediatric)	Levofloxacin IV (500mg daily) **plus** Metronidazole IV (500mg 8 hourly- adult, 7.5mg/kg- paediatric)
Add clindamycin if MRSA			
Diabetic foot infection	*S. aureus* Gram negative bacilli Anaerobes	Levofloxacin IV (500mg daily) **plus** Metronidazole IV (500mg 8 hourly)	Piperacillin/tazobactam IV 4.5g 8 hourly

Ear, nose and throat

Diagnosis	Common pathogens	Drug(s) of choice	Alternative drug(s)
Severe otitis media	*S. aureus* Enterobacteriaceae	Microscopy, culture and sensitivity is	

		required if considering systemic antibiotics	

DEPARTMENT OF MEDICINE

Introduction and clarifications

These guidelines are intended to be used for empirical therapy for bacterial infections, at the time of initial evaluation or when cultures are inclusive. Use of antibiotics at initial evaluation should be initiated after appropriate samples have been taken for microbiology (cultures), and supportive laboratory evaluation (prolactin, FBC, serum lactate, CRP, etc.) Use of antibiotics in these settings should be tailored on whether there is an infection complicated by sepsis or infection without sepsis. Broad spectrum antibiotics should be used at initial contact, and all prescriptions should be closed for 48 hours, after which they should be reviewed. Broad spectrum antibiotics are those that cover the most likely aetiologic organisms and may not necessarily target all types of known microorganisms.

Antibiotic guidelines for common infections

Community acquired pneumonia (CAP)

IMMUNOCOMPETENT

Infection	Recommended antibiotics	Comments
Outpatient (CURB-65 score of 0-1) *Strep pneumoniae* *H influenzae* *Staph aureus* Atypical pathogens	Co-amoxiclav 1g oral 12hourly (5 to 7days) +/- Azithromycin 500mg daily x 3days *(if atypical pathogen is suspected, co-morbidities are present or recent antibiotic use)*	Doxycycline or a macrolide can be used alone, but high prevalence of macrolide resistant pneumococci reported locally, and Doxycycline is less well studied for the treatment of CAP
Hospitalized patient (CURB-65 score of 2) *Strep pneumoniae* *H influenzae* *Staph aureus* Atypical pathogens	Ceftriaxone iv 1-2gm 24hourly x 5 -7days **PLUS** Azithromycin 500mg oral daily for 3days **OR** Clarithromycin **OR** Co- amoxiclav IV 1.2 gm 8 hourly for 5-7days **PLUS**	Levofloxacin 750mg daily or 500mg bd is an option (to be used with permission) in patients who have either failed the recommended antibiotics above, or have structural lung disease or have been on prednisolone (*Pseudomonas spp* risk)

Infection	Recommended antibiotics	Comments
	Azithromycin 500mg oral once daily for 3 days **OR** Clarithromycin	
Switched to oral alternatives and discharge from hospital if: • Stable vital signs for 24hrs • Able to take oral antibiotics • Able to take oral diet • No active clinical problem requiring hospital stay.		

IMMUNOCOMPROMISED PATIENT

Infection	Recommended antibiotics	Comments
Strep pneumoniae *H influenzae* *Staph aureus* Atypical pathogens Pneumocystis pneumonia (PCP)	Ceftriaxone iv 1-2gm 24hourly for 7 days **PLUS** Azithromycin 500mg oral daily for 3 days **PLUS** Co-trimoxazole (960mg) 2 tabs oral bd x 3 days **OR** Co- amoxiclav IV 1.2 gm 8 hourly for 5-7 days **PLUS** Azithromycin 500mg oral daily for 30 days **OR** Clarithromycin + Co-trimoxazole (960mg) 2 tabs oral bd x 30 days	For patients who cannot use co-trimoxazole, alternatives to consider are: o Trimethoprim dapsone o Clindamycin primaquine o Atovaquone

Aspiration pneumonia

Infection	Recommended antibiotics	Comments
Strep pneumoniae *H influenzae* *Staph aureus* Atypical pathogens Anaerobes Gram negative bacteria	Piperacillin/tazobactam IV 4.5g 8hourly for 24-48 hours *and de-escalate with susceptibility result* **OR** Piperacillin tazobactam iv 4.5g 8hourly **PLUS** Clindamycin iv 600mg 8hourly x 24 to 48 hours *and de-escalate with susceptibility result*	In mild to moderate infection co-amoxiclav may suffice

Acute bacterial meningitis
IMMUNOCOMPETENT

Infection	Recommended antibiotics	Comments
Community acquired infections *Strep pneumonia* *N. meningitidis*	Ceftriaxone IV 2g 12hourly for 14 days **OR** Cefotaxime IV 2g 4 – 6 hourly for 14 days	If bacterial meningitis is suspected, antibiotic treatment must be started immediately, regardless of any investigations undertaken and adjunctive steroid therapy There is no evidence of vancomycin resistant *Streptococcus pneumoniae* in our hospital ***IV to oral switch once culture & sensitivity results differ from empiric***

Infection	Recommended antibiotics	Comments
Co-morbidities Chronic ear discharge *Bacteroides spp,* *Fusobacterium spp,* *Clostridium spp,*) Diabetes mellitus Chronic alcoholism (age > 55 years) *L. monocytogenes*	Add metronidazole IV 500mg 6 – 8 hourly to above combination Add ampicillin IV 1-2g 4 – 6 hourly	IV to oral switch once culture & sensitivity results differ from empiric
Healthcare-associated meningitis (e.g. following neurosurgery)	Vancomycin IV 1g 6hourly **PLUS** Piperacillin/tazobactam IV 4.5g 8 hourly **OR** Meropenem IV 2g 8 hourly	Piperacillin/tazobactam if likelihood of pseudomonas is high De-escalate with the susceptibility result
Penicillin allergy	Chloramphenicol IV 500mg – 1g 6 hourly **PLUS** Vancomycin IV 500mg – 1g 6 hourly	Penicillin desensitization should be considered ASAP

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Acute meningitis syndrome on the background of HIV/AIDS, chronic immunosuppressant use (eg transplant recipient)	***INFORM NEUROLOGIST AND INFECTIOUS DISEASE SPECIALIST IMMEDIATELY!***

Brain abscess

Infection	Recommended antibiotics	Comments
Unknown origin/focus	Piperacillin/tazobactam IV 4.5g 8 hourly	Piperacillin/tazobactam if likelihood of *Pseudomonas* is high

Infection	**Recommended antibiotics**	**Comments**
Dental origin	Coagulase-negative staphylococci *Enterococci* *Streptococcus bovis* **OR** 3rd generation cephalosporin IV **PLUS** Metronidazole IV 500mg 6 – 8 hourly	For surgical excision if accessible site Do culture and sensitivity of aspirate IV to oral switch once culture & sensitivity results differ from empiric
Pulmonary origin	Vancomycin IV **PLUS** Piperacillin/tazobactam IV 4.5g 8 hourly **OR** Meropenem IV 2g 8hourly	
Otogenic/sinus origin	3rd generation cephalosporin IV **PLUS** Metronidazole IV 500mg 6 – 8 hourly	
Haematogenous origin multiple abscesses background endocarditis**	Vancomycin IV **PLUS** Piperacillin/tazobactam IV 4.5g 8 hourly **OR** Meropenem IV 2g 8hourly	
** *Use empiric endocarditis regimen*		

Diabetic foot infection

Infection	Recommended antibiotics	Comments
Cellulitis or mild uncomplicated infection.	Cloxacillin IV 1g 6hourly or Co-amoxiclav 1.2g iv 8 hourly for 7-14 days	
Moderately severe with foul odour.	Ampicillin-sulbactam IV 1.5g 8 hourly or Co-amoxiclav IV 1.2g 8hourly	
Moderately severe with necrotic tissue and/or recent antibiotic use.	Ceftriaxone IV 1g 12-24 hourly **PLUS** Metronidazole IV 500mg 8 hourly for 10-14 days	Wound debridement to remove the necrotic tissue. Extend duration to at least 4 weeks if there is evidence of osteomyelitis, can be switched to oral administration after initial 2 weeks of intravenous therapy.
Severe with necrotic tissue and/or foul odour	Piperacillin tazobactam IV 4.5g 8 hourly [or Levofloxacin IV 500mg daily **PLUS** Clindamycin IV 600mg 8 hourly for 10-14 days De-escalate with result of the susceptibility test	Wound debridement to remove necrotic tissue.

Renal tract infections

Infection	Recommended antibiotics	Comments
Pyelonephritis	Cefepime IV 1g 12-24 hourly for 7-10 days **OR** Levofloxacin IV 500mg daily for 7-10 days	Treatment can be switched to oral with Levofloxacin

Infection	Recommended antibiotics	Comments
Haemodialysis with line sepsis	Cloxacillin IV 500mg 6hourly **OR** Vancomycin IV *(if MRSA likely)*	Patient known to be colonized with drug resistant organism should receive empiric antibiotic selected accordingly. Patient with neutropenia or sepsis should receive empiric antibiotic therapy for gram negative organism (including pseudomonas)
Sepsis of unknown cause in both immunocompromised and immunocompetent patients	Piperacillin/tazobactam 4.5g IV 8 hourly for 10-14 days **PLUS** Amikacin IV 15mg/kg/24 hourly for 3-5 days	De-escalate with the result of antibiotics susceptibility test
Neutropaenic, febrile immunocompromised patient	Imipenem or meropenem **PLUS** Amikacin IV 15mg/kg/24 hourly **PLUS** Vancomycin IV 1g 12 hourly, [if lines in-situ, mucositis or in shock] Penicillin allergic patient: IV Levofloxacin **PLUS** Clindamycin Add acyclovir and fluconazole	De-escalate with the result of antibiotics susceptibility test In low-risk patients use Levofloxacin **PLUS** Co-Amoxiclav IV/oral

Gastro-intestinal infections

Infection	Recommended antibiotics	Comments
Infective gastroenteritis		
Mild, afebrile	No Antibiotics required, only IV and oral fluids	
Toxic, febrile or bloody stools	Ciprofloxacin IV 200mg 12 hourly **OR** Ceftriaxone IV 1g 12-24 hourly for 5-7days	IV to oral switch once patient is clinically stable. In suspected *C. difficile* diarrhoea add metronidazole and seek expert opinion.

Enteric fever

Infection	Recommended antibiotics	Comments
S typhi *S paratyphi A, B & C*	Ciprofloxacin IV 400mg or oral 500mg 12 hourly for 7-10 days **OR** Ceftriaxone IV 1g 12-24 hourly for 10-14 days	Time to defervescence is shorter with ciprofloxacin Ceftriaxone preferred in severe systemic illness

Spontaneous bacterial peritonitis

Infection	Recommended antibiotics	Comments
Mild infection.	Ceftriaxone IV 1g 12 hourly for 10-14 days	De-escalate with the laboratory result
Moderately severe infection	Ceftriaxone IV 1g **PLUS** Metronidazole IV 500mg 8 hourly for 10-14 days	

Helicobacter pylori treatment

Infection	Recommended antibiotics	Comments
1st line	Tab Clarithromycin 1g b.d **PLUS** Cap Amoxicillin 1g bd **OR** Tab Metronidazole 500mg t.d.s for 14 days	Add standard dose of Proton pump inhibitor Lansoprazole 30 mg daily **OR** Omeprazole 20 mg daily **OR** Pantoprazole 40 mg daily **OR** Rabeprazole 20 mg daily **OR** Esomeprazole 20 mg daily.
2nd line	Tab levofloxacin 500mg once daily **PLUS** Cap amoxicillin 1g 12 hourly for 14 days	Add standard dose of proton pump inhibitor

Infective endocarditis

Infection	Recommended antibiotics	Comments
Staphylococcus aureus Viridans Streptococci Coagulase-negative staphylococci *Enterococci* *Streptococcus bovis* Other streptococci, fungi, Gram-negative HACEK bacilli, Gram-negative non-HACEK bacilli		
Penicillin-susceptible Viridans streptococci or *Streptococcus bovis*	Penicillin G IV 24million units daily for 4 to 6 weeks **OR** Penicillin G IV 24million units daily for 4 to 6 weeks	

Infection	Recommended antibiotics	Comments
	PLUS Amikacin IV 15mg/kg/24hourly for two weeks	
	Penicillin G IV for four weeks **PLUS** Gentamicin for two weeks **OR** Vancomycin IV 1g 12 hourly for four weeks	Relatively penicillin resistant Viridans streptococci or *S. bovis*
Penicillin-resistant Viridans Streptococcus or *S. bovis*	Ampicillin **PLUS** Gentamicin for four to six weeks **OR** Penicillin G **PLUS** Gentamicin for 4 to 6 weeks	
Oxacillin-susceptible staphylococci	Penicillin G IV **PLUS** Gentamicin for 4 to 6 weeks **OR** Vancomycin for six weeks **PLUS** Gentamicin for 3 to 5 days (optional)	
Enterococcus strains susceptible to penicillin, gentamicin, and vancomycin	Penicillin G IV **PLUS** Gentamicin for 4 to 6 weeks	

Commented [AR1]: Should the dose be added?

Infection	Recommended antibiotics	Comments
	OR Vancomycin for six weeks *To be prescribed based on susceptibility result* **PLUS** Gentamicin for 3 to 5 days (optional)	
Enterococcus strains susceptible to penicillin, streptomycin, and vancomycin, and resistant to gentamicin	Ampicillin **PLUS** Gentamicin for four to six weeks **OR** Penicillin **PLUS** Gentamicin for four to six weeks **OR** Vancomycin **PLUS** Gentamicin for six weeks **OR** Ampicillin or penicillin **PLUS** Streptomycin for four to six weeks **OR** Vancomycin **PLUS** Streptomycin for six weeks	
Enterococcus strains resistant to penicillin, but susceptible to aminoglycosides and vancomycin	Ampicillin/sulbactam (Unasyn) **PLUS** Gentamicin for a minimum of six weeks	

Infection	Recommended antibiotics	Comments
	OR Vancomycin **PLUS** Gentamicin for six weeks **OR** Penicillin G **PLUS** Gentamicin for 4 to 6 weeks **OR** Vancomycin for six weeks *To be prescribed based on susceptibility result* **PLUS** Gentamicin for 3 to 5 days (optional) **OR** Cefazolin for 6 weeks, **PLUS** Gentamicin for 3 to 5 days (optional) Oxacillin-resistant staphylococci Vancomycin for six weeks Enterococcus strains resistant to penicillin, but susceptible to aminoglycosides and vancomycin	

Infection	Recommended antibiotics	Comments
	Ampicillin/sulbactam (Unasyn) plus gentamicin for a minimum of six weeks **OR** Vancomycin plus gentamicin for six weeks	

Others

A. Life threatening sepsis (unknown focus): aminoglycoside (gentamicin, amikacin, or tobramycin) for at least 3 – 5 days **plus** one of the following:
   a. Third-generation cephalosporin (ceftriaxone, cefotaxime, or cefepime) *Piperacillin tazobactam 4.5g IV 8hourly 48hours to de-escalate with result of antibiotics susceptibility test*
   b. Imipinem or meropenem
   c. Piperacillin-tazobactam

B. Suspected methicillin-resistant *S. aureus*: add vancomycin ± rifampicin

C. Intra-abdominal or pelvic infection: Any of the following with or without an aminoglycoside for at least 3 – 5 days;
   a. Ampicillin-sulbactam
   b. Metronidazole **and** ceftriaxone or cefuroxime or ceftazidime
   c. Imipenem
   d. Piperacillin-tazobactam *IV piperacillin tazobactam 4.5g 8 hourly to be de-escalated with susceptibility result*
   e. Cefoxitin **or** cefotetan

D. Biliary tract source (hepato-biliary): [Consider aminoglycoside for 3 – 5 days if severe sepsis or low BP] –
   a. Ampicillin-sulbactam ± aminoglycoside
   b. Ceftriaxone + metronidazole ± aminoglycoside
   c. Ciprofloxacin + metronidazole ± aminoglycoside
   d. Piperacillin-tazobactam ± aminoglycoside

E. Neutropenia + sepsis [consider aminoglycoside for 3 – 5 days if severe or low BP]

a. Ceftazidime ± aminoglycoside
b. Ciprofloxacin + Amoxycillin-clavulanic acid ± aminoglycoside
c. *Please remove and to be treated as sepsis with neutropenia as recommended above. Ceftazidime has low susceptibility rate in the antibiogram*
d. Imipinem, meropenem, or cefepime ± aminoglycoside
e. Piperacillin-tazobactam + amikacin

F. If MRSA suspected (i.e., mucositis, prolonged neutropenia > 5 days, foreign devices *in situ*, MRSA prevalent in setting): add vancomycin to any of above

G. Necrotising fasciitis: clindamycin + penicillin [urgent debridement would be required]

H. Principles for life threatening infections

i. In general bactericidal agents, synergistic combinations and intravenous route should be used whenever possible.
ii. Aminoglycosides should be administered as Single Daily Dosed (SDD) except in endocarditis, enterococcal and possibly drug resistant bacterial infections when Multi Daily Dosing (MDD), 2 – 3 per day, should be used.
iii. Optimised dosage based on PK/PD principle

DEPARTMENT OF PAEDIATRICS

EMPIRIC ANTIBIOTIC THERAPY GUIDELINES FOR DIFFERENT INFECTIONS IN CHILDREN

Introduction

It is important to have cultures done before commencing empiric antibiotics, review therapy with the result of antibiotic sensitivity result of isolated organism and then de-escalate as appropriate. Ensure a review/stop date is included in the prescription.

Sepsis

Infection	Recommended antibiotics	Comments
Blood stream infection for children older than 2 months	Ceftriaxone IV 100mg/kg/day **OR** Cefotaxime 50mg/kg 6-8hourly Duration: for at least 7 days	Review with clinical response in 48 hours and/or culture results
Neutropenic patients	Piperacillin/tazobactam IV 90mg/kg/dose (max 4.5g) 6hly till 48 hours afebrile Duration: until patient is afebrile for 48 hours	Patients with recent or current exposure to 3rd generation cephalosporin, consider adding Vancomycin IV 20mg/kg 12hourly

Neonatal infections

Infection	Recommended antibiotics	Comments
At risk of Early onset neonatal sepsis	Ampicillin-sulbactam IV 6 hourly **PLUS** Amikacin 15mg/kg/dose every 24 hours	Review after 72 hours or Until culture results are available
Early onset neonatal sepsis	Cefepime IV 50mg/kg/dose 12 hourly **PLUS** Amikacin IV 15mg/kg/dose every 24 hours	

Infection	Recommended antibiotics	Comments
Late onset neonatal sepsis	Ampicillin-sulbactam IV 6 hourly **PLUS** Amikacin 15mg/kg/dose every 24 hours **OR** IV Flucloxacillin 50mg/kg 12 hourly PLUS IV Amikacin 15mg/kg/dose every 24hours. Consider Ceftazidime 50mg /kg/dose 8hly AND IV Amikacin 15mg/kg/dose every 24hours if *Pseudomonas* is suspected	Note: Give drugs 12 hourly in 1st week of life and 8hourly after 1st week and in cases of meningitis 10 – 14 days Until culture results are available
Necrotizing enterocolitis (NEC)	Ampicillin-sulbactam IV 6 hourly **PLUS** Amikacin 15mg/kg/dose every 24 hours PLUS IV Metronidazole 20-40mg/kg/day in 3 doses IV Flucloxacillin 50mg/kg 12 hourly + IV Amikacin 15mg/kg/dose 24 hourly+ IV Metronidazole 20-40mg/kg/day in 3 doses	Duration of 5 – 10 days depending on the stage of NEC
Umbilical sepsis	Ampicillin-sulbactam IV 6 hourly **PLUS** Amikacin 15mg/kg/dose every 24 hours PLUS IV Metronidazole 20-40mg/kg/day in 3 doses	

Infection	Recommended antibiotics	Comments
	IV Flucloxacillin 50mg/kg 12 hourly + IV Amikacin 15mg/kg/dose 24 hourly+ IV Metronidazole 20-40mg/kg/day in 3 doses	
Congenital syphilis	Benzylpenicillin 50 000 U/kg/dose 12 hourly IV x 10 days	An alternative is Procaine Penicillin 50 000 U/kg/dose IM once daily x 10 days

Respiratory infections

Upper Respiratory infections

Infection	Recommended antibiotics	Comments
Otitis Media, Pharyngitis, Acute sinusitis	High dose Oral amoxicillin (90mg/kg/day in 2 divided doses) 2nd line: Amoxicillin- clavulanic acid (90mg/kg/day in 2 divided doses) for 5 -7 days **OR** Cefuroxime (20-30mg/kg/ day in 2 divided doses) IV 100mg /kg per day in 3 doses, may go as high 50-60mg /kg/dose 6-8hly	IV to oral switch on clinical picture for at least 5 days.
Acute Epiglottitis	Ceftriaxone 50mg/kg (max 1g) IV once daily treatment is administered for at least 5 days then, if the clinical condition has improved and oral treatment can be tolerated, change to: Amoxicillin/clavulanic acid (co-amoxiclav) PO to complete a	Alternatives- Amoxicillin/sulbactam, Cefotaxime

Infection	Recommended antibiotics	Comments
	total of 7 to 10 days of treatment. Use formulations in a ratio of 8:1 or 7:1 exclusively. The dose is expressed in amoxicillin: Children < 40 kg: 50 mg/kg 2 times daily Children ≥ 40 kg and adult: Ratio 8:1: 3000 mg daily (2 tablets of 500/62.5 mg 3 times daily) Ratio 7:1: 2625 mg daily (1 tablet of 875/125 mg 3 times daily)	
Pharyngotonsillitis	Amoxicillin IV (150mg/kg/day in 3 divided doses) **AND** Gentamicin IV/IM (5- 7.5mg/kg once daily) for at least 5 days **OR** Cefuroxime IV (150mg/kg/day in 3 divided doses) and gentamicin IV/IM (5- 7.5mg/kg once daily) for at least 5 days. Maximum of 2-4gm.	Note: For penicillin-allergic patients, use Erythromycin 10 mg/kg/dose 6 hourly PO × 10 days
Pharyngotonsillitis (which is usually due to group A beta haemolytic strep)	Benzathine penicillin IM <30kg: 600,000 units single dose ≥30kg: 1,200,000 units single dose.	Benzathine penicillin IM is more effective and should be encouraged. Local pain and discomfort can be significantly reduced by using 1% lignocaine hydrochloride to reconstitute benzathine penicillin for injection instead of sterile water.

Infection	Recommended antibiotics	Comments
	OR Phenoxymethylpenicillin: <20 kg: 250 mg; ≥20 kg: 500 mg 12 hourly PO x 10 days	
Sinusitis (acute bacterial)	High dose Amoxicillin 90 mg/kg/day in 2 divided doses.8 hourly PO x 10 days Chloramphenicol eye drops or ointment applied as frequently as is practical plus frequent eye irrigation with normal saline.	For gonococcal or chlamydial infections see section on neonatal infections.
Diphtheria (see also prophylaxis section)	Benzylpenicillin 50 000 U/kg/dose 4-6 hourly IV x 7-10 days	1. Diphtheria antitoxin. 2. Erythromycin 10 mg/kg/dose 6 hourly PO or IV is an alternative to penicillin 3. The patient should be isolated and elimination of the organism documented by 2 consecutive negative cultures of throat swabs after completion of treatment **4. Diphtheria is a notifiable condition**

Lower respiratory infections

Infection	Recommended antibiotics	Comments
Pneumonia <2 months Admit and treat as neonatal sepsis	IV amoxicillin (90mg/kg/day in 2 divided doses) for at least 5 days IV amoxicillin-clavulanic acid (amoxicillin component 90mg/kg/day in 2 divided doses)	

Infection	Recommended antibiotics	Comments
	OR IV cefuroxime (20-30mg/kg/ day in 2 divided doses)	
≥2 months	Cefpodoxime (10mg/kg/day in 2 divided doses) for at least 5 days IV amoxicillin (150mg/kg/day in 3 divided doses) AND IV/IM genticin (5- 7.5mg/kg once daily) for at least 5 days IV cefuroxime (150mg/kg/day in 3 divided doses) and IV/IM genticin (5- 7.5mg/kg once daily) for at least 5 days. OR IV ceftriaxone (50-100mg/kg/day every 12-24hours) **OR** IV cefotaxime (100-200mg/kg/day in 4 divided doses) **OR** IV/IM genticin (5 -7.5mg/kg once daily) and IV cloxacillin (100-200mg/kg in 4 divided doses)	
HIV infected children	High dose oral amoxicillin (90mg/kg/day in 2 divided doses) for at least 10 days Oral amoxicillin-clavulanic acid (amoxicillin component 90mg/kg/day in 2 divided doses))	

Infection	Recommended antibiotics	Comments
	OR oral cefuroxime (20-30mg/kg/ day in 2 divided doses) **OR** oral cefpodoxime (10mg/kg/day in 2 divided doses for at least 10 days IV amoxicillin (150mg/kg/day in 3 divided doses) PLUS IV/IM genticin (5- 7.5mg/kg once daily) for at least 5 days PLUS high dose co-trimoxazole (20mg/kg/day of trimethoprim) for at least 10 days IV ceftriaxone (50-100mg/kg/day every 12-24hours), **OR** IV cefotaxime (100-200mg/kg/day in 4 divided doses) **OR** IV cefuroxime (150mg/kg/day in 3 divided doses) **PLUS** IV/IM genticin (5- 7.5mg/kg once daily) for at least 5 days **PLUS** high dose co-trimoxazole (20mg/kg/day of trimethoprim) in 4 divided doses for at least 10 days	
Children with sickle cell disease	High dose Oral amoxicillin (90mg/kg/day in 2 divided doses) for at least 5 days	Notes: Step down to appropriate oral antibiotics when improvement is sustained. For instance,

Infection	Recommended antibiotics	Comments
	Oral amoxicillin-clavulanic acid (amoxicillin component 90mg/kg/day in 2 divided doses) **OR** oral cefpodoxime (10mg/kg/day in 2 divided doses) **OR** oral cefuroxime (20-30mg/kg/ day in 2 divided doses) for at least 5 days IV amoxicillin (150mg/kg/day in 3 divided doses) **PLUS** IV/IM genticin (5- 7.5mg/kg once daily) for at least 5 days **PLUS** oral erythromycin (60-100mg/kg/day in 4 divided doses)) for at least 5 day IV ceftriaxone (50-100mg/kg/day every 12-24hours) **OR** IV cefotaxime (100-200mg/kg/day in 4 divided doses) **OR** IV/IM genticin (5 -7.5mg/kg once daily) PLUS IV cloxacillin (100-200mg/kg in 4 divided doses) **OR**	cefpodoxime after ceftriaxone; Target pathogens in outpatients' treatment are S. pneumoniae and Hib; whereas in cases on admission, these as well as S. aureus and other bacilli are included; Maximum dose of gentamicin should not exceed 120mg; Chloramphenicol is not included in the antibiotic protocol because of its toxicity in the face of effective alternative antibiotics; *Alternatives: Consider alternatives when first line drugs are not available or applicable or child has not responded to the first line drugs

Infection	Recommended antibiotics	Comments
	IV cefuroxime (150mg/kg/day in 3 divided doses) **PLUS** IV/IM genticin (5- 7.5mg/kg once daily) for at least 5 days. **PLUS** oral azithromycin (10g /kg) daily dose for 3 days	
Empyema thoracis and Lung abscess	IV ceftriaxone (50-100mg/kg/day every 12-24hours), **OR** IV cefotaxime (100-200mg/kg/day in 4 divided doses) **OR** IV/IM genticin (5 -7.5mg/kg once daily) PLUS IV cloxacillin (100-200mg/kg in 4 divided doses) **OR** IV cefuroxime (150mg/kg/day in 3 divided doses) PLUS IV/IM genticin (5- 7.5mg/kg once daily) for 7-10 days	

Eye infections

Infection	Recommended antibiotics	Comments
Conjunctivitis	Erythromycin eye ointment applied as frequently as is practical + frequent eye irrigation with normal saline.	
Gonococcal	IV Ceftriaxone 25 mg/kg/dose as a single dose IV/IM +	

Infection	Recommended antibiotics	Comments
	frequent eye irrigation with normal saline	
Chlamydial	Erythromycin 10 mg/kg/dose 6 hourly PO x 14 days	

Dental infections

Infection	Recommended antibiotics	Comments
Dental abscess	Co-Amoxiclav 30-50 mg/kg/dose 8 hourly PO × 5 days For more severe cases or patients unable to take medication orally, IV Amoxicillin / Clavulanic acid 100-150mg /kg /day in 2-3 divided doses. IV Cefuroxime 50 mg/kg/dose 8 hourly + IV Metronidazole 7.5 mg/kg/dose 8 hourly × 5 days.	If there is uncertainty about the diagnosis or poor clinical response to initial treatment, consider referral to a dental surgeon or ENT specialist.

Central nervous system

Infection	Recommended antibiotics	Comments
Meningitis: Pathogen unknown <3 months of age	IV Cefotaxime 200mg/kg/day in 3 divided doses given 8 hourly for 14-21days	add Ampicillin 50 mg/kg/dose 6 hourly IV for at least 48 hours until Listeria infection is excluded
3months to 5years	IV Cefotaxime 50mg/kg/dose 6hry OR IV Ceftriaxone 50 mg/kg/dose 12 hourly for 10-14 days.	
>5years	IV Ceftriaxone 100 mg/kg/day every 24hours, (give in 2 divided doses if >1gm) for 10-14days	1. Avoid the use of Ceftriaxone in patients receiving concomitant

Infection	Recommended antibiotics	Comments
	When pathogen cultured: H. influenzae & S. pneumoniae - treat for 10 days N. meningitidis - treat for 5- 7 days Grp B Streptococcus - treat for 14 days L. monocytogenes (neonates) - treat for 21 days Gram-negatives (neonates) - treat for 14-21 days	intravenous calcium-containing fluids including total parenteral nutrition; Cefotaxime 50 mg/kg/dose 6 hourly IV is a suitable alternative. 2. Ceftriaxone should be switched to Benzylpenicillin 100 000 U/kg/dose 4-6 hourly IV OR Ampicillin 50 mg/kg/dose 6 hourly IV if the organism is susceptible
Brain abscess and shunt associated infections	IV Ceftriaxone 50 mg/kg/dose 12 hourly + IV clindamycin 15 – 20mg/kg/dose 8 hourly for 10-14 days	1. Avoid the use of Ceftriaxone in patients receiving concomitant intravenous calcium-containing fluids including total parenteral nutrition; Cefotaxime 50 mg/kg/dose 6 hourly IV is a suitable alternative 2. If there is a good clinical response to therapy, 2 weeks of antibiotics is usually sufficient

Other infections/antimicrobials

Infection	Recommended antibiotics	Comments
Herpes simplex encephalitis 0-12 years of age	IV Acyclovir 20 mg/kg/dose 8 hourly IV x 14-21 days	1. If HSV encephalitis is considered, begin treatment before confirmation of infection 2. In neonates with HSV encephalitis, treatment

Infection	Recommended antibiotics	Comments
		duration is at least 21 days and treatment should only be stopped once CSF herpes simplex PCR is negative
>12 years of age	IV Acyclovir 10 mg/kg/dose 8 hourly IV x 14-21 days	
Cryptococcal meningitis	Induction phase: IV Liposomal Amphotericin B 3–5mg/kg/dose once daily + IV Fluconazole 12mg/kg/dose daily (max 800mg) x 2 weeks Consolidation phase: IV Fluconazole 12 mg/kg/dose once daily or PO for a further 8 weeks (maximum dose 800mg) Maintenance: Fluconazole 6 mg/kg/dose once daily PO (maximum dose 200 mg) for one year. Immediate ART initiation is not recommended for adolescents and children living with HIV who have cryptococcal meningitis because of the risk of increased mortality and should be deferred by 4–6 weeks from the initiation of antifungal treatment.	When HIV viral load testing is unavailable, the WHO recommends continuation of maintenance therapy for one year and discontinuation if CD4 counts are >200 cells/µL Manage all cases in consultation with the infectious diseases unit Controlled infusion over 4 hours of Amphotericin B 1 mg/kg in 5% dextrose water *(NOT normal saline or ½ normal saline)* should be given over the first 30 minutes of administration. Adequate hydration should be maintained during Amphotericin B treatment. Side-effects include renal impairment, hypokalaemia, hypomagnesemia, renal tubular acidosis, anaemia, febrile reactions and chemical phlebitis. Relapse episodes: induction phase should be prolonged

Infection	Recommended antibiotics	Comments
		to4-8 weeks, preferably until CSF fungal culture is negative
Tetanus	IV metronidazole 15 mg/kg stat, then 7.5 mg/kg/dose 8 hourly for 7 days	

Cardiovascular system

Infection	Recommended antibiotics	Comments
Acute rheumatic fever	Benzathine penicillin IM: <30kg: 600,000 U; ≥30kg: 1, 200, 000 U Single dose. **OR** Phenoxymethylpenicillin: <20 kg: 250 mg; ≥20 kg: 500 mg 12 hourly PO x 10 days	For penicillin-allergic patients, use Erythromycin 10 mg/kg/dose 6 hou Prophylaxis (primary prevention): Prompt treatment of Streptococcal s (which is usually due to group A beta haemolytic strep) above.
Acute rheumatic fever Secondary prevention	IM Benzathine penicillin: <30kg: 600,000 U; ≥30kg: 1, 200, 000 U every 4 weeks. **OR** Phenoxymethylpenicillin: <20 kg: 250 mg; ≥20 kg: 500 mg divided 12 hourly PO daily	Give secondary prophylaxis until 21years of age or with cases of confi In an environment with ongoing exposure to GAS such as young child living condition, prophylaxis should be longer and may be given for li
Infective Endocarditis Empiric therapy (native valve)	IV Ampicillin /sulbactam 200 - 300mg/kg/day (up to 12g/day) given in divided doses 4 - 6 hourly + IV gentamicin 3-6 mg/kg/day given in divided doses 8 hourly ± IV Vancomycin 60 mg/kg/day given in divided doses 6 hourly x 4 -6 weeks	

Infection	Recommended antibiotics	Comments
Empiric therapy (prosthetic valve)	IV Vancomycin 60 mg/kg/day given in divided doses 6 hourly, Oral Rifampicin 15–20 mg/kg/day given in divided doses 12 hourly (up to 600 mg) for 6 weeks and IV gentamicin 3-6 mg/kg/day given in divided doses 8 hourly for the first 2 weeks	
Empiric therapy (Nosocomial endocarditis associated with vascular cannulae or "early" prosthetic valve endocarditis (≤1 y after surgery)	IV Vancomycin 60 mg/kg/day given in divided doses 6 hourly, Oral Rifampicin 20 mg/kg/day given in divided doses 12 hourly (up to 600 mg) for 6 weeks and IV gentamicin 3-6 mg/kg/day given in divided doses 8 hourly for the first 2 weeks PLUS IV Cefepime 100-150 mg/kg/day given in divided doses 8–12 hourly up to 6 g/day or IV Ceftazidime 100–150 mg/kg/day given in divided doses 8 hourly up to 2–4 g daily x 6 weeks	
Directed therapy (native valve) Viridans streptococci	All doses as for empiric therapy IV Penicillin G 200 000–300 000 U/kg/day given in divided doses 4 hourly (up to 12–24 million U daily) x 4 weeks + IV Gentamicin 3-6 mg/kg/day given in divided doses 8 hourly IV x 2 weeks **OR** IV Ceftriaxone 100 mg/kg/day given in divided doses 12 hourly or 80 mg/kg/day IV every 24 h	Penicillin resistant enterococci and viridans streptococci give IV Vanc 2 weeks (6 weeks for enterococcus). S. aureus (Oxacillin susceptible) give IV Oxacillin or nafcillin 200 mg hourly up to 12 g/d x 4-6 weeks ± IV Gentamicin 3–6 mg/kg/day given S. aureus (Oxacillin resistant – MRSA) give IV Vancomycin x 4 week If Vancomycin resistant or intolerant, IV Daptomycin 6 mg/kg every 2

Infection	Recommended antibiotics	Comments
	up to 4 g daily (if over 2 g, divide BID) x 4 weeks Vancomycin + Rifampicin x 6-8 weeks plus Gentamicin for the first 2 weeks for all staphylococci with prosthetic material	
Gram-negative enteric bacilli	IV Ceftazidime, cefepime, cefotaxime, or ceftriaxone plus gentamicin (or tobramycin or amikacin, depending on susceptibility) x 6 weeks. IV Ceftazidime 100-150mg/kg/day given in divided doses 8hourly (up to 2-4g daily) IV Cefotaxime 200 mg/kg/day given in divided doses 6 hourly (up to 12 g daily) IV Ceftriaxone 100 mg/kg/day given in divided doses 12 hourly or 80 mg/kg/day IV every 24 h (up to 4 g daily) IV Gentamicin or tobramycin 3–6 mg/kg/day given in divided doses 8 hourly. IV Amikacin 15 mg/kg/day given in divided doses 8–12 hourly (up to 15 mg/kg/day	
Empirical therapy for culture negative Prosthetic valve endocarditis	IV Vancomycin 40 mg/kg/day in 2 or 3 equally divided doses PLUS IV/IM Gentamicin 3 mg/kg/day in 3 equally divided doses PLUS IV Cefepime 150 mg/kg/day in 3 equally divided	In patients unable to tolerate Penicillin, Vancomycin or Ceftriaxone ca not suitable for enterococcal infection. Avoid the use of ceftriaxone in patients receiving concomitant intraver including total parenteral nutrition; Cefotaxime 50mg/kg/dose 6 hourly

Infection	Recommended antibiotics	Comments
	doses PLUS Oral Rifampicin 20 mg/kg/day in 3 equally divided doses x 6 weeks	
Prophylaxis Infective endocarditis	Oral Amoxicillin: 50mg/kg up to 2g single dose given as a single dose 30-60min before the procedure. If unable to take medication orally, IV Ampicillin 50mg/kg single dose. **OR** IV Cefazolin 50mg/kg single dose **OR** IV Ceftriaxone 50mg/kg single dose. If allergic to Penicillin and unable to take medication orally give IV Cefazolin **OR** IV Ceftriaxone 50mg/kg single dose OR IV Clindamycin 20mg/kg single dose	For penicillin allergy or if a penicillin or cephalosporin-group antibioti previous month (including those on long-term penicillin prophylaxis fo Oral Cephalexin: 50mg/kg single dose OR Oral Clindamycin: 20mg/kg (up to 600mg) single dose OR Oral Azithromycin or Clarithromycin: 15mg/kg (up to 500mg).

Musculoskeletal system

Infection	Recommended antibiotics	Comments
Skin & soft tissues infections		
Impetigo	Retapamulin Topical for 5 days	

Infection	Recommended antibiotics	Comments
Bullous Impetigo	IV Cloxacillin 50mg/kg. Dose 6hourly for 5 days OR IV Flucloxacillin 25 mg/kg/dose 6 hourly PO x 5 days OR Erythromycin 10 mg/kg/dose 6 hourly PO × 5 days	
Cellulitis	IV Benzylpenicillin 25 000 U/kg/dose 6 hourly + IV Cloxacillin 50 mg/kg/dose 6 hourly for 5 days **OR** Oral or IV Ampiclox 100mg/kg/day in 4 divided doses for 5 to 7 days Oral Cefuroxime 30mg/kg /day in 2 doses or IV 100mg/kg /day given in 2-3 doses	
Furunculosis/carbuncles	Oral Ampiclox 200mg/kg/d given in 4 divided doses for 5 to 7 days	
Necrotizing fasciitis Second line	IV Piperacillin-tazobactam 60-75mg/Kg/dose 6 hourly plus IV clindamycin 10mg per Kg 8 hourly IV Meropenem 20 mg/kg 8 hourly AND IV Vancomycin 15 – 20mg/kg 6 hourly	10 days Ensure surgical debridement is done urgently
Pyomyositis	IV Cefuroxime 50-60mg/kg/dose 6-8hourly for 7 to 10 days	
Acute osteomyelitis	IV Cloxacillin 50 mg/kg/dose 6 hourly for 10-14 days then change to Oral Flucloxacillin 25 mg/kg/dose 6 hourly	In unwell / septicaemic infants <6 months of age, add

Infection	Recommended antibiotics	Comments
	OR IV Cefuroxime 100-200mg/kg/day given in 2-3 doses 8-12hourly for 2 weeks then oral 4weeks	IV Ceftriaxone 50 mg/kg/dose once daily
Sickle Cell Anaemia	IV Clindamycin 20 – 40mg/kg in 3 to 4 divided doses for two weeks if patient is not responding. Convert to oral 8 to 25 mg/kg in 3 to 4 divided doses for 4 weeks	
Chronic osteomyelitis	IV Clindamycin/quinolone 20-30mg/kg/day in 2 divided doses 12 hourly for 14 to 21 days then change to oral Quinolone + Co-amoxiclav for 6 weeks	
Septic arthritis 6 months - <2 years of age	IV Cloxacillin 100-200mg/kg /day given in 4 divided doses followed by Flucloxacillin PO (doses as above) + Ampicillin 50 mg/kg/dose 6 hourly IV followed by Amoxicillin 30 mg/kg/dose 8 hourly PO. Treat for a total of 3 weeks	
>2 years of age	IV Cloxacillin 100-200mg/kg/day in 3-4 divided doses followed by oral flucloxacillin (doses as above) **OR** IV Quinolones 10-20mg/kg /dose 12hly for10 to 14 days	For Children with Sickle Cell Anaemia: Consider IV Clindamycin 20 – 40mg/kg in 3 to 4 divided doses for two weeks if patient is not responding. Convert to oral 8 to 25 mg/kg in 3 to 4 divided doses for 4 weeks

Genito-urinary system

Infection	Recommended antibiotics	Comments
Urinary Tract Infection Cystitis	Oral Nitrofurantoin 5-7 mg/kg/day divided 6hourly (contraindicated in those <3 months, GFR<50% or G6PD deficiency) Oral Co-amoxicillin 40 mg/kg/day in 2 divided doses Oral Cefuroxime: 30 mg/kg/day in 2 divided doses Oral Cefpodoxime 10 mg/kg/day in 2 divided doses Duration of treatment 3-5 days	Urinalysis and urine culture MUST be done before commencing antibiotics. Result of culture should guide review of empiric antibiotics started. Note: bag urine is NOT acceptable for urine culture.
Febrile UTI (pyelonephritis)	IV Amikacin: 15 mg/kg once daily (avoid if kidney disease is present) IV Genticin: 5-7.5 mg/kg once daily (avoid if kidney disease is present) IV Levofloxacin: 10-20 mg/kg/day in 2 divided doses (adjust dose if GFR is markedly decreased) IV Ciprofloxacin 10-20 mg/kg/day in 2 divided doses (adjust dose if GFR is markedly decreased) Duration at least 10 days	Route of administration: IV if child is sick enough to require hospitalization, then antibiotics should be administered intravenously. Once improvement is sustained, then the oral route can be considered.
UTI Prophylaxis	Discuss with the Nephrology Unit	

Gastro-intestinal infections

Infection	Recommended antibiotics	Comments
Amoebiasis	Metronidazole 15 mg/kg/dose 8 hourly x 10 days	

Bacterial dysentery	IV Ceftriaxone 50 mg/kg/dose 24hourly for 5 days IV Ciprofloxacin 10-15 mg/kg/dose 12 hourly for 5 days Cefixime 8mg/kg /day	
Cholera	Tab Azithromycin 10mg/kg once daily for 3 days IV Ciprofloxacin 10 mg/kg 12 hourly for 5 days **OR** IV Ceftriaxone 50 mg/kg/dose 24hourly for 5 days	
Peritonitis /necrotizing enterocolitis	IV Benzylpenicillin 50 000 IU/kg/dose 6hourly + IV Gentamicin 7.5 mg/kg/ dose once daily + IV Metronidazole 7.5 mg/kg/dose 8 hourly.	
Giardiasis	Metronidazole 7.5 mg/kg/dose 8 hourly PO x 5 days	An alternative over the age of 2 years is Albendazole 400 mg once daily PO x 5 days.
Typhoid fever	IV Ceftriaxone 50 mg/kg/dose 12 hourly x 7-10 days **OR** Ciprofloxacin 15 mg/kg/dose 12 hourly PO × 7-10 days	
Cholecystitis/cholangitis Second line	IV Levofloxacin 500mg 24 hourly IV Piperacillin-tazobactam 90mg/kg 8 hourly	Source control. Treatment for 5 – 7 days
Prophylaxis for Liver failure (liver cirrhosis) with	IV Ceftriaxone OR IV Cefotaxime	Duration of 7 days

Upper gastro-intestinal bleeding	IV Levofloxacin	

DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY

GENERAL PRINCIPLES GUIDING ANTIBIOTIC PRESCRIPTION

1. Prescribing guidelines should aid clinical practice and should not replace robust clinical judgment and culture sensitivity.
2. Always consider possible pregnancy before prescribing antibiotics to women of child-bearing age.
3. The woman's allergy status should be established before antibiotic treatment is prescribed.
4. Empiric therapy should be guided by biomarkers
5. Appropriate microbiological samples should be taken before commencing antibiotic treatment, e.g. blood cultures, urine, wound swab, endocervical swab, high vaginal swab, etc.
6. Treatment should be reviewed when culture results become available.
7. If the woman does not improve on a particular course of antibiotics, consider if an empirical switch is needed or another diagnosis.
8. The oral route is the preferred route of administration except in severe infection, or if the woman is unable to tolerate oral medications e.g. due to emesis.
9. Avoid unnecessary prolonged courses of IV antibiotics and switch to the oral route as soon as it is clinically appropriate.
10. Adjust dose appropriately after considering age, weight, hepatic or renal function.
11. Use generic antibiotic names as standard when prescribing.
12. All initial empirical antibiotic prescriptions should be closed for 48 hours, after which they should be reviewed thereafter with culture sensitivity and clinical assessment.
13. Give special consideration to immuno-compromised women or women with morbidities that may compromise antibiotic treatment and infection e.g. HIV, Transplant patient, patient on long term immune suppressants, haematological disorders, patients with chronic renal or hepatic impairment etc.
14. When considering treatment with antibiotics during pregnancy, take into account the severity of the maternal infection, the presence of sepsis, the maternal and fetal risks associated with failing to treat the mother adequately,

the pharmacokinetic and pharmacodynamic effects (where known) of pregnancy on drug absorption, distribution, metabolism and excretion, and the potential fetal toxicity of the treatments being considered.

PROPHYLAXIS

Introduction

Appropriate surgical prophylaxis is necessary to reduce surgical site infections (SSI) and are to be applied within one prior to the onset of surgery. The aim of AMS is to apply a strategy of antibiotic prophylaxis that reduces the use of multiple drugs for a prolonged period of time. The recommendation is to use a single dose within 1 hour of the procedure. Antibiotics not recommended for women with uncomplicated vaginal delivery

CLINICAL CONDITION	**ANTIBIOTICS**	**COMMENTS**
Episiotomy and 1st or 2nd degree perineal tear	Amoxicillin/clavulanate 625mg 12 hourly PO for 24 hours **OR** Cefuroxime 500mg 12 hourly PO (or other 2nd gen. cephalosporin) for 24 hours **OR** Clindamycin 400mg 8 hourly PO for 24 hours	Give antibiotics immediately after episiotomy or perineal tear. Antibiotics should be given for not more than 24hrs. *Antibiotics are not recommended for episiotomy and 1st or 2nd degree perineal tears if principles of asepsis maintained during repair Clindamycin use is recommended in women with penicillin allergy
3rd or 4th degree perineal tear repair	IV Amoxicillin/clavulanate 1.2g 8hourly + IV Metronidazole 500mg 8 hourly x24 hours **OR** IV Cefuroxime 1.5mg **PLUS** IV Metronidazole 500mg 8 hourly for 24 hours	Give antibiotics immediately after episiotomy or perineal tear. Antibiotics should be given for not more than 24 hours. Clindamycin use is recommended in women with penicillin allergy

	OR IV Clindamycin 600mg 8hourly for 24 hours	
Manual removal of placenta	• Amoxicillin/clavulanate 1.2g IV stat **OR** Cefuroxime 1.5mg IV stat	Give a single prophylactic dose 30 mins before the procedure
Surgical evacuation of retained products	Amoxicillin/clavulanate 1.2g IV stat **OR** Cefuroxime 1.5mg IV stat	Give a single prophylactic dose within 30 mins before the procedure Screen for *Chlamydia trachomatis* and bacterial vaginosis before procedure
Caesarean section	IV Cefazolin 2g stat **OR** IV Cefuroxime 1.5g stat	Give a single dose within 30 – 60 mins before surgical incision Re dose if blood loss is more than 1L. OR Surgery lasting more than 3 hours If there is evidence of infection, treat based on the LUTH antibiotic guideline
Gynaecological surgeries	IV Cefepime 1g 12 hourly, **PLUS** IV metronidazole 500mg 12 hourly for 24 hours	Give the first dose within 30 – 60 mins before surgical incision Use only a stat dose for laparoscopy
Preterm Prelabour Rupture of Membrane	Oral erythromycin 500mg 6 hourly for 10days or until in established labour(whichever is sooner)	High vaginal/Endo-cervical swab MCS is taken prior to commencement of antibiotics. There may be need for administration of Intravenous broad spectrum 2nd generation cephalosporins antibiotics – IV

		Cefuroxime and metronidazole if infection is suspected.

Empiric antibiotic treatment

CLINICAL CONDITION	POTENTIAL ORGANISMS	ANTIBIOTICS	COMMENTS
Bacterial vaginosis (BV)	Gardnerella vaginalis, Prevotella species, Mycoplasma hominis and Mobiluncus species.	**Recommended regimens:** Oral Metronidazole 400mg twice daily for 7 days **OR** Oral Metronidazole 2 g single dose. **OR** Intravaginal metronidazole gel (0.75%) once daily for 5 days. **Alternative regimens:** Oral Tinidazole 2G single dose **OR** Oral Clindamycin 300 mg twice daily for 7 days.	With metronidazole treatment alcohol should be avoided because of the possibility of a disulfiram-like action. There are no data on the risks from consuming alcohol with intravaginal metronidazole gel, but it is not recommended at present. Pseudomembranous colitis has been reported with oral clindamycin. Women with BV who are pregnant or breastfeeding may use metronidazole 400 mg twice daily for 5–7 days or intravaginal therapies. A 2g stat dose of metronidazole is not recommended in pregnancy or

			breastfeeding women.
Trichomoniasis (TV)	Trichomonas Vaginalis	**Recommended regimes:** Metronidazole 2g orally in a single dose stat **OR** Oral Metronidazole 400mg twice daily for 7 days **Alternative regimens** • Tinidazole 2g orally in a single dose. • Secnidazole 2g orally stat in a single dose **Treatment protocol for non-response to standard TV therapy (having excluded re-infection and non-adherence)** • Repeat course of 7-day standard therapy Metronidazole 2 g once daily for 7 days OR Tinidazole 2g once daily for 7 days **For patients failing this second regimen:** • Higher-dose course of Metronidazole or tinidazole 2 g daily for 7 days **OR**	Tinidazole has similar activity to metronidazole but is more expensive Patients should be advised not to take alcohol for the duration of treatment and for at least 48h (72h for tinidazole) afterwards because of the possibility of a disulfiram-like reaction

		• Metronidazole 800 mg three times daily for 7 days **OR** • Very high-dose course of Tinidazole 1 g twice or three times daily or 2 g twice daily for 14 days **OR** • Intravaginal Tinidazole tablet 500 mg twice daily for 14 days	
Sexually Transmitted Infection	*Chlamydia trachomatis* *Neisseria gonorrhoea*	**Recommended regimens** **Uncomplicated** • Doxycycline 100mg bd for 7 days (contraindicated in pregnancy) **PLUS** IM Ceftriaxone 1g stat **OR** • Doxycycline 100mg bd for 7 days PLUS Oral Cefixime 400mg stat **OR** Oral Cefixime 400mg stat Plus Azithromycin 2g orally in a single dose.	Individuals who are allergic to, or intolerant of tetracyclines, and pregnant women, should be treated with azithromycin 1g orally as a single dose. If Chlamydia trachomatis is suspected, give only doxycycline OR Azithromycin 1g stat Individuals who are allergic to, or intolerant of tetracyclines, and pregnant women, should be treated with azithromycin
Infected of episiotomy and 1st or 2nd	Staphylococcus aureus	Amoxicillin/clavulanate 1.2g 8 hourly IV for	Clindamycin use is recommended in

degree perineal tears (severe) Infected 3rd or 4th degree perineal tears	Streptococcus spp. Escherichia coli Enterococcus faecalis	48hrs review with laboratory result **OR** Cefuroxime 1.5mg 8 hourly IV for 48hrs review with laboratory result Amoxicillin/clavulanate 1.2g 8 hourly IV + Metronidazole 500mg 8 hourly IV for 5 – 7days **OR** Cefuroxime 1.5mg 8 hourly IV + Metronidazole 500mg 8 hourly IV for 5 – 7days **OR** Clindamycin 600mg 8 hourly IV + Gentamicin 5mg/kg/day IV in 1-3 divided doses for 5- 7 days	women with penicillin allergy
Infective mastitis	Staphylococcus aureus Methicillin-resistant S. aureus (MRSA) Less commonly, Group A beta-hemolytic Streptococcus	**For outpatient treatment** Amoxicillin/clavulanate 625mg bd PO for 7 days **OR** Tab Cephalexin 500mg qds for 7 days **For inpatient treatment** Clindamycin 600mg tds IV for 48- 72hours, review with lab result	Women should be encouraged to continue breastfeeding (or expressing breast milk) during treatment to prevent stasis The outpatient should be reviewed after one week

Pelvic Inflammatory Disease	Neisseria gonorrhoea or Chlamydia trachomatis are the most common pathogens. Others include organisms responsible for bacterial vaginosis, S. aureus, and Bacteroides, E.coli and GBS	**Outpatient** **First Line**: Cap Doxycycline 100mg bd + tab metronidazole 400mg bd + IM ceftriaxone 1g stat **OR** Tab Doxycycline 200mg once daily **PLUS** Tab metronidazole 400mg bd **PLUS** IM Cefotaxime 1g stat. **Inpatient Therapy** IV Ceftriaxone 1g 24 hourly + Cap doxycycline 100mg bd + IV Metronidazole 500mg 12 hourly For 14 days **OR** IV Cefoxitin 2 g 6 hourly) **PLUS** Cap doxycycline 100mg bd **OR** IV Clindamycin 900mg 8 hourly **PLUS** IV Gentamycin 3-5mg/kg once daily For 14 days **OR** IV Ampicillin-Sulbactam 3g 6hourly + Cap	Both doxycycline and metronidazole should be used for 14days. All regimens used to treat PID should also be effective against *N. gonorrhoeae* and *C. trachomatis* because negative endocervical screening for these organisms does not rule out upper genital tract infection. Consider Hospital in-patient in situations such as tubo-ovarian abscess (TOA), nulliparity, pregnancy, failed outpatient treatment, severe clinical illness, nausea and vomiting, PID with pelvic abscess, or the possible need for surgical intervention. Because of the pain associated with IV infusion, **doxycycline should be administered orally when possible.** Oral and IV administration of doxycycline and

		doxycycline 100mg bd For 14 days	metronidazole provide similar bioavailability. Convert from parenteral to oral treatment if there is clinical improvement within 72hours of parenteral therapy**.**
Endometritis	Gram-negative anaerobes Streptococci	IV Ceftriaxone 1g 12 hourly **PLUS** IV metronidazole 500mg 8 hourly **PLUS** IV gentamicin 3-5mg/kg once daily for 10 days **OR** IV Cefuroxime 1.5g 8hourly **PLUS** IV Gentamicin 5mg/kg/day IV (max 480mg/day) in either once daily + IV Metronidazole 500mg 8 hourly for 10 days	Cefotaxime Convert from parenteral to oral treatment if there is clinical improvement within 72hours of parenteral therapy**.** .
Acute pyelonephritis	Gram-negative bacilli Occasionally caused by staphylococci and streptococci	IV Levofloxacin 500mg once daily Cefotaxime 1g 8 hourly IV **OR** Co-amoxiclav 1.2g 8 hourly IV **PLUS**	Gentamicin 5mg/kg/day IV (max 480mg/day) in either one single dose or in 3 divided doses may be added if woman is systemically unwell

		Gentamicin 5mg/kg/day IV (max 480mg/day) once daily	
Lower urinary tract infection Asymptomatic bacteriuria in Pregnancy	*Escherichia coli, Klebsiella pneumonia, Proteus mirabilis, Enterobacter species, Staph saprophyticus,* Group B beta haemolytic streptococcus,	**Preferred Regimen** Nitrofurantoin 100 mg orally twice daily for 7-10 days **OR** Amoxicillin 500 mg orally three times daily) for 7-10 days **OR** Amoxicillin-clavulanate 500/125 mg orally three times daily for 7-10 days	Alternatively, 875/125 mg orally two times daily for 7-10 days Fluoroquinolones and sulphadoxine trimethoprim can be used if not pregnant
Septic Miscarriage	Peptostreptococcus Clostridium perfringens E. Coli Neisseria gonorrhoea, Chlamydia trachomatis	**Recommended Regimen:** IV ceftriaxone 2g every 24 hours **PLUS** IV Metronidazole 500mg every 8 hours **Alternative Regimen** IV Levofloxacin 500mg daily **PLUS** IV Metronidazole 500mg 8 hourly	Assess for clinical improvement and change to orals if sustained clinical improvement after 24-48hrs.
Pelvic abscess	Pathogens usually polymicrobial (predominance of anaerobic bacteria)- E.coli, Bacteroides, fragilis, Bacteroides,	**I**V Levofloxacin 500mg daily **PLUS** IV Metronidazole 500mg 8 hourly **OR**	Parenteral antibiotics should be continued until the patient is afebrile for 48-72 hours.

	Peptostreptococcus, aerobic Streptococcus and Peptococcus	IV Piperacillin–tazobactam 4.5g 6 hourly	Patient should receive oral antibiotics to complete a 10 – 14 day course of therapy. Drainage of abscess
Organ space surgical site infection (SSI)	Enterobacterales Staphylococcus aureus Coliforms such as E. coli, P. mirabilis	IV Amikacin 15mg/kg/day **PLUS** IV Metronidazole 500mg 8 hourly **OR** IV Piperacillin – tazobactam 4.5g 6 hourly (as infusion for 4hours)	Microorganisms most frequently responsible for SSI are polymicrobial aerobes & anaerobes from skin and genital flora. Hence an aspirate for microscopy, culture and sensitivity is necessary before commencement of antibiotics.

DEPARTMENT OF ORAL AND MAXILLOFACIAL SURGERY

Prophylaxis

CLINICAL CONDITION	ANTIBIOTICS	COMMENTS
Routine tooth extraction	No antibiotics	
Complicated tooth extraction due to immunosuppression or those with chronic medical conditions like Diabetes Mellitus	Cap Amoxicillin 2g stat	Give antibiotics 30 mins before the procedure
Routine tooth extraction which become complicated during the procedure	Cap Amoxicillin 500mg 8 hourly for 24 hours	Start the antibiotic immediately after the procedure
Surgical exposure of impacted tooth	Cap Amoxicillin 2 g stat	Give a single prophylactic dose within 30 mins before the procedure
Surgical extraction of an impacted tooth	Cap Amoxicillin 2g stat	Give a single dose within 30 – 60 mins before surgical incision
Incision or excisional biopsy under local anaesthesia	Cap Amoxicillin 2g stat then 500mg 8 hourly for 24 hours	Give a single dose within 30 – 60 mins before surgical incision The first dose of 500mg should start 8 hours after the procedure
Intermaxillary fixation (+/- suspension wiring) of maxillofacial fractures under local anaesthesia +/- conscious sedation	• Cap Amoxicillin 2g stat then 500mg 8 hourly for 24 hours	Give a single dose within 30 – 60 mins before surgical incision The first dose of 500mg should start 8 hours after the procedure.
Open reduction internal fixation of maxillofacial fractures under local	• Cap Amoxicillin 2g stat then 500mg 8 hourly for 24 hours	Give a single dose within 30 – 60 mins before surgical incision

anaesthesia + conscious sedation		The first dose of 500mg should start 8 hours after the procedure.
Surgical management of benign or malignant maxillofacial tumors	IV Amoxicillin-clavulanate 1.2mg 12hourly for 24 hours **PLUS** IV Metronidazole 500mg 8 hourly for 24 hours	First dose of antibiotics should be given 30 minutes before the surgery
Open reduction internal fixation of maxillofacial fractures under general anaesthesia	IV Amoxicillin-clavulanate 1.2mg 12hourly for 24 hours **PLUS** IV Metronidazole 500mg 8 hourly for 24 hours	First dose of antibiotics should be given 30 minutes before the surgery

Empiric antibiotic therapy

CLINICAL CONDITION	**POTENTIAL ORGANISMS**	**ANTIBIOTICS**	**COMMENTS**
Peri-apical and dentoalveolar abscess	Viridans group of Streptococcus, *Staphylococcus epidermis*, *Staphylococcus aureus*.	Cap Amoxicillin 500mg tds **PLUS** Tab metronidazole 400mg tds for 5 days	Source control e.g tooth extraction
Incision and drainage of maxillofacial space infection e.g Ludwig angina under local anaesthesia +/- conscious sedation	Viridans group of Streptococcus, *Staphylococcus epidermis*, *Staphylococcus aureus*.	IV ceftriaxone 1g once daily **PLUS** IV metronidazole 500mg 8 hourly for 5 days .	,

DEPARTMENT OF PAEDIATRIC DENTISTRY

Prophylaxis

CLINICAL CONDITION	ANTIBIOTICS	COMMENTS
Traumatic dental injuries	Oral amoxicillin 20 – 40 mg/kg/day 8 hourly for 24 hours **PLUS** Oral metronidazole 10mg/kg/dose 8 hourly for 24 hours	Start 30 minutes before the procedure
Prophylaxis for endocarditis	Oral amoxicillin 50mg/kg stat	Give antibiotics 30 minutes before the procedure

Empiric antibiotic therapy

CLINICAL CONDITION	POTENTIAL ORGANISMS	ANTIBIOTICS	COMMENTS
Peri-apical abscess	*Streptococcus mutans, Lactobacillus, Actinomyces, Bifidobacterium, Veillonella*.	Oral amoxicillin 20 – 40 mg/kg/day in 3 divided doses **PLUS** Tab metronidazole 10mg/kg/dose 8 hourly for 5 days Oral azithromycin 10-12mg/kg/day stat, followed by 5-6 mg/kg once daily **PLUS** Tab metronidazole 10mg/kg/dose 8 hourly for 5 days	Source control e.g tooth extraction
Dentoalveolar abscess	*Streptococcus mutans, Lactobacillus, Actinomyces, Bifidobacterium, Veillonella*.	Oral amoxicillin 20 – 40 mg/kg/day in 3 divided doses **PLUS**	

		Tab metronidazole 10mg/kg/dose 8 hourly for 5 days Oral Amoxicillin-clavulanate 25-45mg/kg/day in 2 divided doses for 5 days	
Gingival/ periodontal abscess	*Porphyromonas gingivalis, Prevotella intermedia, Peptostreptococcus, Fusobacterium*	Oral Amoxicillin 20 – 40 mg/kg/day in 3 divided dose for 5 days Doxycycline 2.2mg/kg/dose 12hourly for 7 days	Use for children older than 8 years
Cellulitis e.g Ludwig angina	*Streptococcus mutans, Lactobacillus, Actinomyces, Bifidobacterium, Veillonella*.	IV Ceftriaxone 50/mg/kg once daily for 5 days IV Amoxicillin-clavulanate 25-45mg/kg/day 12 hourly for 5 days IV Cefuroxime 25mg/kg 8 hourly for 5 days .	,

DEPARTMENT OF RESTORATIVE DENTISTRY

Prophylaxis

CLINICAL CONDITION	ANTIBIOTICS	COMMENTS
Endodontic procedures without abscess for immunocompromised or Diabetes Mellitus	Cap amoxicillin 2g stat	Give antibiotics 30 mins before the procedure

The key to successful management of infection of endodontic origin is adequate debridement of the infected root canal and drainage for both soft and hard tissue. Endodontic disinfection and abscess drainage if an abscess is present is the main therapy for endodontic infections. Antibiotics should only be used as an adjuvant therapy in cases with evidence of systemic involvement (fever, malaise, cellulitis with or without lymphadenopathy

Empiric antibiotic therapy

CLINICAL CONDITION	POTENTIAL ORGANISMS	ANTIBIOTICS	COMMENTS
Peri-apical abscess/dentoalveolar abscess	*Streptococcus mutans, Lactobacillus, Actinomyces, Bifidobacterium, Veillonella*.	Cap Amoxicillin 500mg 8 hourly **PLUS** Tab Metronidazole 400mg 8 hourly for 5 days Tab Amoxicillin-clavulanate 1g 12 hourly for 5 days Tab Azithromycin if there is penicillin allergy	Source control e.g tooth extraction

DEPARTMENT OF PREVENTIVE DENTISTRY

Prophylaxis

CLINICAL CONDITION	ANTIBIOTICS	COMMENTS
Antibiotic prophylaxis for Endocarditis in patients with Rheumatic fever/Valvular heart disease/Prosthetic heart valve etc	Cap Amoxicillin 2g stat **OR** Tab Erythromycin 40mg/kg stat **OR** Tab Clindamycin 300mg stat	Start 30 minutes before the procedure
Surgical procedures	Cap Amoxicillin 2g stat	Give a single dose 30 minutes before the procedure
Resective or regenerative surgeries	Cap amoxicillin 2g stat then 500mg 8 hourly for 24 hours	Give a single dose 30 minutes before surgical incision. The first dose of 500mg should start 8 hours after the procedure.
Incision and excisional biopsy	Cap amoxicillin 2g stat	Give a single dose within 30 mins before the procedure

Surgical procedures includes Open Flap Debridement, Crown lengthening, Apical reposition flap, Coronal advancement flap, Alveolectomy, Frenectomy, Vestibuloplasty, Operculectomy, Excision of benign lesions, Exploratory flaps.

Empiric antibiotic therapy

CLINICAL CONDITION	POTENTIAL ORGANISMS	ANTIBIOTICS	COMMENTS
Periodontitis	Facultative anaerobes *Porphyromonas gingivalis, Tannerella forsythia,* and	Cap amoxicillin 500mg 8 hourly **PLUS** Tab Metronidazole 400mg 8hourly for 5 days	

	Treponema denticola	**OR** Tab amoxicillin-clavulanate 625mg 12 hourly for 5 days 2nd line Tab doxycycline 200mg stat, then 100mg 24 hourly for 5 days	
Pericoronitis	Facultative anaerobes *Fusobacterium, Prevotella, Porphyromonas gingivalis*, *Tannerella forsythia,* and *Treponema denticola*.	Cap Amoxicillin 500mg 8 hourly **PLUS** Tab Metronidazole 400mg 8hourly for 5 days **OR** Tab amoxicillin-clavulanate 625mg 12 hourly for 5 days	
Periodontal Abscess	streptococcus. Facultative anaerobes *P. ginginvalis*, Fusobacterium, Prevotella, and *Campylobacter species*	Cap amoxicillin 500mg 8 hourly **PLUS** Tab metronidazole 400mg 8 hourly for 5 days **OR** Tab amoxicillin-clavulanate 625mg 12 hourly for 5 days	
Acute Ulcerative Gingivitis/Acute Ulcerative Periodontitis	Facultative anaerobes *Fusobacterium, Prevotella*	Tab metronidazole 400mg 8 hourly for 5 days	

Local antibiotic delivery

CLINICAL CONDITION	POTENTIAL ORGANISMS	ANTIBIOTICS	COMMENTS

Periodontitis	Facultative anaerobes e.g. *Porphyromonas gingivalis*, *Tannerella forsythia*, and *Treponema denticola*	2% Minocycline gel for 2 weeks **OR** Tetracycline fibres, 12.7mg stat	Unit dose cartridge delivers 1mg minocycline HCl. It can be a single visit/up to 3 visits at 3 months intervals Single dose. Slow release over 10 days then, fibre is removed

DEPARTMENT OF FAMILY MEDICINE

Empiric antibiotic therapy

CLINICAL CONDITION	POTENTIAL ORGANISMS	ANTIBIOTICS	COMMENTS
Acute otitis media	Respiratory syncytial virus, Rhinovirus *S. pneumoniae, H. influenzae, and M. catarrhalis viruses*	Adult - Cap Amoxicillin 500mg tds Child – Oral Amoxicillin 40-45 mg/kg 12 hourly for 5-7 days Tab amoxicillin-clavulanate 625mg 8 hourly Oral amoxicillin-clavulanate 40-45 mg/kg 12 hourly for 5-7 days	Most cases of otitis media are of viral origin and do not benefit from antibiotics Antibiotic treatment for patients with severe symptoms (e.g. systemically very unwell, ear pain despite analgesics, fever ≥39.0 °C), those less than 2 years of age, immunocompromised children and patients with bilateral disease
Acute sinusitis	Respiratory syncytial virus, Rhinovirus *S. pneumoniae, H. influenzae, and M. catarrhalis viruses*	Adult - Cap amoxicillin 500mg tds Child – Oral amoxicillin 40-45 mg/kg 12 hourly for 5-7 days Tab amoxicillin-clavulanate 625mg 8 hourly Oral amoxicillin-clavulanate 40-45 mg/kg 12 hourly for 5-7 days.	Most cases of sinusitis are of viral origin and do not benefit from antibiotics Antibiotic treatment for patients with severe symptoms Severe onset is defined as fever ≥ 39.0 °C and purulent nasal discharge or facial pain for at least 3–4 consecutive days Patients at increased risk of complications e.g. those with chronic underlying comorbid diseases

Acute pharyngitis	Respiratory syncytial virus, Rhinovirus Epstein-Barr virus *Streptococcus pyogenes*	Adult - Cap Amoxicillin 500mg tds Child – Oral Amoxicillin 40-45 mg/kg 12 hourly for 10 days Adult – Tab Phenoxymethylpenicillin 500 mg (800 000 IU) q6h Child – Oral Phenoxymethylpenicillin 10-15 mg/kg/dose (16 000-24 000IU/kg/dose) q6-8h for 10 days IM Benzathine benzylpenicillin Adult: 1.2 million units (750 mg) stat Child: <27 kg: 600 000 units (375 mg)	Most cases of pharyngitis are of viral origin and do not benefit from antibiotics Centor scoring system Signs and symptoms (1 point each) • Fever > 38.0 °C • No cough • Tender anterior cervical lymphadenitis • Tonsillar exudates Score 0-2: *Streptococcus pyogenes* pharyngitis Score 3-4: Score suggestive of *Streptococcus pyogenes* pharyngitis and antibiotic treatment is recommended. Consider rapid antigen test or throat culture
Acute bronchitis	Respiratory syncytial virus, Rhinovirus	No need for antibiotics	Give paracetamol, mucolytics, decongestants, antihistamines
Common cold	Respiratory syncytial virus, Rhinovirus	No need for antibiotics	Give paracetamol, mucolytics, decongestants, antihistamines

Gastroenteritis	Rotavirus Norovirus, Adenovirus	Antibiotics not usually needed	Rehydration and electrolyte replacement is the main treatment
Pneumonia		Treat as in Department of Medicine/Paediatrics	
Urinary tract infection		Treat as in Department of Medicine/Paediatrics	

DEPARTMENT OF RADIATION AND CLINICAL ONCOLOGY

Prophylaxis

Patients who undergo cytotoxic chemotherapy are at risk of infection particularly during periods of neutropenia. Target population are patients receiving treatment of cancer as inpatients or outpatients who are experiencing immune suppression or increased susceptibility to infection

CLINICAL CONDITION	ANTIBIOTICS	COMMENTS
Prevention of Febrile neutropenia in oncology patients Multinational Association for Supportive Care in Cancer (MASCC) Risk Index	Low risk – MASCC > 21 Outpatient prophylaxis Tab ciprofloxacin 500mg 12 hourly Tab levofloxacin 500mg once daily High risk – MASCC < 21 Intpatient prophylaxis IV ciprofloxacin 200mg 12 hourly IV levofloxacin 500mg 24hrly	Give for 7 days Full blood count, blood, urine and stool culture. Add fluconazole and acyclovir

Empiric antibiotic therapy

Refer to appropriate sections of this guideline for treatment of various infections

INTENSIVE CARE UNIT

Refer to appropriate sections of this guideline for treatment of various infections

DEPARTMENT OF HAEMATOLOGY AND BLOOD TRANSFUSION

Refer to appropriate sections of this guideline for treatment of various infections

ACCIDENT AND EMERGENCY

Refer to appropriate sections of this guideline for treatment of various infections

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