ANTIMICROBIAL POLICY

2026-27

UNIVERSITY COLLEGE OF MEDICAL SCIENCES

&

GURU TEGH BAHADUR HOSPITAL

DILSHAD GARDEN

DELHI- 110095

ANTIMICROBIAL POLICY MANUAL

2026-27 (Version 2.0)

Formulated by

DEPARTMENT OF MICROBIOLOGY

UCMS & GTB HOSPITAL

DELHI 110095.

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AMENDMENT SHEET

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S. No.	Date	Page No.	Revision No.	Nature of amendment Section/ Details	Authorization

HOSPITAL MEMBERS OF ANTIMICROBIAL STEWARDSHIP PROGRAMME COMMITTEE

The AMSP committee has been structured.

The proposed structure of the committee is as follows:

The AMSP committee has been structured.

1. Medical Director, GTBH and UCMS- Chairman.
2. Principal, UCMS and GTBH and Executive member.
3. HOD, Microbiology- Member Secretary.
4. Dr. Pratima Prasad, Secretary HICC, Nodal Officer BWM and Kayakalp
5. Dr. Bineeta Kashyap, Infection Control Officer- Member
6. Dr. Rachna Gupta, Pharmacology- Member
7. Dr. Nisha Goyal, Microbiology - Member
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11. Dr. Aditya Aggarwal, Orthopedics- Member
12. Dr. Gurbachan Singh, Neurosurgery- Member
13. Dr. Amit Verma, Respiratory Medicine- Member
14. Dr. Asha Tyagi, Anesthesia and critical care (ICU)- Member
15. Dr. Prerna Batra, Pediatrics- Member
16. Dr. Madhu Upadhyay, Community Medicine- Member
17. Dr. Chander Grover, Derma- Member
18. Dr. Smiti Bhaskaran, OBG- Member
19. Dr. Himanshu Sharma, General Surgery- Member
20. Baksho jassy - Nursing superintendent
21. Pharmacist- Member

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1.0	2.00/1.0	2.0	March 2023	March 2026

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1) PURPOSE

2)

Antimicrobial resistance among bacteria is making the antimicrobial ineffective for its uses. Resistance and its spread among bacteria is generally the result of selective antibiotic pressure. The goal of this policy is to ensure effective economical prescribing to minimize the selection of resistant microorganisms.

2. SCOPE

The detail of procedures & protocols outlined in this section is applicable for the entire hospital.

3) RESPONSIBILITY

i. Preparing Antimicrobial Policy.
ii. Periodic review and change in the policy as per the Hospital data.
iii. Review of implementation of the policy.
iv. Approval of restricted antimicrobials.
v. Providing periodic antibiogram data and help in the preparation of the antimicrobial policy.
vi. Review & monitoring of antimicrobial use and prescriptions and providing periodic report of antimicrobial use.

Note: This document is valid for 1 year from the date of release.

TABLES OF CONTENTS

ABBREVIATIONS AND ACRONYMS

AMSP: Antimicrobial Stewardship Program

DTC: Drug and Therapeutics Committee

HCF: Healthcare facility

AMT: Antibiotic Management Team

HICC: Hospital infection control committee

OPD: Outpatient department

IPD: Inpatient department

ICU: Intensive care unit

OT: Operation Theatre

DDD: Defined Daily Dose

UTI: Urinary tract infection

BSI: Blood stream infection

UTI: Urinary tract infection

SSI: Surgical site infection

SSTI: Skin and soft tissue infections

RTI: Respiratory tract infection

MRSA: Methicillin resistant Staphylococcus aureus

MSSA: Methicillin sensitive Staphylococcus aureus

ESBL: Extended spectrum beta-lactamase

VRSA: Vancomycin Resistant Staphylococcus aureus

VRE: Vancomycin Resistant Enterococci

BL-BLI: Beta lactam- Beta lactamase inhibitor

CRE: Carbapenem- resistant Enterobacterales

CAI: Community acquired infection

HAI: Hospital acquired infection

HCAI: Health care associated infection

NI: Nosocomial infection

OPAT: Out Patient Parental Antibiotic Therapy

MDR: Multidrug Resistant

MDRO: Multi- drug resistant organisms

PDR: Pan drug Resistant

ERCP: Endoscopic retrograde cholangiopancreatography

IAI: Intra- abdominal infection

PEG: Percutaneous endoscopic gastrostomy

CRP: C-Reactive protein

WCC: White cell count

MIC: Minimum inhibitory concentration

IV: Intravenous

IM: Intramuscular

NG: Nasogastric

PO: Orally

OD: Once a day

BD: Twice a day

TDS/TID: Thrice a day

QID: Four times a day

EUCAST: The European Committee on Antimicrobial Susceptibility Testing

CLSI: The Clinical and Laboratory Standards Institute

NCDC: National Centre for Disease Control

CDC: Centre for Disease Control and Prevention

ICN: Infection Control nurse

ICC: Infection Control Committee

HIC: Hospital Infection Control

CDAD: Clostridium difficile produces a diarrhea

PROM: Premature rupture of Membrane

LSCS: Lower segment cesarian section

NCDC: National Centre for Disease Control

ICMR: Indian Council for Medical Research

ATCC: American Type Culture Collection

STP: Standard Treatment Protocol

C/S: Culture susceptibility

SDD: Susceptible-dose dependent

CLABSI: Central Line associated Blood stream infections

CAUTI: Catheter associated Urinary tract infection.

ANTIMICROBIAL STEWARDSHIP PROGRAMME

The past 30 years has observed rise in multidrug-resistant pneumococcal, gonococci, and *Salmonella* spp. and extremely drug-resistant tuberculosis to patients in the community. Vancomycin-resistant *Enterococcus* and vancomycin-resistant *S. aureus* have also emerged. Extremely drug resistant gram-negative bacteria, such as carbapenemase-producing *Klebsiella pneumoniae* and other carbapenem-resistant *Enterobacteriaceae* spp., extended spectrum beta-lactamase-producing *Enterobacteriaceae*, *P. aeruginosa*, and *Acinetobacter baumannii* have spread widely among patients in healthcare settings; in some cases, these pathogens have been pan-resistant, that is, resistant to all available antibiotics.

Unfortunately, during the last decade there has also been a dramatic drop in the development and approval of new antibacterial agents. The antimicrobial armamentarium has been depleted and our ability to treat infectious diseases has been severely compromised. Resistant infections not only result in increased morbidity and mortality but also dramatically increase healthcare costs. It is ironic that in the twenty-first century we are encountering bacterial infections for which we have no treatment. A multifaceted approach is necessary to prevent, detect, and control the emergence of antimicrobial-resistant organisms. This includes ensuring the availability of adequate and appropriate therapeutic agents, the existence of diagnostic capacity to rapidly and reliably detect specific pathogens and their antimicrobial susceptibilities, and the promotion of robust infection prevention, control, and antimicrobial stewardship programs. This document focuses on issues relating to antimicrobial stewardship. Other issues important to the emergence, transmission, and management of antimicrobial resistance are addressed else.

1.1 DEFINITION

Antimicrobial stewardship refers to coordinated interventions designed to improve and measure the appropriate use of antimicrobial agents by promoting the selection of the optimal antimicrobial drug regimen including dosing, duration of therapy, and route of administration.

1.2 OBJECTIVES

The major objectives of antimicrobial stewardship are to achieve best clinical outcomes related to antimicrobial use while minimizing toxicity and other adverse events, thereby limiting the selective pressure on bacterial populations that drives the emergence of antimicrobial-resistant strains. Antimicrobial stewardship may also reduce excessive costs attributable to suboptimal antimicrobial use.

1.3 KEY COMPONENTS FOR IMPLEMENTING ASP

1. Assess the baseline situation
2. Ensure accountability and leadership
3. Set up structure and organization
4. Define priorities and how to measure progress and success
5. Identify effective interventions for your setting
6. Identify key measurements for improvement
7. Educate and training
8. Communication

Effective interventions for Antimicrobial Stewardship Programme (AMSP) - When establishing a new stewardship program, it is best to start with the core strategies and focus on achieving and maintaining them before adding some of the supplemental strategies. The Antimicrobial Stewardship (AMS) team manages the hospital's AMS program on a day-to-day basis. The AMS team is distinct from the AMS committee as the AMS team is responsible for enacting the strategies to achieve the goals determined by the committee. The team report to the AMS committee (or equivalent), although, in practice, members of the AMS team will usually be part of the AMS committee.

1.4 CORE STRATEGIES:

Front–end strategies where antimicrobials are made available through an approval process (e.g., formulary restrictions and preauthorization)

Back-end strategies are where antimicrobials are reviewed after antimicrobial therapy has been initiated (e.g., prospective audit with intervention and feedback)

1.5 SUPPLEMENTAL STRATEGIES

1. Streamlining / timely de-escalation of therapy
2. Dose optimization
3. Parenteral to oral conversion
4. Guidelines and clinical pathways
5. Antimicrobial order forms
6. Education
7. Computerized decision support,
8. Surveillance
9. Laboratory surveillance and feedback
10. Combination therapies
11. Antimicrobial cycling

1.6 ANTIMICROBIAL STEWARDSHIP COMMITTEE (ASC)

A Multidisciplinary inter professional **antimicrobial stewardship committee** with multidisciplinary membership including clinicians, surgeons of major clinical departments, microbiologist (if available in the health care framework (HCF) or link HCF for microbiology services), pharmacists, nursing staff etc. The ASP Committee assists the Drug and Therapeutics Committee (DTC) in finalizing the list of antibiotics in the HCF formulary. There should be Antibiotic Management Team (AMT) for daily monitoring of antibiotic use.

Core AMS team should comprise:

- ✓ Clinical microbiologist
- ✓ A Doctor (an infectious diseases clinician or doctor with an interest in infections or antimicrobial use)
- ✓ A pharmacist
- ✓ A nurse.

The following '*expert group'* members are desirable, but not essential:

- ✓ Infectious diseases physicians
- ✓ Clinical pharmacist with knowledge of antimicrobials
- ✓ Infection control practitioner or specialist nurse.

The Hospital infection control (HIC) team consists of:

- ✓ Secretary ICC
- ✓ Microbiologist (Infection control officer)
- ✓ Infection Control Nurses (ICNs)

1.7 ANTIBIOTIC POLICY

Antibiotic policy: It is consisting of written guidance that recommended antibiotics and their dose for treating and preventing specific infections. It is to be prepared by the antimicrobial stewardship team in consultation with microbiology, pharmacologists, if available and physicians and surgeons from major departments. The policy is reviewed and updated annually.

1.7.1 The hospital antimicrobial policy should be based upon the following factors:

- ✓ Prevent local antibiogram
- ✓ Spectrum of antimicrobial activity
- ✓ Pharmacokinetics/ pharmacodynamics of antimicrobials
- ✓ Adverse effects and potential to select resistance of antimicrobials
- ✓ Cost of the therapy
- ✓ Special needs of individuals patient group like immunocompromised, pregnant women etc.

1.7.2 Development of Antimicrobial policy

The key elements of developing hospital antimicrobial policy are given below:

- ✓ Multidisciplinary group to make review and adapt policy
- ✓ Adapt National/ state guidelines to suit need of hospitals and review hospital AST surveillance data/antibiogram
- ✓ Recommend antimicrobials based on efficacy against prevalent pathogens with dose, duration and route
- ✓ Develop prophylactic and empirical guidelines including for intravenous to oral switch, special group, surgical prophylaxis.
- ✓ Monitor and review antibiotics policy

- ✓ Review policy by experts other than developing group
- ✓ Revise as per yearly antibiogram and feedback.

1.8 ANTIMICROBIAL STEWARDSHIP PROGRAM (AMSP)

1.8.1 Antimicrobial Stewardship Program monitoring activities

1. Rational use of antibiotic is being monitored
   - ✓ Restricted use of indicator antibiotics ***(Vancomycin, Meropenem, Ofloxacin, Ciprofloxacin, Cephalosporin with Sulbactam combination, Colistin, Levofloxacin, Daptomycin, Tigecycline, Ceftaroline and non-TB use of rifampicin or any other antibiotic outside HCF formulary***) are monitored by ICNs on daily rounds and details recorded on preformatted template.
   - ✓ Other antibiotics are also checked for rational combinations, doses and duration prescribed. Treating doctors are asked to explain the reasons for initiating these antibiotics in writing. These patients are the discussed for rationality with Clinical Microbiologists.
   - ✓ Irrational antibiotic therapy, if identified is communicated to treating physician or surgeon.
   - ✓ eon for immediate discontinuation/modification. Irrational combination of antibiotics or doses is also monitored.
   - ✓ The continued need for antimicrobial therapy should be reviewed at least daily. For most types of infection treatment should continue until the clinical signs and symptoms of infection have resolved – exceptions to this are indicated in the relevant sections.
   - ✓ Parenteral therapy is normally used in seriously ill patients and those with gastrointestinal upset.
   - ✓ Oral therapy can often be substituted as the patient improves.
2. Pre – surgical prophylaxis and post operative antibiotic therapy are also monitored on daily basis whether in line with Perisurgical antibiotic prophylaxis guidelines. In case of irrationality concerned department is informed and necessary actions are taken.
3. AMSP have a direct responsibility to ensure prudent antimicrobial prescribing. It focuses on **"4Ds"** of prescribing antimicrobials (Right drug, Right dose, Right duration, De-escalation at Right time)
4. Microbiologist clinical rounds for acceleration and deceleration of antibiotics in infectious diseases.
5. Defined Daily Dose (DDD) for antibiotics per thousand days are calculated and monitored for the antibiotic usage pattern.
6. Number of doses administered are also monitored per thousand patient days.
7. The data analysis is done and discussed periodically during Hospital Infection Control Committee (HICC) meetings and feedback provided to the users.
8. Adherence to antibiotic policy is also discussed in the HICC meeting.
9. Prescription audits of in patients and outpatients are conducted periodically.
10. Major objective of Schedule H and H1 drug is **to control the un-restricted use of antibiotics**. This specified list of drugs should be sold by chemists only after retaining a

copy of the prescription by them. The packs of these drugs should have a warning in a box with a red border on the label.

1.8.2 Aims of antimicrobial therapy

1. To provide a simple, best empirical/specific treatment of common infections
2. To promote the safe, effective, economic and rational use of antibiotics
3. To minimize the emergence of bacterial resistance in the community

1.9 GENERAL ANTIBIOTIC USE GUIDELINES

i. All antibiotic initiations are done after sending appropriate samples for cultures or any changes in antibiotic is done after receiving culture report.
ii. Rapid tests e.g., Gram stain, is done to determine therapeutic choices when decision on empiric therapy is required.
iii. Health care Framework (HCF) has categorized usage of antibiotics for restricted use, limited access and under surveillance based on antibiogram, if available and/or in consultation with Drugs & Therapeutic Committee (DTC) of the HCF.
iv. HCF has a list of antibiotics available for OPD, IPD, emergency and respective ICUs in consultation with Drugs & Therapeutic Committee (DTC) of the HCF.
v. List of all available antibiotics are communicated to the prescribers every month or from time-to-time if there is any change in the list or medicine is not available for some reasons.
vi. Antimicrobials are chosen following HCF policy and National Standard Treatment guidelines for infectious diseases and Delhi State Standard Treatment Guidelines. If alternatives are chosen, reason for the same is documented in the case records.
vii. Prescribe an antibiotic only when there is likely to be a clear clinical benefit.
viii. Do not prescribe an antibiotic for viral sore throat, simple coughs and colds and viral diarrhoea.
ix. Empiric Therapy is given where delay in initiating therapy awaiting microbiological results would be life threatening or risk serious morbidity, antimicrobial therapy based on a clinically defined infection is justified. Necessary specimens are drawn before commencing therapy. Where empiric therapy is used the accuracy of diagnosis is reviewed regularly and treatment altered/stopped when microbiological results become available.
x. Once culture / sensitivity report available:
    a. Presumptive therapy antibiotic may require to be changed
    b. Consult Microbiologist to decide the choice of antibiotic (based on narrowest spectrum antibiotic which covers the pathogen isolated).
xi. Following factors affecting antimicrobial choices and route of administration are checked e.g., age, type and site of infection (respiratory, intra-abdominal, pneumonia, blood stream, urinary tract and skin and soft tissue), renal& hepatic function, interactions, allergy, if any.
xii. A dose and duration of treatment is suggested but can be modified by consultants based on clinical scenarios
xiii. Use simple generic antibiotics first whenever possible. Avoid broad spectrum antibiotics (e.g. Amoxycillin+Clavulanate, quinolones and cephalosporin's) when

standard and less expensive antibiotics remain effective, as they increased risk of *Clostridium difficile*, MRSA and resistant UTIs.

xiv. Avoid widespread use of topical antibiotics (especially those agents also available as systemic preparations).

xv. All allergies are recorded prominently in red ink in the allergy box on the patient's case sheet. Drug chart is completed when a new prescription chart is written or transcribed. If no allergy - "No known allergy or allergic to name of the drug ……." is recorded. The box is signed and dated. If allergy history cannot be obtained, then "history not available" is specified. Under no circumstances allergy box is left blank. The allergy box is completed before prescribing a new drug, except in exceptional circumstances. If patients have a suspected drug allergy, then the drug and suspected reaction is documented in the case sheet and the drug chart.

xvi. Check that the appropriate dose is prescribed. If uncertain, contact Infectious disease physician, Pharmacy, or check in the formulary.

xvii. The need for antimicrobial therapy is reviewed on a daily basis. For most types of infection treatment is continued until the clinical signs and symptoms of infection have resolved – exceptions to this are noted. For most infections 5 – 7 days of antimicrobial therapy is sufficient (simple UTIs can be adequately treated with 3 days of antibiotic).

xviii. Parenteral therapy is normally used in seriously ill patients and those with gastrointestinal upset. All IV antibiotics are initially given for 48 – 72 hours without review and switching over to oral alternatives is considered after 48 hours. Oral therapy can often be substituted as the patient improves.

xix. Switching to oral is indicated by:

a. Oral route is not recommended (i.e., no vomiting, nil by mouth, severe diarrhoea, swallowing disorder, unconscious).
b. For nasogastric (NG)/PEG feeding consult prescriber and pharmacist.
c. Suitable oral antibiotic option available.
d. fever effervescence for at least 24h and, marked clinical improvement; BP stable, RR and HR normal for age; White cell count showing a trend towards normal; low CRP.

High-risk and deep-seated infections: certain infections may appear to respond promptly but warrant prolonged IV therapy to optimize response and minimize relapse risk. Discuss with Microbiology before switching patients with a high risk/ deep-seated infection to oral therapy.

Deep-seated infections (Liver abscess, Osteomyelitis, Septic arthritis, Empyema, Cavitating pneumonia) an initial two weeks of IV therapy may be needed,

High risk infections need prolonged IV therapy, such as:

a. Meningitis
b. Intracranial abscesses
c. Staphylococcus aureus bacteraemia,
d. Severe or necrotising soft tissue infections, Severe infections during chemotherapy-related neutropenia
e. Infected implants/prosthetics
f. Inadequately drained abscesses and empyema
g. Intra-abdominal sepsis

h. Mediastinitis
i. Endocarditis
j. Exacerbation of cystic fibrosis

xx. Antimicrobials are de-escalated or stepped down to the narrowest spectrum, most efficacious and most cost-effective option as per culture reports. If no step down availed, the reason is documented and is subjected to clinical audit.

xxi. Where treatment is apparently failing, advice from the microbiologist and Physician may be for changing to an alternative choice of antimicrobial agent.

xxii. The indication for all antibiotics should be documented on the drug chart by the prescriber. For all infections the specific diagnosis should be documented clearly in the medical notes and the indicators for making the diagnosis (↑ Wbc, ↑temp >38°C, evidence of inflammation, fluid collection, ↑CRP etc).

xxiii. 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.

xxiv. **Stat Doses:** To prevent delay in the initiation of antibiotic treatment the first dose should be written as a STAT dose on the front of the prescription chart, stating the time to be given. Ensure the nurse is informed so that administration is actioned. The subsequent dose(s) can be scheduled to continue at the next drug round or that dose crossed if the interval is due soon. Mark the required box for commencement of regular administration.

xxv. Duration: 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. When discussing choice of antibiotics with the microbiologist confirm and document the recommended duration. IV antibiotics should be reviewed after 48 to 72 hours (earlier if appropriate), unless prescribed for a high risk or deep-seated infection requiring longer IV treatment.
- A review or stop date should always be indicated on the drug chart by the prescriber for all antibiotics.
- Missed Doses: 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.
- **Key Performance Indicators (KPI):** Documentation of indication and stop or review dates on the prescription, compliance with the Antibiotic Policy and ensuring there are no missed doses and all have **key performance indicators** attached and are audited regularly. An AMS program should be evaluated against selected KPIs, which are measures of impact used to evaluate the success of these programs as a quality improvement strategy. A suitable selection of KPIs provides the committee that oversees AMS, healthcare executives and other stakeholders with concise information about the direct or indirect effects of AMs initiatives.

ROLE OF THE PRESCRIBER

- When prescribing an antibiotic, the prescriber should write on the drug chart the indication for each antibiotic. This should be as specific as is known at the time e.g. "sepsis, Cause", and should be updated as more information is available. If, for confidentiality reasons, it is not appropriate to write the indication on the drug chart, then add "see notes" to the drug chart and document the indication clearly in the medical notes.
- Always state either a stop date (if known) or review date (48hours is usually a reasonable initial duration), see below. Ensure the indication is clearly documented in the medical notes together with the intended duration of therapy and any other information on plans e.g. awaiting sensitivities or step-up / step-down decisions.
- For all restricted antibiotics used outside the indications in the policy the prescriber should discuss the choice of antibiotic with the AMS Team and write the indication and "Discussed with microbiologist" on the drug chart.
- For all antibiotics write the first dose as a STAT dose on the front of the prescription chart stating the time to be given so that treatment is started promptly. Ensure the nurse is informed so that administration is actioned. The subsequent dose(s) can be scheduled to continue at the next drug round or that dose crossed if interval is due soon. Mark the required box for commencement of regular administration.
- Reviewing antibiotics: For most IV antibiotics and for some conditions treated orally, a review date will be required. Write the review date in the designated space and where appropriate write “Review” next to the box.
- Most IV antibiotics should be reviewed after 48 hours with a view to changing to oral therapy, unless prescribed for a condition requiring an extended IV course.
- Antibiotics should be reviewed and stopped earlier than the documented date, if clinically indicated.

ROLE OF THE NURSE

- Request the doctor to write the indication and stop/review date on the drug chart for all antibiotic prescriptions.
- Query all prescriptions beyond the review date but, whilst awaiting review, continue to administer the antibiotic.
- If the patient has missed any antibiotic doses ask the doctor to review the patient and chart and treatment, and add a new review date / stop date if appropriate.

ROLE OF THE PHARMACIST

- Ensure that for all antibiotic prescriptions the indication and review or stop date is clearly documented on the drug chart. Pharmacists may endorse these on the chart after reference to the notes or discussion with a doctor.
- Ensure the administration section of the drug chart is annotated correctly.
- Pharmacists may add this annotation providing a stop date or review date has been confirmed by the doctor.

Take part in scheduled point prevalence audits (twice yearly) to review the documentation of the indication and stop/review dates on the drug charts and the prescribing of antibiotics in accordance with the Antibiotics Policy.

1.9 PRINCIPLES OF ANTIMICROBIALS

Antimicrobial stewardship: It is defined as processes to assist and support clinicians with decisions regarding the optimal selection, dose and duration of an antimicrobial agent.

The objective of AMS:

- **To ensure the best clinical outcome for the treatment or prevention of Infection.**
- **Minimal toxicity to the patient.**
- **Minimal impact on development of resistance.**

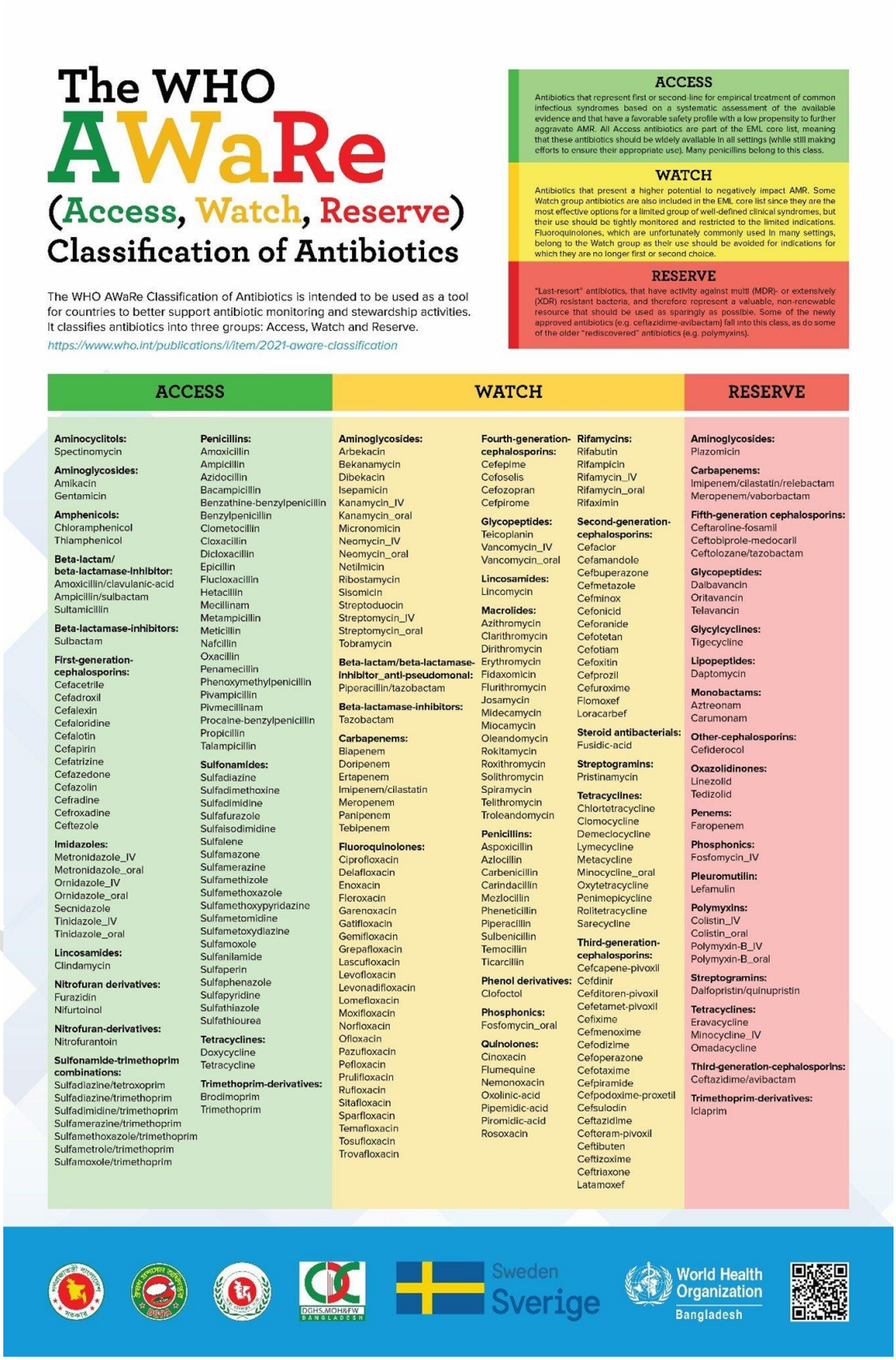
1.9.1. AWaRe Classification: WHO created the *AWaRe* classification in 2017 (and revised it in 2019 and 2021) to categorize antibiotics into three groups: ***Access, Watch and Reserve***

Access, Watch and Reserve antibiotics definitions:

- **Access** antibiotics are antibiotics with a narrow spectrum of activity, generally with less side-effects, a lower potential for the selection of antimicrobial resistance and of lower cost. They are recommended for the empiric treatment of most common infections and should be widely available.
- **Watch** antibiotics generally have a higher potential for the selection of antimicrobial resistance and are more commonly used in sicker patients in the hospital facility setting. Their use should be carefully monitored to avoid overuse.
- **Reserve** antibiotics are last-resort antibiotics that should only be used to treat severe infections caused by multidrug-resistant pathogens.

Access, Watch and Reserve antibiotics in the 2021 *WHO Model list of essential medicines for children*	
Access group	Amikacin; amoxicillin; amoxicillin + clavulanic acid, ampicillin, benzathine benzylpenicillin, benzylpenicillin; cefalexin, cefazolin, chloramphenicol, clindamycin, cloxacillin, doxycycline, gentamicin, metronidazole, nitrofurantoin, phenoxymethylpenicillin, procaine benzylpenicillin, sulfamethoxazole + trimethoprim and trimethoprim.
Watch group	Azithromycin, cefixime, cefotaxime, ceftazidime, ceftriaxone, cefuroxime, ciprofloxacin, clarithromycin, meropenem; piperacillin + tazobactam and vancomycin.
Reserve group	Cefiderocol ceftazidime + avibactam, colistin, Fosfomycin, linezolid, meropenem + vaborbactam and polymyxin B.

WHO AWaRe Antibiotics classification



The WHO AWaRe (Access, Watch, Reserve) Classification of Antibiotics

The WHO AWaRe Classification of Antibiotics is intended to be used as a tool for countries to better support antibiotic monitoring and stewardship activities. It classifies antibiotics into three groups: Access, Watch and Reserve.

https://www.who.int/publications/i/item/2021-aware-classification

ACCESS

Antibiotics that represent first or second-line for empirical treatment of common infectious syndromes based on a systematic assessment of the available evidence and that have a favorable safety profile with a low propensity to further aggravate AMR. All Access antibiotics are part of the EML core list, meaning that these antibiotics should be widely available in all settings (while still making efforts to ensure their appropriate use). Many penicillins belong to this class.

WATCH

Antibiotics that present a higher potential to negatively impact AMR. Some Watch group antibiotics are also included in the EML core list since they are the most effective options for a limited group of well-defined clinical syndromes, but their use should be tightly monitored and restricted to the limited indications. Fluoroquinolones, which are unfortunately commonly used in many settings, belong to the Watch group as their use should be avoided for indications for which they are no longer first or second choice.

RESERVE

"Last-resort" antibiotics, that have activity against multi (MDR)- or extensively (XDR) resistant bacteria, and therefore represent a valuable, non-renewable resource that should be used as sparingly as possible. Some of the newly approved antibiotics (e.g. ceftazidime-avibactam) fall into this class, as do some of the older "rediscovered" antibiotics (e.g. polymyxins).

ACCESS

Aminocyclitols:
Spectinomycin

Aminoglycosides:
Amikacin
Gentamicin

Amphenicols:
Chloramphenicol
Thiamphenicol

Beta-lactam/ beta-lactamase-inhibitor:
Amoxicillin/clavulanic-acid
Ampicillin/sulbactam
Sultamicillin

Beta-lactamase-inhibitors:
Sulbactam

First-generation-cephalosporins:
Cefacetrile
Cefadroxil
Cefalexin
Cefaloridine
Cefalotin
Cefapirin
Cefatrizine
Cefazedone
Cefazolin
Cefradine
Cefroxadine
Ceftezole

Imidazoles:
Metronidazole_IV
Metronidazole_oral
Ornidazole_IV
Ornidazole_oral
Secnidazole
Tinidazole_IV
Tinidazole_oral

Lincosamides:
Clindamycin

Nitrofuran derivatives:
Furazidin
Nifurtoinol

Nitrofuran-derivatives:
Nitrofurantoin

Sulfonamide-trimethoprim combinations:
Sulfadiazine/tetroxoprim
Sulfadiazine/trimethoprim
Sulfadimidine/trimethoprim
Sulfamerazine/trimethoprim
Sulfamethoxazole/trimethoprim
Sulfametrole/trimethoprim
Sulfamoxole/trimethoprim

Penicillins:
Amoxicillin
Ampicillin
Azidocillin
Bacampicillin
Benzathine-benzylpenicillin
Benzylpenicillin
Clometocillin
Cloxacillin
Dicloxacillin
Epicillin
Flucloxacillin
Hetacillin
Mecillinam
Metampicillin
Meticillin
Nafcillin
Oxacillin
Penamecillin
Phenoxymethylpenicillin
Pivampicillin
Pivmecillinam
Procaine-benzylpenicillin
Propicillin
Talampicillin

Sulfonamides:
Sulfadiazine
Sulfadimethoxine
Sulfadimidine
Sulfafurazole
Sulfaisodimidine
Sulfalene
Sulfamazone
Sulfamerazine
Sulfamethizole
Sulfamethoxazole
Sulfamethoxypyridazine
Sulfametomidine
Sulfametoxydiazine
Sulfamoxole
Sulfanilamide
Sulfaperin
Sulfaphenazole
Sulfapyridine
Sulfathiazole
Sulfathiourea

Tetracyclines:
Doxycycline
Tetracycline

Trimethoprim-derivatives:
Brodimoprim
Trimethoprim

WATCH

Aminoglycosides:
Arbekacin
Bekanamycin
Dibekacin
Isepamicin
Kanamycin_IV
Kanamycin_oral
Micronomicin
Neomycin_IV
Neomycin_oral
Netilmicin
Ribostamycin
Sisomicin
Streptoduocin
Streptomycin_IV
Streptomycin_oral
Tobramycin

Beta-lactam/beta-lactamase-inhibitor_anti-pseudomonal:
Piperacillin/tazobactam

Beta-lactamase-inhibitors:
Tazobactam

Carbapenems:
Biapenem
Doripenem
Ertapenem
Imipenem/cilastatin
Meropenem
Panipenem
Tebipenem

Fluoroquinolones:
Ciprofloxacin
Delafloxacin
Enoxacin
Fleroxacin
Garenoxacin
Gatifloxacin
Gemifloxacin
Grepafloxacin
Lascufloxacin
Levofloxacin
Levonadifloxacin
Lomefloxacin
Moxifloxacin
Norfloxacin
Ofloxacin
Pazufloxacin
Pefloxacin
Prulifloxacin
Rufloxacin
Sitafloxacin
Sparfloxacin
Temafloxacin
Tosufloxacin
Trovafloxacin

Fourth-generation-cephalosporins:
Cefepime
Cefoselis
Cefozopran
Cefpirome

Glycopeptides:
Teicoplanin
Vancomycin_IV
Vancomycin_oral

Lincosamides:
Lincomycin

Macrolides:
Azithromycin
Clarithromycin
Dirithromycin
Erythromycin
Fidaxomicin
Flurithromycin
Josamycin
Midecamycin
Miocamycin
Oleandomycin
Rokitamycin
Roxithromycin
Solithromycin
Spiramycin
Telithromycin
Troleandomycin

Penicillins:
Aspoxicillin
Azlocillin
Carbenicillin
Carindacillin
Mezlocillin
Pheneticillin
Piperacillin
Sulbenicillin
Temocillin
Ticarcillin

Phenol derivatives:
Clofoctol

Phosphonics:
Fosfomycin_oral

Quinolones:
Cinoxacin
Flumequine
Nemonoxacin
Oxolinic-acid
Pipemidic-acid
Piromidic-acid
Rosoxacin

Rifamycins:
Rifabutin
Rifampicin
Rifamycin_IV
Rifamycin_oral
Rifaximin

Second-generation-cephalosporins:
Cefaclor
Cefamandole
Cefbuperazone
Cefmetazole
Cefminox
Cefonicid
Ceforanide
Cefotetan
Cefotiam
Cefoxitin
Cefprozil
Cefuroxime
Flomoxef
Loracarbef

Steroid antibacterials:
Fusidic-acid

Streptogramins:
Pristinamycin

Tetracyclines:
Chlortetracycline
Clomocycline
Demeclocycline
Lymecycline
Metacycline
Minocycline_oral
Oxytetracycline
Penimepicycline
Rolitetracycline
Sarecycline

Third-generation-cephalosporins:
Cefcapene-pivoxil
Cefdinir
Cefditoren-pivoxil
Cefetamet-pivoxil
Cefixime
Cefmenoxime
Cefodizime
Cefoperazone
Cefotaxime
Cefpiramide
Cefpodoxime-proxetil
Cefsulodin
Ceftazidime
Cefteram-pivoxil
Ceftibuten
Ceftizoxime
Ceftriaxone
Latamoxef

RESERVE

Aminoglycosides:
Plazomicin

Carbapenems:
Imipenem/cilastatin/relebactam
Meropenem/vaborbactam

Fifth-generation cephalosporins:
Ceftaroline-fosamil
Ceftobiprole-medocaril
Ceftolozane/tazobactam

Glycopeptides:
Dalbavancin
Oritavancin
Telavancin

Glycylcyclines:
Tigecycline

Lipopeptides:
Daptomycin

Monobactams:
Aztreonam
Carumonam

Other-cephalosporins:
Cefiderocol

Oxazolidinones:
Linezolid
Tedizolid

Penems:
Faropenem

Phosphonics:
Fosfomycin_IV

Pleuromutilin:
Lefamulin

Polymyxins:
Colistin_IV
Colistin_oral
Polymyxin-B_IV
Polymyxin-B_oral

Streptogramins:
Dalfopristin/quinupristin

Tetracyclines:
Eravacycline
Minocycline_IV
Omadacycline

Third-generation-cephalosporins:
Ceftazidime/avibactam

Trimethoprim-derivatives:
Iclaprim

DGHS.MOH&FW BANGLADESH
Sweden Sverige
World Health Organization Bangladesh

1.9.2 CATEGORIZATION OF ANTIBIOTICS

These needs to be defined by the Drugs and Therapeutic committee of the HCF. The categories should be revised/revised at least once in six months. HICC should be informed of the same on periodic basis.

1.9.2.1 Restricted use

A pre use authorization from an ID Physician / Clinical Microbiologist needs to be taken before prescribing these antibiotics. A written documentation to be maintained which captures the request along with justification for use by the clinician and also captures the approval for use by the authority in charge

1.9.2.2 Limited access

Unrestricted use of these antibiotics may be allowed for empirical use for first 48-72 hours but after that a clinical justification by clinician and approval from authority in charge needs to be documented that why these antibiotics cannot be de-escalated and need to be continued further

1.9.2.3 Under Surveillance

A close monitoring to check their usage (indication, quantity and pattern) in OPD/Type 1 Patients/ Surgical prophylaxis. Audits to be done at regular intervals to assess their consumption.

1.9.2.4 Restricted Use Antibiotics

Colistin: It is the last resort for managing gram negative MDRs and its use, dose and duration need to be rationalized. Liberal use should be restricted

Doripenem: It is the last carbapenem (at least in near future). If Imipenem and Meropenem are working, we need to conserve the use of Doripenem

Rifampicin: (For Non-TB use) - This is a valuable drug for TB. The use of rifampicin in MDR, Pseudomonas, Acinetobacter or MRSA should be restricted

Linezolid: Alternatives available e.g., Vancomycin/Teicoplanin. Linezolid is bacteriostatic and available as oral - more prone for misuse VRSA / VRE rare

Daptomycin: Alternatives are available for MRSA e.g., Vancomycin and Teicoplanin. Moreover, VRSA and VRE are still not a major cause of concern.

Tigecycline: Bacteriostatic, one of the most broad-spectrum drugs has limited role in MDR infections like SSTI, IAI where ESBL/MRSA and or Acinetobacter are feared.

Sulbactam: Reserved for PDR Acinetobacter. Dose has to be correct (4-12 g/day for PDR Acinetobacter).

1.9.2.5 Limited Access Antibiotics

Imipenem/Meropenem: Use as empirical in sick patients is allowed looking at the antibiograms in most HCFs showing better sensitivity of these antibiotics over other classes, however after culture and sensitivity report is available, if it shows a susceptible pathogen to other classes of antibiotics plus if patient condition improves – then de-escalation should be advised.

Piperacillin-Tazobactam/ Cefoperazone-Sulbactam: These are as broad spectrum as carbapenem (this fact is not appreciated generally). Use as empirical in sick patients is allowed looking at the antibiograms in most HCFs showing decent sensitivity of these antibiotics over other classes, however after culture and sensitivity report is available, if it shows a susceptible pathogen to other classes of antibiotics plus if patient condition improves - then de-escalation should be advised.

Vancomycin/Teicoplanin: Use as empirical in sick patients may be allowed specially in BSI, SSTI where MRSA is suspected but if after 48-72 h culture and sensitivity report shows no *S. aureus* or MSSA then Vancomycin/Teicoplanin have absolutely no role and should be discontinued.

1.9.2.6 Under Surveillance Antibiotics

3rd generation cephalosporin's (both oral and IV) and Fluoroquinolones: One of the main reasons for widespread ESBLs in India in the community is due to overuse of 3rd generation cephalosporin and Fluoroquinolones at OPD level-Type 1 patients, paediatric patients and surgical prophylaxis.

It is must to educate the clinicians about these antibiotics and the collateral damage they cause. Also, it is imperative to exercise control on liberal usage of these antibiotics in a phased manner and perform regular audits on the rate of consumption of these antibiotics. This could be the single most valuable intervention to curb resistance in India in community.

1.9.2.7 Irrational combinations or less evidenced combinations

(As per Standard Treatment Protocol, 2022-ICMR)

1. Amoxicillin - tazobactam
2. Cefadroxil-clavulanic acid
3. Cefepime + Amikacin
4. Cefepime-sulbactam
5. Cefepime-tazobactam
6. Cefixime + Ofloxacin
7. Cefixime + Ornidazole
8. Cefixime-clavulanic acid
9. Cefotaxime-sulbactam
10. Cefpodoxime-clavulanic
11. Ceftazidime-tazobactam
12. Ceftriaxone-sulbactam
13. Ceftriaxone-tazobactam
14. Cefuroxime-clavulanic acid
15. Cefuroxime-sulbactam
16. Meropenem-sulbactam
17. Vancomycin + Ceftriaxone
18. Cefoperazone –Tazobactam
19. Ampicillin-Amoxicillin-Cloxacillin
20. Ceftazidime-Sulbactam
21. Ofloxacin- Ornidazole/Tinidazole
22. Gemifloxacin-Ornidazole
23. Fluconazole-Tinidazole
24. Doxycycline-Tinidazole
25. Tetracycline-Metronidazole
26. Cefixime/Cefadroxil + Ambroxol + Lactobacillus
27. Ciprofloxacin/Gatifloxacin + Ambroxol
28. Roxithromycin + Ambroxol

IMPORTANT POINTS TO REMEMBER:

1.9.3 Restricted antibiotics and their dosages: *(As per Standard Treatment Protocol, 2022-ICMR)*

Colistin	**Intravenous:** ≤60 kg: 75000 units/kg daily in 3 divided doses >60 kg: 2 million units 3 times a day
Imipenem/cilastatin	**Intravenous:** 2.5 gm daily (in 3-4 divided doses) Less sensitive organism: upto 50 mg/kg daily) in 3-4 divided doses
Meropenem	**Intravenous:** 1 gm three times a day
Ertapenem	**Systemic:** 1 gm once daily
Piperacillin Tazobactam	**Intravenous:** 4.5 gm four times a day
Ampicillin - Sulbactam	**Systemic:** 1.5 gm (1 gm ampicillin as the sodium salt plus 0.5 gm sulbactam as the sodium salt) to 3 g (2 gm ampicillin as the sodium salt plus 1 gm sulbactam as the sodium salt) four times a day
Cefoperazone-Sulbactam	**Intravenous:** The dose of Cefoperazone-Sulbactam is 4 gm I.V. BD. Impaired Renal Function: Upto Moderate Impairment: The dose of Cefoperazone-Sulbactam is 1.5 gm IV BD plus Cefoperazone 1 gm IV BD
Co Amoxiclav	**Oral:** 500 to 625 mg twice a day **Intravenous:** 1.2 gm three times a day
Tigecycline	**Intravenous:** >18 yrs: initially 100 mg, then 50 mg every 12 hrs for 5-14 days
Ceftriaxone	**Systemic:** 1 gm daily OR 2-4 gm daily in severe infections
Cefuroxime	**Oral (cefuroxime axetil):** 250-500 mg twice daily for 10 days **Intravenous:** 7.5 mg-1.5 gm three or four times a day in severe infection
Ofloxacin	**Oral:** 200 to 400 mg twice a day **Intravenous:** 200 mg over at least 30 minutes once to twice daily
Ciprofloxacin	**Oral:** 500-750 mg twice a day **Intravenous:** 400 mg three times a day
Moxifloxacin	**Oral/ Intravenous:** 400 mg (orally or as intravenous infusion)
Levofloxacin	**Oral:** 500-750 mg once a day **Intravenous:** 750 mg once a day
Norfloxacin	**Oral:** 400 mg twice daily
Linezolid	**Oral/ Intravenous:** 600 mg twice daily (if i.v. infusion over 30-120 minutes)
Vancomycin	**Intravenous**: 1 gm twice a day; elderly over 65 yrs,500 mg every 12 hrs or 1gm once daily
Teicoplanin	**Intravenous:** Severe infection 10 mg/kg/day every 12 hours for first 3 doses, then 10 mg/kg/day iv once daily
Metronidazole	**Oral:** 800 mg initially then 400 mg three times a day **Intravenous:** 500 mg three times a day
Amikacin	**Systemic:** 15-20 mg/kg daily in 1-3 divided doses depending on severity of infection
Erythromycin	**Oral:** 500 mg four times a day

	Intravenous: 50 mg/kg daily by continuous infusion or in divided doses four times a day
Clarithromycin	**Oral:** 500 mg twice a day
Azithromycin	**Intravenous**: 500 mg once daily for 3 days or 500 mg on first day then 250 mg once daily for 4 days
Nitrofurantoin	**Oral:** 100 mg twice daily with food
Ceftazidime	**Intravenous:** 2 gm three times a day
Cefixime	**Oral:** 400 mg or 200 mg twice a day
Cefepime	**Intravenous:** 2 gm two times a day

- In infections caused by **Multi Drug Resistant (MDR)** organisms like *Pseudomonas* and *Acinetobacter*, antibiotics should be administered as prolonged or extended infusions e.g. Imipenem (2hrs infusion), Meropenem (3hrs infusion), Piperacillin-Tazobactam and Doripenem (4hrs infusion)
- All dosages mentioned are from British National Formulary 2008/ respective products monographs and are for healthy adult. Necessary adjustments are to be done for hepatic / renal insufficiency, pediatric patients and as per clinician's discretion. Please refer product literature for dosages of drugs not listed here.
  - **Cockcroft's formula for calculating Creatinine Clearance**: (140-Age) x Body Weight (kg) x 0.85 if female) /72 x Serum Creatinine (in mg/dl)
  - For **obese patients**, use Corrected Body Weight i.e. BW + 1/3 Extra Weight

1.9.4.1 The following important guidelines are important for clinicians for prescribing antibiotics / DO NOT REPORT/ INTRINSIC RESISTANCE. (*As per Standard Treatment Protocol,2022-ICMR)*

Organisms	**Antibiotics**
Antibiotics not effective against **Enterobacterales**	• Clindamycin • Glycopeptides (Vancomycin) • Lipoglycopeptides (Teicoplanin) • Linezolid • Macrolides
Antibiotics not effective against **MRSA**	• Carbapenem • β lactam + β lactamase inhibitors • Penicillin • Cephamycins
Antibiotics not effective against **ESBL** producers:	• Aztreonam • Penicillin • Cephalosporin (except Cefotetan, Cefmetazole)
Antibiotics not effective against ***Salmonella & Shigella***	• 1st& 2nd generation cephalosporin • Cephamycins • Aminoglycosides.
Antibiotics not effective against ***Enterococcus***	• Cephalosporin • Clindamycin • Cotrimoxazole • Aminoglycosides G (except high dose)
Antibiotics not effective against **Pseudomonas**	• Tigecycline / Tetracycline • 1st & 2nd generation cephalosporin /Ceftriaxone / Cefotaxime • Cotrimoxazole • Nitrofurantoin • Ertapenem • Amoxicillin- clavulanic acid /Ampicillin/ Ampicillin-sulbactam
Antibiotics not effective against **Proteus**	• Nitrofurantoin • Ampicillin (Proteus vulgaris) • 1st, 2nd Generation cephalosporins • Tetracycline/ Tigecycline • Colistin/ polymyxin B • Imipenem (Proteus mirabilis)
Antibiotics not effective against **Acinetobacter**	• Ampicillin /Amoxycillin/ Amoxicillin-clavulanic acid • Aztreonam • Ertapenem • Chloramphenicol • All antibiotic initiations should be done after sending appropriate specimens for culture and sensitivity test.

1.9.4.2 The following important guidelines are important for clinicians for prescribing antibiotics- ANTIBIOTICS NOT TO REPORT IN FOLLOWING SPECIMENS AND INFECTIONS (*As per Standard Treatment Protocol,2022-ICMR)*

SITE/PATIENT	**WHAT ANTIBIOTIC NOT TO REPORT IN AST**
Blood	Tigecycline (High volume of distribution so does not stay in blood)
CSF	1st and 2nd Generation Cephalosporins, Cephamycins, clindamycin, colistin, oral agents, Doripenem, Ertapenem, Imipenem, Lefamulin, Macrolides, Tetracycline and Fluroquinolones.
Abscesses	Aminoglycosides -Never used for Anaerobic infection and *Salmonella and shigella* spp. also.
Lung	Daptomycin
Urine	Macrolides, Tigecycline, Chloramphenicol, Clindamycin
Children	Fluoroquinolones, Tetracyclines Chloramphenicol, Cotrimoxazole (Infants)
Pregnancy	Tetracyclines, Fluoroquinolones, Aminoglycosides, Metronidazole

WHICH ANTIBIOTICS TO REPORT FOR SPECIFIC SITES ONLY

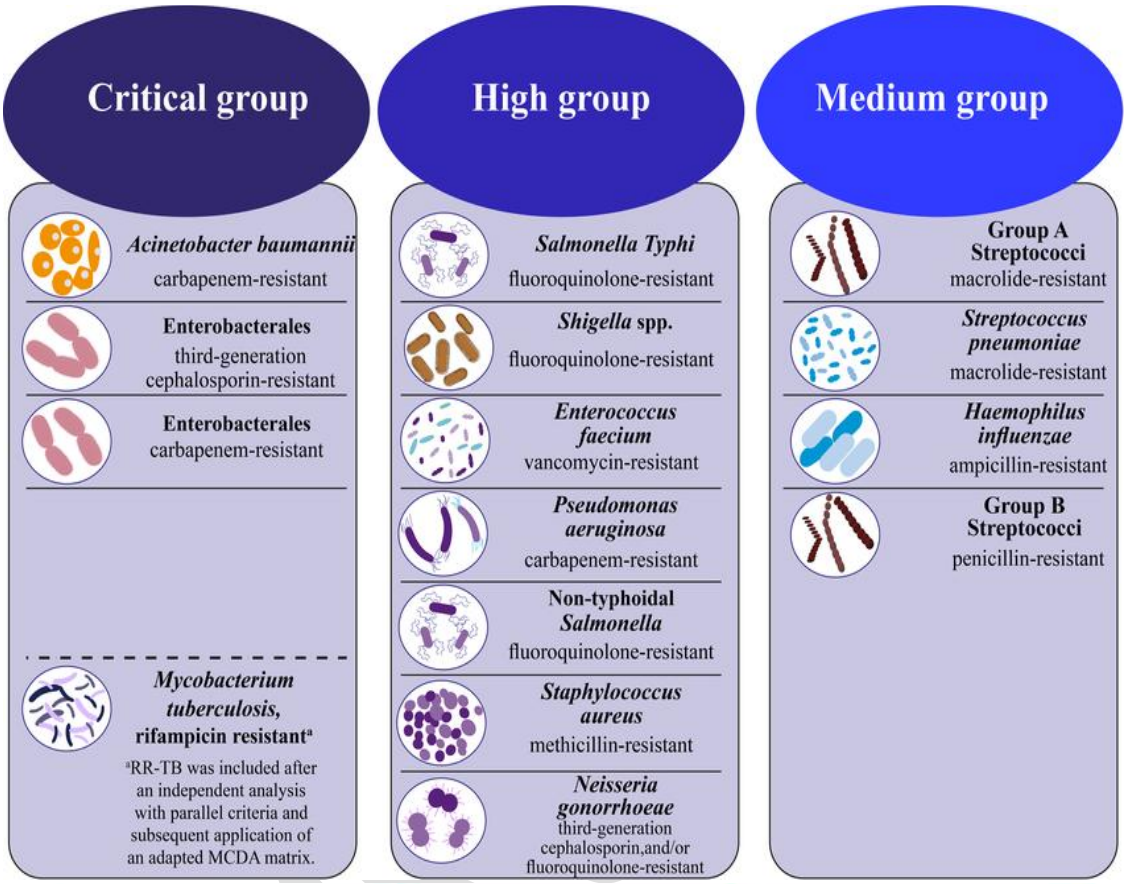
ANTIBIOITCS	**TO BE REPORTED FOR SPECIFIC SITE ONLY**
Tigecycline	Complicated skin and soft tissue infections Only
Nitrofurantoin	Lower UTI
Fosfomycin	Lower UTI (*E. coli and Enterococcus fecalis)*
Beta Lactams	Not for Lower UTI

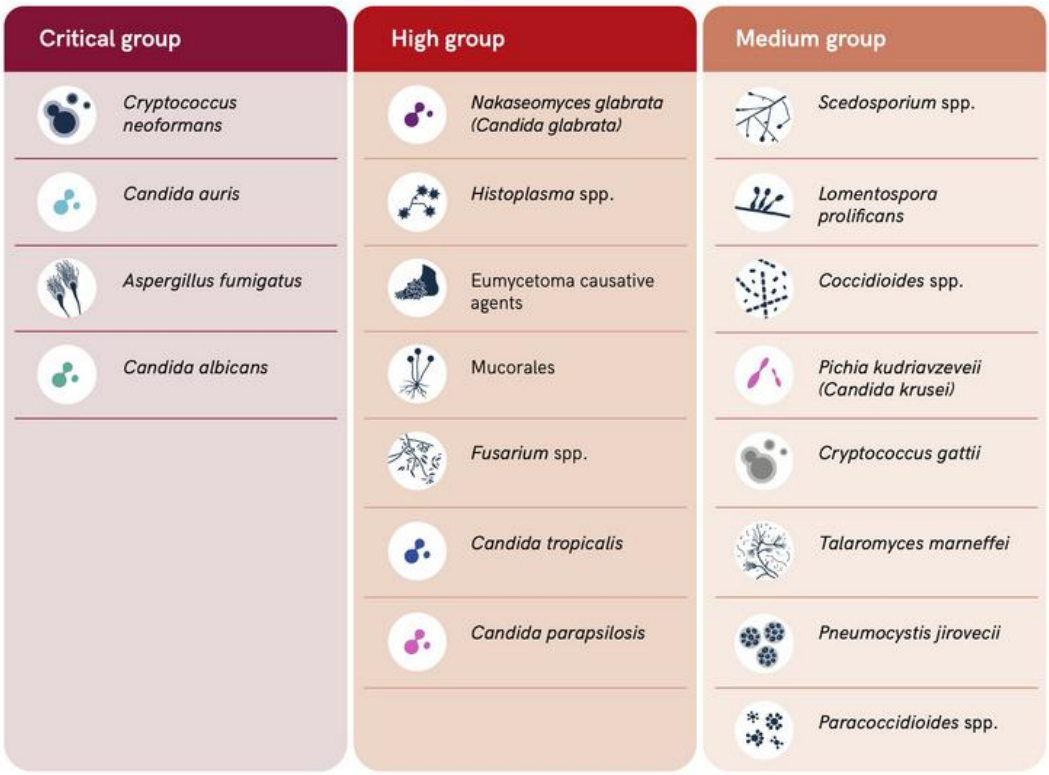
1.9.5. ESSENTIAL ANTIMICROBIAL DRUGS LIST SPECIFIC TO GTB- HOSPITAL.

Sr. No.	Code	Drug Name	Strength Specification	Dosage Form	Packing
1	1318026	Amikacin	500mg/2ml	Inj	2ml vial
2	1318001	Amoxycillin	250mg.	Cap	Strip of 10
3	1318002	Amoxycillin	500mg.	Cap	Strip of 10
4	1318003	Amoxycillin	125mg./ 5ml.	Susp.	40ml Bottle
5	1318071	Amoxycillin Clavulanic acid	125+ 31.2mg/ 5ml	Susp.	30 ml Bottle
6	1318072	Amoxycillin Clavulanic acid	200+ 28.5mg/ 5ml	Susp.	30 ml Bottle
7	1318073	Amoxycillin Clavulanic acid	625mg (500 mg + 125 mg)	Tab	Strip of 10
8	1318085	Amoxycillin Clavulanic acid	1.2g	Inj	Vial
9	1318005	Ampicillin	500mg	Cap	Strip of 10
10	1318006	Ampicillin	125mg./5ml.	Powder for Suspn.	40ml Bottle
11	1318007	Ampicillin	500mg. Powder/vial.	Inj	500mg vial
12	1318075	Azithromycin	500mg	Inj	Vial
13	1318021	Azithromycin	250 mg	Tab	Strip of 6
14	1318022	Azithromycin	500 mg	Tab	Strip of 3
15	1318076	Azithromycin	200mg/ 5ml	Susp.	30 ml Bottle
16	1318013	Benzathine Penicillin	2.4MU/vial	Inj	One vial
17	1318014	Benzathine Penicillin	1.2MU/vial	Inj	One vial
18	1318077	Cefixime	100mg/5ml	Syp	30 ml Bottle
19	1318079	Cefixime	400mg	Tab/ Cap	Strip of 10
20	1318035	Ceftazidime	1gm.	Inj	vial of 1gm
21	1318042	Ceftriaxone	1gm.	Inj	1gm vial
22	1318027	Ciprofloxacin	250mg.	Tab	Strip of 10
23	1318028	Ciprofloxacin	500mg.	Tab	Strip of 10
24	1318029	Ciprofloxacin	100mg/50ml	Infusion	100 ml Polypack
25	2853014	Ciprofloxacin	0.50%	Ear Drops	10 ml Vial
26	3321016	Ciprofloxacin	0. 3%	Eye Drops	10ml vial
27	4000143	Clindamycin	300mg	Tab	Strip of 10
28	1318010	Cloxacillin	500mg./ vial.	Inj	500mg vial
29	1318011	Cloxacillin	250mg.	Cap	Strip of 10
30	1318014	Crystaline Penicillin	0.5MU/vial	Inj	One vial
31	1318015	Doxycycline	100mg	Cap	Strip of 10
32	1318080	Levofloxacin	500mg/ 100ml	Infusion	100 ml pack
33	1318081	Levofloxacin	500mg	Tab	Strip of 10
34	4000338	Linezolid	600mg	Tab	Strip of 10
35	4000356	Linezolid	200mg/100ml	Infusion	300ml pack
36		Linezolid	300mg	Tab	Strip of 10
37	1318055	Meropenem	500 mg.	Inj	500 mg. vial
38	1328005	Metronidazole	400mg	Tab	Strip of 10
39	1328006	Metronidazole	500mg/100ml.	Inj	100 ml vial
40	1328007	Metronidazole	200mg/ 5ml	Susp.	30ml Bottle

41	3984041	Metronidazole	1%	Oral Gel	10gm tube
42	4000425	Moxifloxacin preservative free for intracameral use, single use		Eye Oint	5gm
43	4000426	Moxifloxacin preservative free 0.5%	0.50%	Eye Drops	5ml vial
44	1318082	Nitrofurantoin	100mg	Tab	Strip of 10
45	1318032	Norfloxacin	400mg	Tab. (coated)	Strip of 10
46	4000491	Piperacillin + Tazobactam	4.5gm	Inj	vial
47	4000500	Polymyxin B	500000 Units	Inj	vial
48	1318064	Sulfamethoxazole + Trimethoprim	400mg+80mg	Tab	Strip of 10
49	1318065	Sulfamethoxazole + Trimethoprim	800mg+160mg	Tab	Strip of 10
50	1318066	Sulfamethoxazole + Trimethoprim	200mg+40mg	Syp	60ml bottle
51	1318061	Teicoplanin	200mg/vial	Inj	One vial
52	3321020	Tobramycin	0.30%	Eye Drops	5ml vial
53	1318058	Vancomycin as hydrochloride	500mg Powder	Inj	500mg vial

1. 1.9.6 WHO PRIORITY PATHOGENS LIST OF MICROORGANISMS OF NEW ANTIBIOITCS (WHO bacterial priority pathogens list, 2024: Bacterial/Fungal pathogens of public health importance to guide research, development and strategies to prevent and control antimicrobial resistance.)





1.10. GENERAL GUIDELINES FOR ANTIBIOTIC POLICY:

STEPS TO FOLLOW THE PROTOCOLS

1. Identify the type of infection — bloodstream, respiratory, intra-abdominal or urinary tract infection etc.
2. Define the location — OPD, ICU and IPD ward patients.
3. Identify the patient type based on described parameters — Type 1, Type 2, Type 3 or Type 4.
4. Refer to the empiric/specific therapy for that patient type 1, 2 or with first second- or third-line antibiotic respectively.
5. Wait for at least 48 h of antimicrobial therapy before labelling patient as non-responding to the therapy and to switch to the higher next line of therapy. Also consider if patient condition deteriorates.
6. Send respective cultures and or primary set of investigations before starting antibiotic therapy
7. Once culture / sensitivity report available initiate specific antimicrobial therapy. Antimicrobial may require changed/de-escalated.

Classification categories of patients

- **Patient Type 1/A**: No contact with health care system. No prior antibiotic treatment No procedures done Patient with few co-morbid conditions
- **Patient Type 2/B**: Contact with health care system (e.g., recent HCF admission, nursing home, dialysis) without invasive procedure - within last 90 days Recent antibiotic therapy -within last 90 days Minimum procedures done. Patient with multiple co-morbidities. Patient
- **Patient Type 3/C**: Long hospitalization and or invasive procedures –within last 90 days. Recent & multiple antibiotic therapies - within last 90 days Major invasive procedures done. Cystic fibrosis, structural lung disease, advanced AIDS, neutropenia, other severe immunodeficiency.
- **Patient Type 4/D.** Patients with suspected INVASIVE fungal infection.

1.10.2 PATIENTS RISK STRATIFICATION

The process typically involves analyzing diverse data sources—such as electronic health records (EHRs), lab results, demographic information, and social determinants of health—to assign a risk level.

- **Low-Risk:** Generally healthy individuals; focus is on maintenance and preventive care.
- **Rising-Risk:** Patients showing early signs of chronic conditions; focus is on early intervention to prevent escalation.
- **High-Risk:** Patients with multiple chronic conditions or frequent hospitalizations; require coordinated, ongoing management.
- **Catastrophic/Very High-Risk:** Patients with life-threatening or complex, terminal conditions; require intensive, specialized, and often multidisciplinary care

1.11: ANTIBIOTIC PROTOCOL

1.11.1: Outpatients Department (OPD)

1. For treating the outdoor patients, the microbiology data should be considered mainly for patients belonging to Patient Types 2 and 3. Patient type 1 refers to the patients reporting with community acquired infections, and for them the treatment options are based on the guidelines.
2. Avoid Antipseudomonal Fluoroquinolones (e.g., ciprofloxacin and levofloxacin) and Antipseudomonal 3rd generation cephalosporin (e.g., Ceftazidime and Cefoperazone) in Patients Type 1 and 2 since they have potent antipseudomonal activity.
3. Treatment of serious infections caused by ESBL +ve pathogens with BL-BLI combinations (e.g., Piperacillin-Tazobactam, Cefepime-Tazobactam and Cefoperazone-Sulbactam) should be avoided as there is limited clinical data and evidence available for the use of these drugs in such infections.
4. **Out Patient Parenteral Antibiotic Therapy (OPAT) -**allows patients requiring intravenous antibiotics to be treated outside HCF but is otherwise stable and well enough not to be in HCF. These patients may be discharged early to an OPAT service or may avoid HCF admission altogether. Early OPAT programs facilitate the discharge of stable in-patients with infections who, other than the requirement for prolonged intravenous antibiotic therapy, had no other need for inpatient care. OPAT are suitable for many infections, especially cellulitis, bone and joint infections, and infective endocarditis. Antibiotics can be administered in an outpatient unit, at home by a nurse, or at home by the patient or a career, however, patients should be assessed by a doctor to determine medical and social suitability to minimise risk. ***System for OPAT can be created in OPD in minor OT recovery room or Injection room as per discretion of OPD nursing in-charge in consultation with respective MO I/C. Post injection monitoring program should be defined and documented by individual patient care unit.***

1.11.2: Antibiotic Protocol: Intensive Care Unit (ICU)

i. For treating the Intensive care patients, the microbiology data should be considered mainly for patients belonging to Patient Types 2, 3 and 4. Patient type 1 refers to the patients reporting with Community acquired infections, and for them the treatment options are based on the guidelines.
ii. Avoid Antipseudomonal Fluoroquinolones (e.g., Ciprofloxacin and Levofloxacin) and Antipseudomonal 3rd generation Cephalosporin (e.g., Ceftazidime and Cefoperazone) in Patients Type 1 and 2 since they have potent antipseudomonal activity.
iii. Treatment of serious infections caused by ESBL +ve pathogens with BL-BLI combinations (e.g., Piperacillin-Tazobactam, Cefepime-Tazobactam and Cefoperazone-Sulbactam) should be avoided as there is limited clinical data and evidence available for the use of these drugs in such infections.
iv. In infections with MDR *Pseudomonas/ Acinetobacter*, Carbapenem should be used as Extended Infusions e.g., Imipenem (2-3 hours infusion), Meropenem (3 hours infusion), Doripenem (4 hours infusion)
v. Linezolid and Daptomycin are reserved drugs for inpatients and should be used only in cases of Vancomycin Resistant *S. aureus* (VRSA) or Vancomycin Resistant *Enterococcus* (VRE)
vi. De-escalation to Fluconazole if: Isolates susceptible to Fluconazole (e.g., *Candida albicans*) + Patient clinically stable.
vii. De-escalation to Voriconazole if: *C. krusei* or Voriconazole susceptible *C. glabrata* + Patient clinically stable. De-escalation to fluconazole or voriconazole not recommended without confirmation of isolate susceptibility.
viii. ***C.auris*** **,** if confirmed by microbiology department, strict isolation and Infection prevention control measures to be adopted as per ICMR guidelines, preferred drug will be Echinocandins (DOC: Caspofungin etc)

1.11.3: Antibiotic Protocol: In patient Department (IPD)

i. For treating the Indoor patients, the Microbiology data should be considered mainly for patients belonging to Patient Types 2 and 3. Patient type 1 refers to the patients reporting with Community acquired infections, and for them the treatment options are based on the guidelines.
ii. Avoid Antipseudomonal Fluoroquinolones (e.g., Ciprofloxacin and Levofloxacin) and Antipseudomonal 3rd generation Cephalosporin (e.g., Ceftazidime and Cefoperazone) in Patients Type 1 and 2 since they have potent antipseudomonal activity
iii. Treatment of serious infections caused by ESBL +ve pathogens with BL-BLI combinations (e.g., Piperacillin-Tazobactam, Cefepime-Tazobactam and Cefoperazone-Sulbactam) should be avoided as there is limited clinical data and evidence available for the use of these drugs in such infections.
iv. In infections with MDR Pseudomonas/ Acinetobacter, Carbapenem should be used as Extended Infusions e.g., Imipenem (2 -3 hours infusion), Meropenem (3 hours infusion), Doripenem (4 hours infusion)

v. Linezolid and Daptomycin are reserved drugs for inpatients and should be used only in cases of Vancomycin Resistant *S. aureus* (VRSA) or Vancomycin Resistant *Enterococcus* (VRE).

vi. The marker used in the laboratory to assess potential ESBL production among *Enterobacteriaceae* is resistance to Cefotaxime and Ceftazidime.

vii. The marker used in our laboratory to assess potential MRSA production is the resistance of *S. aureus* to cefoxitin.

1.11.4. MAXIMUM DAILY DOSE OF ANTIBIOTICS

(As per Standard Treatment Protocol, 2022-ICMR)

Colistin	The recommended maximum daily dose of colistin is 10 million IU, or 800 mg of colistimethate sodium, from the manufacturer of Coly-MycinA, which is approximately, double the recommended daily dose from the manufacturer of Colomycin. Parenteral colistin should be given in 2 to 4 divided doses at dose levels of 2.5 to 5 mg/kg per day for patients with normal renal function, depending on the severity of the infection
Imipenem/ cilastatin	Maximum dose is 50mg/kg/day or 4 grams/day, whichever is lowest. Give in divided doses
Meropenem	2 g every 8 h.
Ertapenem	1gm/day
Piperacillin Tazobactam	The usual total daily dose of Piperacillin and Tazobactam for injection for adults is 3.375 g every six hours totalling 13.5 g (12 g piperacillin/1.5 g tazobactam). Presumptive treatment of patients with nosocomial pneumonia should start with Piperacillin and Tazobactam for injection at a dosage of 4.5 g every six hours plus an aminoglycoside, totalling 18 g (16 g piperacillin/2 g tazobactam). For patients on haemodialysis, the maximum dose is 2.25 g every twelve hours for all indications other than nosocomial pneumonia and 2.25 g every eight hours for nosocomial Pneumonia. Max dose 4.5 gm TDS Paediatric (Intravenous) Dose: 300 mg/kg/day in 3-4 divided doses, max: 4g TDS.
Ampicillin Sulbactam	The recommended adult dosage of Ampicillin and sulbactam for injection is 1.5 g (1 g Ampicillin as the sodium salt plus 0.5 g sulbactam as the sodium salt) to 3 g (2 g Ampicillin as the sodium salt plus 1 g sulbactam as the sodium salt) every six hours. This 1.5 to 3 g range represents the total of Ampicillin content plus the sulbactam content of Ampicillin and sulbactam for injection and corresponds to a range of 1 g Ampicillin/0.5 g sulbactam to 2 g Ampicillin/1 g sulbactam. The total dose of sulbactam should not exceed 4 grams per day
Cefoperazone-Sulbactam	In severe or refractory infections, the daily dosage of sulbactam/ Cefoperazone may be increased up to 8 g of the 1:1 ratio (i.e., 4 g Cefoperazone activity maximum dosage is 4g/day.). Patients receiving the 1:1 ratio may require additional Cefoperazone administered separately. Doses should be administered every 12 hours in equally divided doses. The recommended maximum daily dosage of sulbactam is 4 g

1.12. PRESURGICAL/PERISURGICAL ANTIBIOTIC USE *(As per Standard Treatment Protocol, 2022-ICMR)*

1.12.1 Aim of surgical antibiotic prophylaxis is to:

i. Prevent surgical site infection (SSI) & related morbidity and mortality
ii. Reduce the duration and cost of health care (when the costs associated with the management of SSI are considered, the cost effectiveness of prophylaxis become evident)
iii. Antibiotic chosen should not produce any adverse effects as well as no adverse consequences for the microbial flora of the patient or the HCF.

Surgical antibiotic prophylaxis is an adjunct to, not a substitute for, good surgical technique. Antibiotic prophylaxis should be regarded as one component of an effective policy for the control of HCF-acquired infection such as attention to basic infection-control strategies, the surgeon's experience and technique, the duration of the procedure, HCF and operating-room environments, instrument sterilization issues, preoperative preparation (e.g., surgical scrub, skin antisepsis, appropriate hair removal), perioperative management (temperature and glycaemic control) and the underlying medical condition of the patient.

1.12.2. Presurgical/Perisurgical Antibiotic prophylaxis – General principles

i. Do not use antibiotic prophylaxis routinely for clean, non-prosthetic, uncomplicated surgery.
ii. Give antibiotic treatment (in addition to prophylaxis) to patients having surgery on a dirty or infected wound.
iii. Give antibiotic prophylaxis to patients prior to following surgery:
- Clean surgery involving the placement of a prosthesis or implant
- Clean-contaminated surgery
- Contaminated surgery

iv. Consider giving a **SINGLE DOSE** of antibiotic prophylaxis intravenously within**1 hour** before incision to maximize tissue concentration. However, give prophylaxis earlier for operations in which a tourniquet is used. **Two hours are allowed for the administration of vancomycin and Fluoroquinolones.**
v. Before giving antibiotic prophylaxis, consider the timing and pharmacokinetics (for example, the serum half-life) and necessary infusion time of the antibiotic. Give a repeat dose of antibiotic prophylaxis at one to two half-lives of the antibiotic when the operation is longer than the half-life of the antibiotic given or if there is excessive blood loss (usually more than 1500 ml in adults) during the procedure, extensive burns.
vi. Antibiotics should also be administered immediately after unexpected contamination of the tissues.
vii. **Post operative antibiotic administration is NOT required *where antibiotics are given prophylactically only (esp. Clean Surgeries).***
viii. There is no data to support the continuation of antimicrobial prophylaxis until all indwelling drains and intravascular catheters are removed.

ix. Antibiotic prophylaxis should be confined to the perioperative period (less than 24 hours for most procedures). The prophylaxis duration in cardiothoracic procedures may be up to 48 hours. **Prolonged prophylaxis is associated with an increased risk of acquired antimicrobial resistance.**

x. Discontinue antibiotics given for implantation of a pacemaker or defibrillator within 24 hours of surgery.

xi. Select appropriate agents on the basis of the surgical procedure, the most common pathogens causing SSI for a specific procedure, and published recommendations (Details given below 1.12.6 & 1.12.7 tables).

xii. Inform patients before the operation, whenever possible, if they will need antibiotic prophylaxis, and afterwards if they have been given antibiotics during their operation.

xiii. Studies with results showing a beneficial effect of supplemental oxygen included patients who underwent colorectal surgery. It has been observed that 30%-35% supplemental FiO_2 levels are useful in minimizing SSI. Higher /lower concentrations are less helpful.

xiv. Maintaining normothermia (temperature higher than 36^0C) immediately after colorectal surgery is helpful in reducing the incidence of SSI.

1.12.3. Antibiotic prophylaxis for surgical wounds

No prophylaxis for class I wounds patient, EXCEPT

i. Abdominal cases
ii. Surgery exceeding 2 h
iii. Having three concomitant diagnoses
iv. No prophylaxis for urological procedures with sterile urine
v. Prophylaxis for 24 h to be given in all class II cases
vi. Bowel preparations in colorectal surgeries
vii. Therapeutic antibiotics to be given for all class III and class IV wounds

1.12.4. Choice of antibiotic for Presurgical/Perisurgical prophylaxis

i. Antibiotic selection is influenced by the organism most commonly causing wound infection in the specific procedure, characteristics of the ideal agent, the comparative efficacy of the antimicrobial agent for the procedure, the safety profile, and the patient's medication allergies and cost of the antibiotic agent. In certain gastrointestinal procedures, oral and intravenous administration of agents with activity against Gram-negative and anaerobic bacteria is warranted, as well as mechanical preparation of the bowel. **Cefazolin provides adequate coverage for most types of procedures.**

ii. Antimicrobial agents with the narrowest spectrum of activity are required for efficacy in preventing infection and the chosen antibiotics must reflect local, disease-specific information about the common pathogens and their antimicrobial susceptibility. A past history of a serious adverse event should preclude administration of a particular antibiotic like penicillin.

iii. Choice of antibiotic is influenced by the organism most commonly causing wound infection in the specific procedure, characteristics of the ideal agent, the comparative

efficacy of the antimicrobial agent for the procedure, the safety profile, and the patient's medication allergies and cost of the antibiotic agent.

iv. In certain gastrointestinal procedures, oral and intravenous administration of agents with activity against **Gram-negative and anaerobic bacteria** is warranted, along with mechanical preparation of the bowel. **Cefazolin provides adequate coverage for most types of procedures.**

v. **Do not routinely use vancomycin prophylaxis for any procedure**.

1.12.5. Choice of antibiotic for Presurgical/Perisurgical prophylaxis:

(As per Standard Treatment Protocol, 2022-ICMR)

SURGERY	MEDICATION
Breast	Inj.Cefazolin 2gm or Inj.Cefuroxime 1.5gm IV stat
Gastroduodenal & biliary	Inj.Cefaperazone- Sulbactam 2gm IV stat & BD for 24hrs(maximum)
ERCP	Inj.Piperacillin-Tazobactum 4.5gm or Inj.Cefaperazone-Sulbactam 2gm IV stat
Cardiothoracic	Inj.Cefuroxime 1.5gm IV stat & BD for 48hrs
Colonic surgery	Inj.Cefaperazone- Sulbactam 2gm IV stat & BD for 24hrs(maximum)
Abdominal surgery (hernia)	Inj.Cefazolin 2gm or Inj.Cefuroxime 1.5gm IV stat
Head & Neck/ ENT	Inj.Cefazolin 2gm IV stat
Neurosurgery	Inj.Cefazolin 2gm or Inj.Cefuroxime 1.5gm IV stat
Obstetrics& Gynecology	Inj.Cefuroxime 1.5gm IV stat
Orthopedic	Inj.Cefuroxime 1.5gm IV stat & BD for 24 hrs(maximum) or Inj.Cefazolin 2gm IV stat Open reduction of closed fracture with internal fixation- Inj.Cefuroxime 1.5gm IV stat and q 12h or Inj.Cefazolin 2gm IV stat and q 12h for 24 hrs
Trauma	Inj.Cefuroxime 1.5gm IV stat and q 12h (for 24 hrs) or Inj.Ceftriaxone 2gm IV OD
Urologic procedures	Antibiotics only to patients with documented bacteriuria
Trans- rectal prostatic surgery	Inj.Cefaperazone- Sulbactam 2gm IV stat

1.12.6. Categories of Surgeries:

Clean Surgeries

a) Uninfected, no inflammation
b) Respiratory, Gastrointestinal and Genitourinary tracts not entered
c) Closed primarily Examples: Exploratory laparotomy, mastectomy, neck dissection, thyroid, vascular, hernia, splenectomy

Clean-contaminated Surgeries

a) Respiratory, Gastrointestinal and Genitourinary tracts entered, controlled, no spillage
b) No unusual contamination Examples: Cholecystectomy, small bowel resection - anastomosis, Whipple's procedure, liver transplantation, gastric surgery, bronchoscopy, colon surgery

Contaminated Surgeries

a) Open, fresh, accidental wounds
b) Major break in sterile technique
c) Gross Spillage from GI tract
d) Acute non-purulent inflammation Examples: Inflamed appendectomy, bile spillage in cholecystectomy, diverticulitis, Rectal surgery, penetrating wounds

Dirty Surgeries:

a) Old traumatic wounds, devitalized tissue
b) Existing infection or perforation
c) Organisms present BEFORE procedure Examples: Abscess I&D, perforated bowel, peritonitis, wound debridement, positive cultures preoperatively

1.12.7. Classification of major surgical procedures

Type of Surgery	Examples of surgery	
Clean	• Mastectomy • Diagnostic laparoscopy • Exploratory laparoscopy • Thyroidectomy • Parathyroidectomy • Total hip replacement • Total knee replacement • Inguinal, femoral or incisional hernia repair • Splenectomy • Transverse rectus abdominis myocutaneousbrest reconstruction • Ventriculoperitoneal shunting • Lumpectomy • Axillary node dissection • Carpal tunnel repair	• Open herniotomy • Lipoma excision • Lap. Orchidopexy • Lap. Pyloromyotomy • Lap. Herniotomy • Subcutaneous cyst excision • Orchidopexy • Prepucial dilatation • Penoscrotal transposition correction • Thoracotomy • Pyloromyotomy • Umbilical hernia umbilical polyp mini lap • CDH repair • Umbilical polyp excision
Clean contaminated	• Cholecystectomy with chronic inflammation • Colectomy • Colostomy reversal • Bowel resection for ischemic bowel • Laryngectomy • Appendectomy with chronic inflammation • Small bowel resection • Vaginal hysterectomy • Dental extractions • Alveoloplasty • Total abdominal hysterectomy • LSCS	• Duhamel's pull through • Fistula closure (U.C. fistula) • Fundoplication (hiatus hernia) • Genitoscopy • Kasai's procedure • Lap. Appendicectomy • Lap. Cholecystectomy • Lap. Nephrectomy • Meatotomy • Nephrectomy

	• Whipple pancreaticoduodenectomy • Roux-en-Y gastric bypass • Abdominal perineal resection • Gastrostomy tube placement • Transurethral resection of prostate • Cholecystectomy • Choledochal cyst excision • Circumcision • Cleft lip repair • Cysto lithotomy • Cystoscopy • D.J. stent insertion • D.J. stent removal	• Oesophageal atresia repair • Open appendicectomy • Palate repair • Pyelolithotomy • Pyeloplasty • Sacrococcygeal teratoma excision • Splenectomy • Suprapubic cystotomy • Ureteric re - implantation • Ureter lithotomy • Ureterostomy • Urethral cyst excision • Urethroplasty
Contaminated	• Cholecystectomy with acute inflammation • Appendectomy with acute inflammation • Bile spillage during cholecystectomy • Bowel resection for infarcted or necrotic bowel • Limb amputation with dry gangrene	• Ileostomy • Fistulectomy • Exploration of foreign body • Colostomy closure • Anoplasty • ASARP • PSARP • Rectal biopsy
Dirty	• Incision or drainage of perirectal abscess • Perforated bowel repair • Peritonitis • Appendectomy with perforation and/or pus • Perforated gastric ulcer • Open fracture with prolonged time in the field before treatment	• Dental extraction with abscess • Limb amputation with wet gangrene • Ruptured appendectomy • Decortication

2.00: TREATMENT GUIDELINES OF MUTI-DRUG RESISTANT BACTERIAL PATHOGENS

1. **Methicillin- Resistant *Staphylococcus aureus* (MRSA)**
   - These organisms are considered resistant to all penicillin's, cephalosporin and macrolides.
   - Though MRSA strains may be reported as susceptible to Fluoroquinolones, aminoglycosides, chloramphenicol and doxycycline in-vitro, these drugs are NOT to be used alone or as initial treatment for serious MRSA infections.
   - The drug of choice for treatment of infections due to MRSA is the glycopeptides i.e Vancomycin and Teicoplanin.
   - Linezolid can be used to treat skin and soft tissue infections caused by MRSA. Mupirocin local application (intranasal bid x 5 days) for eradicating nasal carriage. Daptomycin is an intravenous antibiotic approved to be used for the treatment of complicated skin infections and Staphylococcus aureus bacteremia. Daptomycin should NOT be used for treatment of pneumonia due to its inactivation by surfactant.
   - ***The marker used in our laboratory to assess potential MRSA is the resistance of S.aureus to Cefoxitin.***

2. **Vancomycin Resistant *Enterococcus* (VRE)**

   The treatment for VRE should be based on infection severity and in-vitro susceptibility of the strain to other antibiotics.
   - Linezolid is the only drug specifically approved for the treatment of VRE-blood stream infections.
   - Isolates that remain relatively susceptible to penicillin or Ampicillin may be treated with high doses of these agents.
   - Daptomycin not approved for treatment of VRE infection.
   - Doxycycline not a first line therapy. For susceptible isolates, not for bacteremia or endocarditis. It should not be used as monotherapy.
   - Nitrofurantoin for uncomplicated UTIs have been treated successfully with nitrofurantoin.
   - Fosfomycin for urinary tract infections (cystitis) with isolates susceptible to Fosfomycin.
   - For chloramphenicol-susceptible isolates of E faecium and *E. faecalis*. Not a first-line therapy and it should not be used as monotherapy.
   - Gentamicin or streptomycin cab be used in combination with Ampicillin for the treatment of enterococcal endocarditis caused by organisms susceptible in vitro to either agent; streptomycin is used when Gentamicin cannot be used because of resistance.

3. **Extended Spectrum β-Lactamases (ESBL) Producing *Enterobacteriaceae*.**
   - CLSI (Clinical and Laboratory Standards Institute) recommends that laboratories should report ESBL producing isolates as resistant to all penicillin's, cephalosporin (including cefepime and cefpirome), and Aztreonam irrespective of in-vitro test results.
   - The carbapenem (Ertapenem, Meropenem and Imipenem) are currently considered the drug of choice for serious infections caused by these pathogens.
   - Piperacillin–Tazobactam and Cefoperazone- Sulbactam may be considered options in mild infections and when ESBL producers are demonstrably susceptible in -vitro. *The marker used in our laboratory to assess potential ESBL production among *Enterobacteriaceae* is the resistance to Cefotaxime and Ceftazidime.

4. **Carbapenem- Resistant *Enterobacteriaceae* (CRE)**
   - Most carbapenemase producers are extremely drug resistant: being resistant to β-lactam antibiotics, aminoglycosides, and β-lactam–βlactam inhibitor combinations.
   - Polymyxins, tigecycline &Fosfomycin are the agents with most frequent in vitro activity, but all have limitations. Dosage will vary with the patient and infection site.
   - Colistin - Case reports of successful use in a range of infections due to carbapenemase producers.
   - Tigecycline: Licensed for complicated skin and soft-tissue Infections and complicated intra-abdominal infections.
   - Others: a few isolates are susceptible to other antibiotics including e.g. chloramphenicol, ciprofloxacin and Cotrimoxazole. Most producers, however, are resistant to these drugs.

2.0.1 Available treatment options for carbapenem resistant Enterobacterales in India.

(GUIDANCE ON DIAGNOSIS & MANAGEMENT OF CARBAPENEM RESISTANT GRAM-NEGATIVE INFECTIONS; 2022-ICMR)

Carbapenemase	
Metallo-β-lactamase (*eg.* NDM)	1st Choice: Prolonged infusion of ceftazidime-avibactam and aztreonam (over 3 hours) * Other options: a. Polymyxins (Do-not use polymyxin B for UTI) plus other agent to which organism has demonstrated susceptible MIC (like tigecycline, aminoglycosides, IV Fosfomycin) or high dose carbapenems if MIC < 16 b. Tigecycline (approved for intra-abdominal infection and skin –soft tissue infection)- DO-NOT use for blood stream infection or pneumonia as a standalone agent c. Aminoglycosides (for uncomplicated infections like UTI, any other infection for which source reduction has been done)
Metallo-β-lactamase (eg. NDM) + OXA-48	1st Choice: Prolonged infusion of ceftazidime-avibactam and aztreonam (over 3 hours) * Other options: a. Polymyxins (do-not use polymyxin B for UTI) plus other agent to which organism has demonstrated susceptible MIC (like tigecycline, aminoglycosides, IV Fosfomycin) or high dose carbapenems if MIC < 16 b. Tigecycline (approved for intra-abdominal infection and skin –soft tissue infection)- DO-NOT use for blood stream infection or pneumonia as a standalone agent c. Aminoglycosides (for uncomplicated infections like UTI, any other infection for which source reduction has been done)
OXA-48 like	1st Choice: Prolonged Infusion of ceftazidime-avibactam** Other options: a. Polymyxins (do-not use polymyxin B for 17 UTI) plus other agent to which organism has demonstrated susceptible MIC (like tigecycline, aminoglycosides, IV Fosfomycin) or high dose carbapenems if MIC < 16 b. Tigecycline (approved for intra-abdominal infection and skin –soft tissue infection)- DO-NOT use for blood stream infection or pneumonia as a standalone agent c. Aminoglycosides (for uncomplicated infections like UTI, any other infection for which source reduction has been done)
KPC	1st Choice: Prolonged Infusion of ceftazidime-avibactam ** Other options:

	a. Polymyxins (do-not use polymyxin B for UTI) plus other agent to which organism has demonstrated susceptible MIC (like tigecycline, aminoglycosides, IV Fosfomycin) or high dose carbapenems if MIC < 16 b. Tigecycline (approved for intra-abdominal infection and skin –soft tissue infection)- DO-NOT use for blood stream infection or pneumonia as a standalone agent c. Aminoglycosides (for uncomplicated infections like UTI, any other infection for which source reduction has been done)
*Ceftazidime-avibactam + aztreonam: Perform a synergy test and demonstrate zone of inhibition. Prolonged infusion over 3 hours yields best result. This combination is not well studied in paediatric situations, de-ranged creatinine clearance and CNS infections. (Consultation with an Infectious Disease Physician or a physician having experience in treating such infection is advised) ** Ceftazidime-avibactam alone: Apart from carbapenemase test; *in-vitro* susceptibility testing is recommended prior to use.	

2.0.2 Carbapenem Resistant Non- Enterobacterales (*Acinetobacter baumanii* & *Pseudomonas aeruginosa*)- *(GUIDANCE ON DIAGNOSIS & MANAGEMENT OF CARBAPENEM RESISTANT GRAM-NEGATIVE INFECTIONS; 2022-ICMR)*

a. **Carbapenem Resistant *Acinetobacter baumannii (CRAB)-*** Treatment Options:

1. High dose sulbactam (6-9g/day) on its own or as ampicillin-sulbactam (if susceptible) or Cefoperazone-sulbactam (1g/1g).
2. Polymyxins (use colistin instead of polymyxin B for UTI)
3. Minocycline
4. Tigecycline (do not use for UTI)
5. Other agents like trimethoprim-sulfamethoxazole, aminoglycosides, if susceptible

Use of these agents as standalone therapy or in combination is a matter of debate.

- Combination therapy with at least two active agents (include high dose sulbactam even if non-susceptible), whenever possible, is suggested for the treatment of moderate to severe CRAB infections.
- A single active agent may be considered for the treatment of patients with mild CRAB infections. Mild infections although maybe difficult to define, but may include urinary tract infection or, skin and soft tissue infections without hemodynamic instability. The agent of choice is sulbactam due to sulbactam's activity against CRAB demonstrated in-vitro. It is useful to note that even if non-susceptibility to sulbactam is demonstrated, high dose sulbactam may still be an effective option.
- Nebulized antibiotics for the treatment of respiratory CRAB is not recommended due to the unequal distribution of the drugs in the infected lung and the potential for adverse reactions like bronchoconstriction.

B) **Carbapenem Resistant *Pseudomonas aeruginosa-*** Treatment Options:

- Use a β-Lactam (ceftazidime or cefepime) or β-lactam-β-lactamase inhibitor combination (piperacillin-tazobactam or Cefoperazone-sulbactam) if *in-vitro* susceptibility is demonstrated
- Aminoglycosides (if *in-vitro* susceptibility is demonstrated)
- Polymyxins (for infections in which no other treatment option is available)

a) For patients with severe infections caused by CRPA susceptible in vitro only to polymyxins, aminoglycosides, or Fosfomycin, a combination therapy is suggested. Polymyxins plus other agent to which organism has demonstrated susceptible MIC or in intermediate range or SDD (susceptible dose dependent) can be used in such scenario. (Consultation with an Infectious Disease Physician or a physician having experience in treating such infections is advised)

b) In patients with non-severe infections or among patients with low risk CRPA infections monotherapy to be considered on an individual basis according to the source of infection

2.0.3 Dosage of common antibiotics used in treatment of MDR Organisms.

(GUIDANCE ON DIAGNOSIS & MANAGEMENT OF CARBAPENEM RESISTANT GRAM-NEGATIVE INFECTIONS; 2022-ICMR)

Antibiotics	**Dosage in adults**
Ceftazidime-avibactam and aztreonam	Ceftazidime-avibactam: 2.5 g IV q8h, infused over 3 hours PLUS aztreonam: 2 g IV q8h, infused over 3 hours
Colistin	9 million units as loading dose and then 4.5 million units q12h
Polymyxin B	15 lacs IU as loading dose and then 7.5 lacs IU q12h.
High dose meropenem	2 g IV q8h, infused over 3 hours
High dose Imipenem	1g IV q8h, infused over 2 hours
Tigecycline	200 mg IV x 1 dose, then 100 mg IV q12h
Minocycline	200mg IV q12h
Sulbactam	2g IV q6 - 8h
IV Fosfomycin	4-6g IV q6h
High dose ampicillin-sulbactam (2g of ampicillin and 1 gm of sulbactam)	9g IV q8h over 4 hours
Cefoperazone-sulbactam (1g/1g)	4g IV q6-8h

2.1 Recommended measures to control spread of multi-drug resistant organisms (MDRO)

- Improved laboratory detection and reporting of MDRO
- Enhanced infection surveillance and control in ICUs
- Prevent spread by barrier precautions: Gowns and gloves
- Hand Washing
- Restricted use of 3rd generation cephalosporin

Infection Control Practices

Horizontal interventions (for all patients)

1. Standard precautions including hand-hygiene

2. Adherence to device insertion and maintenance bundles for prevention of device related infections (VAP/CLABI/CAUTI)

Vertical Interventions (for patients infected or colonized with CRE, CRAP, CRPA)

1. Isolating these patients or cohorting (if many patients with same organism) into a single room or separate area

2. Following contact precautions as per WHO guidelines

3. Active surveillance (rectal samples) to look for CRE and subsequently isolating these patients can be done as a part of hospital policy to mitigate the spread of such organisms

LOCAL ANTIMICROBIAL POLICY MANUAL

2026-27 (Version 2.0)

Formulated by

DEPARTMENT OF MICROBIOLOGY

UCMS & GTB HOSPITAL

DELHI 110095.

2.2 BLOOD STREAM INFECTIONS (BSI) ANTIBIOTIC PROTOCOL -UCMS & GTBH

UCMS & GTB HOSPITAL ANTIBIOGRAM OF BLOOD STREAM INFECTIONS (JANUARY 2025–DECEMBER 2025).	**Isolates**	**% Susceptibility pattern of pathogens**
	Methicillin-resistant Staphylococcus aureus (MRSA)	Linezolid, Vancomycin, Doxycycline, Minocycline (100%) > Gentamicin (76%) > Tetracycline (47%) > Clindamycin (44%) > Trimethoprim/Sulfamethoxazole (35%) > Ciprofloxacin (23%) > Erythromycin (4%).
	Methicillin-sensitive Staphylococcus aureus (MSSA)	Linezolid, Vancomycin, Doxycycline, Minocycline (100%) > Gentamicin (95%) > Tetracycline (82%) > Clindamycin (76%) > Trimethoprim/Sulfamethoxazole (67%) > Ciprofloxacin (66%) > Erythromycin (31%).
	Enterococcus faecalis	Linezolid, Vancomycin, Doxycycline (100%) > Teicoplanin (83%) > Ampicillin (60%) > High-level gentamicin (38%) > Ciprofloxacin, Erythromycin (0%).
	Enterococcus faecium	Vancomycin, Linezolid, Chloramphenicol (100%) > Doxycycline (75%) > Teicoplanin (63%) > Ampicillin (57%) > High-level gentamicin (44%) > Ciprofloxacin (33%) > Erythromycin, Tetracycline (0%).
	Escherichia coli	Colistin (100%) > Meropenem (95%) > Gentamicin (86%) > Imipenem (85%) > Cefepime (67%) > Amikacin (56%) > Cefotaxime (45%) > Amoxicillin-Clavulanate (38%) > Piperacillin-Tazobactam (33%) > Ciprofloxacin (30%) > Ceftriaxone, Ceftazidime (28%)
	Acinetobacter baumannii	Colistin (100%) > Cefepime (31%) > Gentamicin (27%) > Imipenem, Piperacillin/Tazobactam (26%) > Amikacin (25%) > Ciprofloxacin (24%) > Ceftriaxone (17%) > Ceftazidime (13%) > Meropenem, Cefotaxime (6%).
	Klebsiella pneumoniae ss. pneumoniae	Colistin, Doxycycline (100%) > Gentamicin (57%) > Meropenem (41%) > Imipenem (34%) > Amikacin (33%) > Cotrimoxazole (25%) > Ciprofloxacin, Cefotaxime (24%) > Cefepime (14%) > Ceftazidime, Ceftriaxone, Piperacillin-Tazobactam (13%) > Amoxicillin-Clavulanate (11%) >Cefuroxime (0%)
	Pseudomonas aeruginosa	Imipenem (94%) > Piperacillin-Tazobactam (88%) > Ceftazidime (77%) > Meropenem (75%) > Amikacin (64%) > Aztreonam (55%) > Tobramycin (48%) > Ciprofloxacin (44%).
	Salmonella Typhi	Ceftriaxone, Imipenem, Meropenem, Tetracycline, Azithromycin (100%) > Chloramphenicol (97%) > Ampicillin (95%) > Cotrimoxazole (93%) > Cefotaxime (88%) > Pefloxacin (22%) > Ciprofloxacin (7%).
	Citrobacter freundii	Imipenem (70%) > Amikacin (58%) > Ceftriaxone, Cefotaxime (50%) > Ceftazidime (40%) > Ciprofloxacin (27%) > Piperacillin-Tazobactam (17%).
	Citrobacter koseri	Cefotaxime (100%) > Imipenem (89%) > Piperacillin-Tazobactam (86%) > Amikacin (70%) > Ceftriaxone (38%) > Ciprofloxacin (30%) > Ceftazidime (29%) > Cefepime, Gentamicin (0%).
	Proteus mirabilis	Cefotaxime, Cefepime (100%) > Piperacillin-Tazobactam (80%) > Ceftriaxone (60%) > Ciprofloxacin (50%) > Amoxicillin-Clavulanate (80%) > Amikacin (57%) > Ceftazidime (40%).

2.2.1 ANTIBIOTIC PROTOCOL - BLOOD STREAM INFECTION (*As per Standard Treatment Protocol, 2022-ICMR*)

Condition	Likely Causative Organism	Empiric antibiotics (Presumptive antibiotics)	Alternative antibiotics	Comment
Enteric fever	*Salmonella Typhi* *Salmonella Paratyphi A*	Cefixime 20mg/kg/day for 14 days or Azithromycin 500 mg BD for 7days. Inpatients: Ceftriaxone 2g IV BD for 2 weeks +/-Azithromycin 500mg BD for 7days	Cotrimoxazole 960mg BD for 2 weeks	Majority of strains are nalidixic acid resistant. Ceftriaxone to be changed to oral cefixime when patient is afebrile to finish total duration of 14 days.
Febrile Neutropenia	*Enterobacteriaceales (E. coli, Klebsiella sp.) Pseudomonas aeruginosa, Acinetobacter species, Staphylococcus aureus, Coagulase Negative Staphylococci, Enterococcus species, Candida species*	Cefoperazone-sulbactam Piperacillin-tazobactam 4.5gm IV 8 hourly) Amikacin 500mg IV BD for 3days	Meropenem 1gm IV q8h +Vancomycin/ teicoplanin	Add/increase gram positive cover (Vancomycin/Linezolid). Add Amphotericin B (if fever persists >5-7 days). Continue broad-spectrum antibiotics until the patient is afebrile for at least 2 days and the neutrophil count is >500 cells/mm3 on at least one occasion. If blood cultures are negative at 3 days following initiation of antibiotics like Teicoplanin/Vancomycin.
Sepsis	*Enterobacteriaceales (E.coli, Klebsiella sp.) Group A beta haemolytic streptococcus Anaerobes Source of sepsis outside genital Tract: S.pyogenes, E.coli, S.aureus (MRSA,MSSA), S.pneumoniae,*	Imipenem 500 mg IV q6h or 1g q8h Amikacin 15 mg/kg IV q24h Vancomycin 15 mg/kg IV q8–12h Teicoplanin Doxycycline 100 mg iv q12h Colistin 9mu iv stat, then 4.5 mu iv q12h Polymyxin B 15-20 lakh units iv stat, then 7.5-10 lakhs iv q12h 70 mg IV on	Colistin +Vancomycin 15 mg/kg IV q8–12h Meropenem 1gm IV q8h Cefoperazone – Sulbactam 3g IV q12h Amikacin 15 mg/kg IV q24h Vancomycin or Teicoplanin	Septic shock patient must receive empiric combination therapy with at least two antibiotics of different antimicrobial classes. Add MRSA or CR-GNB coverage or antifungals in patients with appropriate risk factors. Avoid piperacillin-tazobactam in septic shock till bacteraemia with cephalosporin resistant organisms is

	Morganella morganii	day 1, then 50 mg IV q24h		excluded, as mortality increases (MERINO trial). De-escalation of antimicrobials should be considered at the earliest stage when the clinical situation permits/ once culture susceptibility reports are available. Treatment duration of 7 to 10 days is adequate for most cases. Longer courses appropriate in slow clinical response, undrainable foci of infection, bacteremia with S. aureus, some fungal and viral infections, or immunologic deficiencies. Measurement of procalcitonin levels can be used to support shortening the duration of antimicrobial therapy
Central line associated Blood stream infections (CL-BSI)	*Gram-negative (Klebsiella pneumoniae> Acinetobacter spp.) more common than Gram positive (Staphylococcus spp., Enterococcus spp.)*	Imipenem+ Gentamicin± Vancomycin/Teicoplanin 400mg IV every 12h for 3 doses followed by 400mg IV q24h	Meropenem Colistin ± vancomycin/Teicoplanin Cefoperazone – Sulbactam + Gentamicin	Catheter removal is warranted in the following circumstances a) Septic shock b) Hemodynamic instability c) Suppurative thrombophlebitis d) Endocarditis or evidence of metastatic infection e) Persistent bacteraemia after 72 hours of appropriate therapy f) CLABSI caused by Staphylococcus aureus, enterococci, GNB, fungi, mycobacteria (for short-term catheters). Duration of therapy for uncomplicated bacteraemia10 to 14

				days from the day the culture was negative Persistent bacteraemia after 72 hours of catheter removal treat for 4- 6 weeks.
Fungal Infections	*Candida* *Non-albicans Candida* *Molds*	Fluconazole IV/oral 800 mg OD first day (12mg/kg) and then 400 mg OD (6mg/kg from second day) Liposomal Amphotericin B IV 3mg/kg OD or	Voriconazole Caspofungin dose: IV 70mg on Day 1, 50mg OD (80kg) thereafter	2 weeks of therapy may be needed. Routine antifungal prophylactic therapy in critically ill patients is NOT recommended. Fungal therapy is usually started based on positive cultures or systemic evidence of fungal infection. It is advised to take paired cultures if fungal infection is suspected. Avoid nephrotoxic agents, steroids with L-Amphotericin.

2.2.2 **Drug doses, duration and route of antimicrobial agents in Sepsis**
(*As per Standard Treatment Protocol, 2022-ICMR)*

Antibiotics	**Doses, duration and route of administration**
Imipenem-Cilastatin	500 mg IV q6h or 1g q8h
Amikacin	15 mg/kg IV q24h
Meropenem	1gm IV q8h
Cefoperazone – Sulbactam	3g IV q12h
Vancomycin	15 mg/kg IV q8–12h
Teicoplanin	400mg IV every 12h for 3 doses followed by 400mg IV q24h
Doxycycline	100 mg iv q12h
Colistin	9mu iv stat, then 4.5 mu iv q12h
Polymyxin B	15-20 lakhs unit's iv stat, then 7.5-10 lakhs iv q12h
Caspofungin	70 mg IV on day 1, then 50 mg IV q24h
micafungin	100 mg iv od
anidulafungin	200 mg iv stat then 100 mg iv od

2.3 URINARY TRACT INFECTION: ANTIBIOTIC PROTOCOL UCMS & GTBH

	ISOLATES	SUSCEPTIBILITY PATTERN OF PATHOGENS (%)
UCMS & GTB HOSPITAL ANTIBIOGRAM OF URINARY TRACT INFECTIONS (JANUARY 2025–DECEMBER 2025	*Escherichia coli*	Fosfomycin, Chloramphenicol, Minocycline, Colistin 100% > Imipenem 96% > Nitrofurantoin 82% > Doxycycline 71% > Gentamicin 67% > Piperacillin-Tazobactam 63% > Meropenem 58 % > Amikacin 57 % > Ertapenem 50% > Cefixime 40% > Cotrimoxazole 35% > Ceftriaxone 31% > Cefepime 31% >Amoxicillin – clavulanate, Norfloxacin 29% > Cefotaxime 26% > Ciprofloxacin 23% > Tetracycline 18% > Cefuroxime, Ampicillin 17% > Ceftazidime 0%
	Acinetobacter baumannii	Colistin 100% > Gentamicin 42% > Imipenem 39%> Piperacillin/tazobactam 32% > Ciprofloxacin, Cotrimoxazole 29% > Amikacin 17% > Ceftriaxone 8% Cefotaxime 7% > Ceftazidime, Meropenem, Norfloxacin, Nitrofurantoin, Tetracycline 0%
	Citrobacter koseri.	Imipenem 91% > Nitrofurantoin 75% > Piperacillin/tazobactam 72% > Amikacin 68% > Gentamicin 67% > Cotrimoxazole 42% > Cefixime 40% > Norfloxacin 39% > Cefotaxime 34% > Ciprofloxacin, Tetracycline 33% > Ceftriaxone 31% > Ceftazidime, Meropenem 0%
	Citrobacter freundii	Meropenem 100% > Imipenem 83% > Gentamicin 81% > Piperacillin/tazobactam 75% > Ceftriaxone 67% > Cotrimoxazole 60% > Norfloxacin, Tetracycline 50% > Nitrofurantoin 43% > Cefotaxime 30% > Cefixime, Amikacin, Ciprofloxacin 0%
	Klebsiella pneumonia	Colistin 100% > Imipenem 82% > Gentamicin 69% > Meropenem 67% > Norfloxacin 60% > Piperacillin/tazobactam 59% > Amikacin, Cefixime 50% > Cotrimoxazole, Ceftriaxone 49% > Cefotaxime 42% > Tetracycline 36% > Amoxicillin – clavulanate 32% > Ciprofloxacin 31% > Nitrofurantoin 24% > Ceftazidime, Cefepime 0%
	Klebsiella oxytoca	Meropenem, Colistin 100% > Imipenem 80% > Gentamicin 69% > Piperacillin-Tazobactam, Norfloxacin 50% > Ceftriaxone 46% > Amoxicillin – clavulanate 45% > Amikacin 44 % > Nitrofurantoin 43% > Cotrimoxazole 42% > Tetracycline 33% > Ciprofloxacin 20% > Cefotaxime 12% > Cefixime 0%
	Proteus mirabilis	Meropenem 100% > Piperacillin/tazobactam 94% > Norfloxacin 76% > Ceftriaxone 67% > Gentamicin 55% > Amikacin 50% > Cotrimoxazole 45% > Cefotaxime 38% > Amoxicillin – clavulanate 25% > Ciprofloxacin, Cefixime 0%
	Proteus vulgaris	Imipenem 100% > Piperacillin/tazobactam 91% > Cefotaxime 63% > Gentamicin 61% > Ceftriaxone 45% > Norfloxacin 40% > Cotrimoxazole 26% > Amoxicillin – clavulanate 17% > Cefixime, Amikacin 0%
	Pseudomonas aeruginosa	Imipenem 85% > Aztreonam 79% > Tobramycin 76% > Norfloxacin 70% > Ciprofloxacin 67% > Piperacillin/tazobactam 63% > Ceftazidime 56% > Amikacin 0%
	Enterobacter sp.	Colistin 100% > Imipenem 76% > Meropenem 71% > Gentamicin 64% > Nitrofurantoin 63% > Piperacillin/tazobactam 52% > Amikacin 48% > Cotrimoxazole 37% > Norfloxacin 36% > Ceftriaxone 29% > Tetracycline 23% > Cefixime, Cefotaxime 22% > Ciprofloxacin 15% > Ceftazidime, Cefepime 0%
	Methicillin Resistant Staphylococcus aureus (MRSA)	Linezolid, Vancomycin, Nitrofurantoin, Chloramphenicol 100% > Tetracycline 75% > Gentamicin 48% > Co-trimoxazole 38% > Norfloxacin 24 % > Ciprofloxacin 15% > Cefoxitin 0%
	Methicillin sensitive Staphylococcus aureus (MSSA)	Cefoxitin, Co-trimoxazole, Linezolid, Vancomycin 100% > Tetracycline 95% > Nitrofurantoin 94% > Gentamicin 86% > Norfloxacin 58% > Ciprofloxacin 54%
	Enterococcus faecalis	Linezolid 100% > Vancomycin 98% > Teicoplanin 87% > Nitrofurantoin 76% > High Level Gentamicin 53% > Ampicillin 50% > Norfloxacin, Tetracycline 17% > Ciprofloxacin 15% > Erythromycin 0%
	Enterococcus faecium	Linezolid, Vancomycin, Teicoplanin 100% >Nitrofurantoin 79 % >High Level Gentamicin 47.7% >Tetracycline 25% > Norfloxacin 7.5% > Erythromycin 0%

2.3.1 ANTIBIOTIC PROTOCOL – URINARY TRACT INFECTI ON (*As per Standard Treatment Protocol, 2022-ICMR*)

Condition	Likely Causative Organism	Empiric antibiotics (Presumptive antibiotics)	Alternative antibiotics	Comment
Acute Cystitis	*E.coli, Staphylococcus saprophyticus (in sexually active young women), Klebsiella pneumoniae*	Nitrofurantoin [100mg BD for 5 days 1.25-1.75 mg/kg oral 6 hourly (Dose in children)] Fosfomycin [3.0 gm single dose]	Co-trimoxazole [ds 1 tab bd for 3 days] Ertapenem [1g IV once daily for 7 days] Amikacin (can be used in children as well) [15mg/ kg/day once daily IV or IM for 3 days] Cefadoxil [500mg q12h for 3 days]	Dosage adjustment as per eGFR. Fosfomycin and nitrofurantoin should be avoided when there is suspicion of pyelonephritis or prostatitis / presence of systemic features of infection. Fosfomycin susceptibility to being requested for, and used only for Gram-negative MDR organisms.
Acute Pyelonephritis	*Escherichia coli, Klebsiella pneumonia, Proteus mirabilis, Pseudomonas aeruginosa, Enterococcus sp. Frequently multi-drug resistant organisms are present*	Piperacillin – tazobactam [4.5 g IV 6 hrs] (complicated pyelonephritis) Ertapenem [1 g IV once daily for 7 - 10 days] *Cotrimoxazole* [160/800mg q12h 14 for days] Cefpodoxime [200mg q12h for 10 days] *Ciprofloxacin* [400 mg q12h for 7days] Levofloxacin [750mg q12h for 5 days]	Imipenem [1 gm 8 hourly IV] Meropenem [1 g IV q8h] Amikacin (recommended for children as well) [15mg/kg/day once daily IV/IM for 7-14 days] *Cefepime [1-2 g q12h for 7-14 days] Ceftriaxone [1g q12h for 7-14 days] Cefotaxime [2 g q8h for 7-14 days]*	Dosage adjustment as per eGFR. Treatment is for a minimum of 7 days. The total duration of treatment is 14 days in children. Same treatment regimen to be used for complicated UTI except the duration is extended (7-14 days).
Acute prostatitis	*Enterobacteriaceales (E.coli, Klebsiella sp.) Sexual transmission Neisseria gonorrhoea Chlamydia trachomatis*	*Ceftriaxone [250 mg iv/im] followed by Doxycyiline [100 mg q12h for 10 days]* Ertapenem [1 g IV once daily for 7 - 10 days] Outpatient therapy	Piperacillin-tazobactam [4.5 g IV 6 hrs] Imipenem [1 gm 8 hourly] Meropenem [1g IV q8h] Trimethoprim-Sulfamethoxazole [(160-800mg) BD]	Urine and prostatic massage specimen for cultures to be collected before antibiotics. Prostatitis requires a minimum of 21 days antibiotics. Repeat urine culture after 1

		Oral Ciprofloxacin 200 mg q8h Levofloxacin 500 mg q24h Cotrimoxazole 160/800 mg q12 for 10-14 days Outpatient therapy: Risk of STI-Single dose of ceftriaxone 250 mg IM/IV followed by Doxycycline 100 mg q1 2h for 10 days	No Risk factors for resistance: Piperacillin-tazobactam + Aminoglycoside Fluoroquinolones + Aminoglycoside Risk factors for resistance: • Piperacillin-tazobactam or Cefotaxime or Ceftazidime with Aminoglycoside •Alternatives: Imipenem-cilatatin or Meropenem	week after antibiotics to ensure bacterial clearance Nitrofurantoin should be avoided in prostatitis due to poor tissue penetration Duration of therapy: • Mild infection—10-14 days • Severe infection—4 weeks
Urethritis	Gonococcal urethritis (GU) *Neisseria gonorrhoea* *Non*-Gonococcal urethritis (NGU) *Chlamydia trachomatis (D to K –Most common)* *Ureaplasma urealyticum* *Trichomonas vaginalis*	GU- Ceftriaxone 1g IM/IV with azithromycin 1 g single dose NGU – Oral Doxycycline 100mg q12h for 7 days	NGU Azithromycin 1 g single dose	Evaluate and treat the sex partner and advise to abstain from sex until treatment is complete. Urethritis is confirmed when > 2 WBC/hpf
Epididymo-orchitis (Low and High risk of sexually transmitted)	*E.coli, Klebsiella spp.* *Chlamydia trachomatis* *Neisseria gonorrhoea*	Oral Doxycycline 200mg followed by Ceftriaxone 100 mg q12h for 10-14 days (Low risk of STI) Ceftriaxone 1 mg IM with oral Doxycycline 200mg followed by 100 mg q12h for 10-14 days (High risk of STI)	Ofloxacin [200 mg BD] Levofloxacin 500 mg q24h or Ciprofloxacin 200 mg q8h.	Total duration of treatment is 14 days (except for Levofloxacin where it is 10 days) (For Low risk of sexually transmitted; likely due to enteric or urinary organisms)

2.3.2 Drug doses, duration and route of antimicrobial agents in Urinary tract infection (*As per Standard Treatment Protocol, 2022-ICMR*)

Antibiotics	**Doses, duration and route of administration**
Acute cystitis	
1. Nitrofurantoin	100mg BD for 5 days
1. Nitrofurantoin	1.25-1.75 mg/kg oral 6 hourly (Dose in children)
2. Fosfomycin	3.0 gm single dose
3. Co-trimoxazole	ds 1 tab bd for 3 days
4. Ertapenem	1 g IV once daily for 7 days
5. Amikacin	15mg/ kg/day once daily IV or IM for 3 days
Acute Pyelo-nephritis	
6. Piperacillin –Tazobactam	4.5 g IV 6 hrs
7. Ertapenem	1 g IV once daily for 7 -10 days
8. Imipenem	1 gm 8 hourly IV
9. Meropenem	1 g IV q8h
10. Amikacin	15mg/kg/day once daily IV/IM for 7-14 days
Acute Prostatitis	
11. Ertapenem	1 g IV once daily for 7 -10 days
12. Piperacillin-Tazobactam	4.5 g IV 6 hrs
13. Imipenem	1 gm 8 hourly
14. Meropenem	1g IV q8h
15. Trimethoprim-Sulfamethoxazole	(160-800mg) BD
Epididymo-orchitis	
16. Ceftriaxone	500 mg IM
17. Doxycycline	100 mg BD
18. Ofloxacin	200 mg BD
19. Levofloxacin	500 mg OD

2.4 RESPIRATORY TRACT INFECTIONS ANTIBIOTIC PROTOCOL: UCMS & GTBH

UCMS & GTB HOSPITAL ANTIBIOGRAM OF RESPIRATORY TRACT INFECTIONS (JAN 2025- DEC 2025).	ISOLATES	% SUSCEPTIBILITY PATTERN OF PATHOGENS
	Klebsiella pneumonia	Imipenem 79.2% > Amikacin 61.5% > Gentamicin 58.3% > Ceftriaxone 47.3% > Ofloxacin 47.1% > Cefepime 44.8% > Piperacillin/Tazobactam 42.3% > Ciprofloxacin 38.3% > Amoxicillin/Clavulanic acid 36.4% > Ceftazidime 18.8% > Cefuroxime 0.0% > Cefuroxime 0.0% > Cefotaxime 0.0% > Meropenem 0.0%
	Klebsiella oxytoca	Cefepime 100.0% > Imipenem 100.0% > Meropenem 100.0% > Ofloxacin 100.0% > Amoxicillin/Clavulanic acid 60.0% > Ceftriaxone 60.0% > Cefotaxime 50.0% > Gentamicin 50.0% > Amikacin 40.0% > Ciprofloxacin 33.3% > Piperacillin/Tazobactam 0.0% > Ceftazidime 0.0% > Trimethoprim/Sulfamethoxazole 0.0%
	Methicillin Resistant Staphylococcus aureus (MRSA)	Gentamicin, Cotrimoxazole, Linezolid, Chloramphhenicol 100% > Clindamycin, Erythromycin 0%
	Methicillin Sensitive Staphylococcus aureus (MSSA)	Cotrimoxazole, Linezolid, Doxycycline, Tetracycline 100% > Chloramphenicol 75% > Clindamycin 40% > Erythromycin 20%
	Acinetobacter baumannii	Minocycline 80.0% > Trimethoprim/Sulfamethoxazole 10.0% > Ampicillin/Sulbactam 9.4% > Ceftazidime 8.8% > Amikacin 6.9% > Cefepime 5.0% > Gentamicin 3.2% > Ciprofloxacin 1.9% > Piperacillin/Tazobactam 0.0% > Ceftriaxone 0.0% > Cefotaxime 0.0% > Imipenem 0.0% > Meropenem 0.0%
	Pseudomonas aeruginosa	Amikacin 100.0% > Ciprofloxacin 100.0% > Ceftazidime 69.2% > Imipenem 63.6% > Tobramycin 61.5% > Aztreonam 60.0% > Netilmicin 57.1% > Piperacillin/Tazobactam 46.2% > Cefepime 25.0% > Meropenem 25.0% > Ofloxacin 25.0%
	Enterobacter species	Meropenem 100.0% > Imipenem 71.7% > Gentamicin 53.3% > Amikacin 52.1% > Ceftriaxone 43.0% > Ciprofloxacin 39.7% > Piperacillin/Tazobactam 39.3% > Cefepime 37.1% > Ofloxacin 36.0% > Ceftazidime 26.5% > Cefotaxime 23.1% > Colistin 0.0%
	Streptococcus Pyogenes	Clindamycin 100.0% > Erythromycin 100.0% > Linezolid 100.0% > Vancomycin 100.0% > Tetracycline 100.0%
	Enterococcus faecium	Gentamicin-High 100.0% > Linezolid 100.0% > Vancomycin 100.0% > Teicoplanin 100.0% > Erythromycin 0.0%
	Enterococcus faecalis	Gentamicin-High 100.0% > Vancomycin 100.0% > Teicoplanin 100.0% > Chloramphenicol 100.0%

2.4.1 ANTIBIOTIC PROTOCOL – RESPIRATORY TRACT INFECTION

(*As per Standard Treatment Protocol, 2022-ICMR*)

Condition	Likely Causative Organism	Empiric antibiotics (Presumptive antibiotics)	Alternative antibiotics	Comment
Acute bacterial rhinitis/ rhinosinusitis	*Streptococcus pneumoniae, Haemophilus influenzae, Moraxella catarrhalis*	Amoxicillin-Clavulanate 1gm Oral BD for 7 days (In children: 10-14 days)	Ceftriaxone Cefpodoxime (adults)	In case of penicillin allergy, Adults: doxycycline/ respiratory quinolones Children Anaphylactic: respiratory quinolones, Non- anaphylactic: cefixime and clindamycin
Bacterial pharyngitis/ tonsillopharyngitis	*Group A ß-haemolytic Streptococci (GABHS), Group C, G Streptococcus*	Oral Penicillin v 500mg BD or Amoxicillin 500mg Oral TDS for 10 days	Amoxicillin Benzathine penicillin single dose	In case of penicillin allergy: Anaphylactic: clindamycin/ clarithromycin/ azithromycin Non-anaphylactic: cephalexin/ cefadroxil As most cases are viral no antimicrobial therapy required. Antibiotics are recommended to reduce transmission rates and prevention of long term sequalae such as rheumatic fever
Acute otitis media	*Streptococcus pneumoniae, Haemophilus influenzae, Beta-haemolytic Streptococci, Staphylococcus aureus, Moraxella catarrhalis*	Amoxicillin Co-amoxiclav Chloramphenicol Linezolid	Cefpodoxime, cefuroxime, cefdinir, Ceftriaxone	In case of penicillin allergy: Anaphylactic: azithromycin/ clarithromycin Non-anaphylactic: cephalosporins

Ventilator Associated pneumonia	*Acinetobacter baumannii* *Klebsiella pneumoniae*	Beta Lactam + beta lactamase inhibitor (Piperacillin – Tazobactam 4.5 gm 6 hourly) Plus Either Aminoglycoside (Amikacin, Gentamicin, or Tobramycin) OR Antipseudomonal fluroquinolone (Cipro/ Levofloxacin)	Meropenem 1gm 8 hourly + colistin 3miu	Check for Multiple organ failure Nephrotoxic (Fluoroquinolone is preferred in nephrotoxicity)
Community acquired Pneumonia*	*Streptococcus pneumoniae,* *Haemophilus influenzae,* *Gram-negative bacilli (E. coli, Klebsiella sp.), Staphylococcus aureus* *Atypical pneumonia pathogens (Mycoplasma pneumonia, Chlamydophila pneumonia, Legionella species)*	**Outpatients without co-morbidities: Co amoxiclav** - Outpatients with co-morbidities or use of antimicrobial in 3 months: Co-amoxiclav and macrolide/doxycycline -Outpatients with co-morbidities or use of antimicrobial in 3 months: Co-amoxiclav and macrolide/doxycycline -Inpatient ICU: Ceftriaxone with macrolide/doxycycline -Inpatient ICU with risk factors for Pseudomonas aeruginosa/ other enteric gram-negative bacteria: Piperacillin tazobactam/ macrolide/doxycycline -Newborns < 1 month	**Macrolides, Cefuroxime, Cefpodoxime** -Cefuroxime/ cefpodoxime and macrolide/doxycycline -Cefuroxime/ cefpodoxime and macrolide/doxycycline -Cefotaxime, piperacillin-tazobactam with macrolide -Cefepime/imipenem with macrolide/doxycycline -Outpatient and inpatient: Cefotaxime and gentamicin, add macrolides if Chlamydia suspected	
* Note: Suspected MRSA: add vancomycin/ teicoplanin /(linezolid only if TB ruled out) Suspected influenza: Add oseltamivir				

2.4.2 Drug doses, duration and route of antimicrobials in Respiratory tract infections. (*As per Standard Treatment Protocol, 2022-ICMR*)

Drug	Adult dose	Paediatric dose
Penicillin V	500 mg twice daily	250 mg twice daily
Benzathine penicillin	<27 kg 6,00,000 units IM single dose > 27 kg 1.2 million units IM single dose	
Amoxicillin	500 – 1000 mg thrice daily (PO or IV)	15-20 mg/kg twice daily oral 30-35 mg/kg thrice daily IV
Co-amoxiclav	1 gm twice daily/ 625 mg thrice daily oral 1.2 gm IVq8h	15-20 mg/kg of amoxicillin twice daily PO 25-30 mg/kg of amoxicillin component thrice daily IV
Azithromycin	500 mg daily (PO or IV)	10 mg/kg once daily
Clarithromycin	500 mg twice daily	7.5 mg/kg twice daily
Oseltamivir	75 mg twice daily PO	<15 kg 30 mg twice daily 16-34 kg 45 mg twice daily 35 -44 kg 60 mg twice daily 45 kg and more 75 mg twice daily
Doxycycline	100 mg twice daily	1.5-2 mg/kg twice daily
Clindamycin	300 mg four times a day PO 600 mg thrice daily IV	7 mg/kg thrice daily
Cephalexin	750 mg twice daily PO	20 mg/kg twice daily PO
Cefadroxil	1 gm once daily	30 mg/kg once daily
Levofloxacin	750 mg once daily PO or IV	10-15 mg/kg in one or two divided doses PO or IV
Moxifloxacin	400 mg once daily PO or IV	10 mg/kg once daily PO or IV
Cefpodoxime	200 mg twice daily	5 mg/kg twice daily
Cefuroxime	500 mg twice daily oral 1.5 gm twice daily IV	10 mg/kg twice daily oral 35 mg/kg twice daily IV
Ceftriaxone	2 gm once daily IV	50 mg/kg twice daily
Cefotaxime	2 gm thrice daily IV	30-35 mg/kg thrice daily IV
Cefepime	2 gm twice daily IV	50 mg/kg twice daily
Piperacillin tazobactam	4.5 gm thrice daily	100 mg/kg piperacillin thrice daily
Cefoperazone sulbactam	3 gm twice daily	50 mg/kg of Cefoperazone twice daily
Imipenem	1 gm thrice daily or 500 mg four times daily IV	15-25 mg/kg four times daily IV
Meropenem	1 gm thrice daily IV	20-40 mg/kg thrice daily
Vancomycin	1 gm twice daily	10 mg/kg four times daily
Teicoplanin	400 mg twice daily for 3 doses and then 400 mg once daily	12 mg/kg twice daily for 3 doses and then 12 mg/kg once daily
Linezolid	600 mg twice daily PO or IV	10 mg/kg thrice daily PO or IV

2.5 SKIN AND SOFT TISSUE INFECTIONS ANTIBIOTIC PROTOCOL: UCMS & GTBH

UCMS & GTB HOSPITAL ANTIBIOGRAM OF SKIN AND SOFT TISSUE INFECTIONS (JAN 2025- DEC 2025).	**ISOLATES**	**% SUSCEPTIBILITY PATTERN OF PATHOGENS**
	Methicillin-Resistant *Staphylococcus aureus*	Linezolid (100%)> Doxycycline (99%)> Chloramphenicol (94%)> Tetracycline (58%)> Clindamycin (58%)> Trimethoprim/Sulfamethoxazole (58%)> Gentamicin (44%)> Erythromycin (9%)> Ofloxacin (5%)
	Methicillin-Sensitive *Staphylococcus aureus*	Cefoxitin (100%)> Linezolid (100%)> Doxycycline (100%)> Chloramphenicol (96%)> Gentamicin (75%)> Clindamycin (75%)> Tetracycline (65%)> Trimethoprim/Sulfamethoxazole (66%)> Ofloxacin (26%)> Erythromycin (18%)
	Escherichia coli	Minocycline (100%)> Trimethoprim/Sulfamethoxazole (67%)> Imipenem (60%)> Gentamicin (54%)> Amikacin (51%)> Ampicillin/Sulbactam (50%)> Meropenem (36%)> Piperacillin/Tazobactam (24%)> Ofloxacin (21%)> Ceftriaxone (16%)> Cefepime (15%)> Amoxicillin/Clavulanic acid (14%)> Ceftazidime (11%)> Ciprofloxacin (9%)> Cefotaxime (9%)
	Acinetobacter baumannii	Minocycline (29%)> Gentamicin (12%)> Imipenem (9%)> Piperacillin/Tazobactam (8%)> Ciprofloxacin (7%)> Cefotaxime (7%)> Trimethoprim/Sulfamethoxazole (7%)> Ampicillin/Sulbactam (7%)> Ceftriaxone (6%)> Amikacin (6%)> Meropenem (5%)> Ceftazidime (2%)
	Pseudomonas aeruginosa	Cefepime (97%)> Netilmicin (92%)> Aztreonam (90%)> Imipenem (89%)> Ofloxacin (88%)> Ceftazidime (85%)> Piperacillin/Tazobactam (79%)> Tobramycin (78%)> Ciprofloxacin (76%)> Meropenem (68%)> Amikacin (65%)
	Klebsiella species	Gentamicin (61%)> Imipenem (55%)> Amikacin (42%)> Meropenem (36%)> Cefepime (34%)> Ofloxacin (23%)> Ceftazidime (23%)> Ceftriaxone (21%)> Amoxicillin/Clavulanic acid (17%)> Cefotaxime (17%)> Ampicillin/Sulbactam (17%)> Piperacillin/Tazobactam (16%)
	Proteus species	Meropenem (83%)> Cefepime (68%)> Piperacillin/Tazobactam (72%)> Ampicillin/Sulbactam (58%)> Ceftriaxone (58%)> Ceftazidime (53%)> Ofloxacin (43%)> Amikacin (45%)> Cefotaxime (38%)> Gentamicin (26%)> Amoxicillin/Clavulanic acid (20%)> Ciprofloxacin (16%)
	Enterococcus species	Linezolid (100%)> Vancomycin (100%)> Doxycycline (100%)> Teicoplanin (86%)> Chloramphenicol (81%)> Gentamicin-High (69%)> Erythromycin (7.5%)
	Citrobacter species	Minocycline (100%)> Cefepime (67%)> Ofloxacin (63%)> Imipenem (60%)> Gentamicin (52%)> Amikacin (50%)> Meropenem (44%)> Piperacillin/Tazobactam (35%)> Ceftriaxone (30%)> Ceftazidime (29%)

2.5.1 SKIN AND SOFT TISSUE INFECTIONS ANTIBIOTIC PROTOCOL.

(*As per Standard Treatment Protocol, 2022-ICMR*)

Condition	Likely Causative Organisms	Empiric antibiotics (presumptive antibiotics)	Alternative antibiotics	Comments
Cellulitis	*Staphylococcus. Aureus & Streptococcus pyogenes*	Amoxicillin Clavulanate 1.2gm IV TDS/625mg oral TDS Ceftriaxone 2gm IV OD	Clindamycin 600-900mg IV TDS	Treat for 5-7days.
Furunculosis	*Staphylococcus. aureus*	Amoxicillin Clavulanate 1. 2gm IV/Oral 625mg TDS Ceftriaxone 2gm IV OD	Clindamycin 600-900mg IV TDS	Get pus Cultures before starting antibiotics Duration–5-7days
Erysipelas	*Staphylococcus. aureus*	Amoxicillin Clavulanate 1. 2gm IV/Oral 625mg TDS Ceftriaxone 2gm IV OD	Clindamycin 600-900mg IV TDS	Get pus Cultures before starting antibiotics Duration–5-7days
Abscess	*Staphylococcus aureus, Facultative gram-negative anaerobes*	Linezolid 600 mg q12h Vancomycin 25-30 mg/kg loading dose then 15-20 mg/kg/dose q8h Ciprofloxacin 400 mg IV q 24h	Generally, 14 days	-
	Streptococcus pyogenes, & anaerobes	Clindamycin 600-900 mg q 8h Amoxicillin clavulanate 1. 2gm IV/Oral 625mg TDS Metronidazole 500 mg q8h	5-7 days	-

2.5.2 Drug doses, duration and route of antimicrobials for Skin and soft Tissue & Deep Neck space infections. (*As per Standard Treatment Protocol, 2022-ICMR*)

Antibiotics	**Doses, duration and route of administration**
Cefazolin	1-2 g IV q8h
Cephalexin	750 mg bd, 500 mg TID
Amoxicillin-clavulanate	Oral: 1g bd/ IV 1.2gm TDS
Clindamycin	600-900 IV 8hourly
Piperacillin-tazobactam + Clindamycin	IV 4.5 gm 6 hourly (P-T) + IV 600 mg TDS
Ciprofloxacin	IV 750 mg q12h
Doxycycline	IV200 mg stat f/b 100 mg 1-0-1
Amoxicillin-clavulanate	1g bd
Drug doses, duration and route of antimicrobials in Deep neck space infection.	
Clindamycin	600 mg 6-8 hourly for 2-3 weeks
Ampicillin-sulbactam	3 gm 6 hourly
Amoxicillin-clavulanate	1.2 g 8 hourly (for Peri-tonsillar abscess)
Piperacillin-tazobactam	4.5 gm 6-8 hourly 2-3 weeks
Amoxicillin-clavulanate	625 mg 8 hourly
Ceftriaxone	1gm 12 hourly
Linezolid	600 mg 12 hourly
Metronidazole	500 mg 8 hourly
Vancomycin	15 mg/kg 12 hourly
Gentamicin	1.7 mg/kg IV Q 8 h
Tobramycin	5 mg/kg IV Q 24 h
Ciprofloxacin	400 mg IV Q 12 h

2.6 BONE AND JOINT INFECTIONS ANTIBIOTIC PROTOCOL: UCMS & GTBH

UCMS & GTB HOSPITAL ANTIBIOGRAM OF BONE AND JOINT INFECTIONS (JAN 2025- DEC 2025).	ISOLATES	% SUSCEPTIBILITY PATTERN OF PATHOGENS
	Methicillin-Resistant *Staphylococcus aureus*	Linezolid 100% > Doxycycline 98% > Chloramphenicol 92% > Tetracycline 69% > Clindamycin 60% > Trimethoprim/Sulfamethoxazole 55% > Gentamicin 48% > Erythromycin 12% > Ofloxacin 8%
	Methicillin-Sensitive *Staphylococcus aureus*	Linezolid, Doxycycline 100% > Chloramphenicol 95% > Clindamycin 74% > Gentamicin 72% > Trimethoprim/Sulfamethoxazole 58% > Tetracycline 50% > Ofloxacin 33% > Erythromycin 20%
	Enterobacter spp.	Minocycline 100% > Meropenem 50% > Imipenem 47% > Amikacin 44% > Gentamicin 29% > Piperacillin/Tazobactam 28% > Trimethoprim/Sulfamethoxazole 25% > Ciprofloxacin 15% > Ceftriaxone 13% > Cefotaxime 12% > Ceftazidime 10% > Ofloxacin 9% > Cefepime 8%
	Escherichia coli	Trimethoprim/Sulfamethoxazole 100% > Gentamicin 50% > Amikacin 43% > Imipenem 40% > Ampicillin/Sulbactam 40% > Meropenem 33% > Cefepime 25% > Ceftriaxone 18% > Ciprofloxacin 17% > Ceftazidime 12% > Piperacillin/Tazobactam 7% > Amoxicillin/Clavulanic acid 6% > Cefotaxime, Ofloxacin 0%
	Pseudomonas aeruginosa	Imipenem 92% > Cefepime 90% > Netilmicin 90% > Aztreonam 87% > Ceftazidime 83% > Piperacillin/Tazobactam 82% > Ofloxacin 80% > Tobramycin 78% > Ciprofloxacin 66% > Amikacin, Gentamicin, Meropenem 50% >
	Acinetobacter baumannii	Trimethoprim/Sulfamethoxazole 20% > Ampicillin/Sulbactam, Cefotaxime 16% > Minocycline 14% > Gentamicin 13% > Meropenem 12% > Amikacin 9% > Piperacillin/Tazobactam 8% > Imipenem, Ciprofloxacin, Ceftazidime 7% > Ceftriaxone 2% > Cefepime 0%
	Klebsiella pneumoniae	Imipenem 45% > Amikacin 31% > Amoxicillin/Clavulanic acid, Cefepime, Ofloxacin 16% > Ceftriaxone, Ciprofloxacin 11% > Ceftazidime 10% > Piperacillin/Tazobactam 6% > Ampicillin/Sulbactam, Cefotaxime, Gentamicin, Meropenem 0%
	Klebsiella oxytoca	Amoxicillin/Clavulanic acid 100% > Amikacin 33.3% > Ceftazidime, Ceftriaxone, Ciprofloxacin, Imipenem, Piperacillin/Tazobactam 0%
	Citrobacter koseri	Cefepime, Meropenem, Ofloxacin 100% > Gentamicin 50% > Imipenem 40% > Amikacin 38.5% > Piperacillin/Tazobactam 18.2% > Ciprofloxacin 14.3% > Ceftazidime 10% > Cefotaxime, Ceftriaxone 0%
	Citrobacter freundii	Gentamicin, Minocycline, Ofloxacin 100% > Cefotaxime, Imipenem, Piperacillin/Tazobactam 50% > Ciprofloxacin 40% > Ceftriaxone 33.3% > Amikacin 25% > Cefepime, Ceftazidime 0%
	Proteus mirabilis	Cefepime, Cefotaxime, Ofloxacin 100% > Amikacin 85% > Piperacillin/Tazobactam 66% > Ampicillin/Sulbactam 50% > Gentamicin 38% > Ceftriaxone 31% > Ceftazidime 28% > Ciprofloxacin 12% > Amoxicillin/Clavulanic acid 0%

	Proteus vulgaris	Amikacin 100% > Ceftriaxone, Imipenem, Piperacillin/Tazobactam 50% > Ciprofloxacin 33.3% > Ceftazidime, Gentamicin 0%
	Enterococcus faecalis	Chloramphenicol, Doxycycline, Linezolid, Teicoplanin, Vancomycin 100% > Gentamicin-High 33.3% > Erythromycin, Tetracycline 0%
	Enterococcus faecium	Chloramphenicol, Vancomycin 100% > Gentamicin-High, Teicoplanin 66% > Erythromycin 0%
	Streptococcus pyogenes	Clindamycin, Erythromycin, Linezolid, Vancomycin 100%

2.6.1 OSTEOMYELITIS, SEPTIC ARTHRITIS & PROSTHETIC JOINT INFECTION (PJI) ANTIBIOTIC PROTOCOL.

(*As per Standard Treatment Protocol, 2022-ICMR*)

Condition	Likely causative Organisms	Empiric antibiotics	Alternative antibiotics	Comments
Acute osteomyelitis OR Septic arthritis	*S. aureus, Streptococcus pyogenes Enterobacteriaceae*	Ceftriaxone 2g IV OD Followed by Oral therapy by Cloxacillin 500 mg q 8h Vancomycin 1g q12h Or Teicoplanin 400mg q24	Piperacillin-tazobactam 4.5gm IV q6h Or Cefoperazone-sulbactam 3gm IV q12h And Clindamycin 600-900mg IV TDS	Treatment based on culture of blood/ synovial fluid/ bone biopsy Duration: 4-6 weeks (From initiation or last major debridement)
Chronic Osteomyelitis OR Chronic synovitis	Patients with B&J infections, especially chronic osteomyelitis and implant-associated infections often undergo multiple incomplete procedures and receive several courses of empiric antibiotics. Whereas this practice should be strongly discouraged and every attempt should be made at a tissue diagnosis, fashioning empiric treatment based on the most likely cause is sometimes inevitable when cultures fail to isolate the organism or the patient is clinically unstable.			Definitive treatment guided by bone/ synovial biopsy culture. Treat for 6 weeks minimum Investigate for TB, Nocardia, fungi. Extensive surgical debridement. Total duration of treatment depends on the joint and the organism. Choose antibiotic based on sensitivity.
Prosthetic joint infection	*Coagulase negative staphylococci, Staphylococcus aureus, Streptococci Gram-negative bacilli, Enterococcus, Anaerobes*	Ceftriaxone 2g IV OD Add Vancomycin 1gm IV BD Or Teicoplanin 800mg x3 doses followed by 400 mg once daily.	-	4 weeks

2.6.2 Drug doses, duration and route of antimicrobials for Treatment of Bone and Joint Infections. (*As per Standard Treatment Protocol, 2022-ICMR*)

Organism	Antibiotic	Dosage	Chronic Suppression
MSSA	Cloxacillin/ Flucloxacillin Cephalexin	1000 mg TDS/QDS 1000 mg QDS	500 mg TDS 500 mg TDS
MRSA	Linezolid TMP-SMX Doxycycline	600 mg bd 800/160 mg BD 100 mg BD	Linezolid Difficult for a prolonged period 800/160 mg BD 100 mg BD
B- haemolytic Streptococcus	Cephalexin Amoxicillin	1000 mg QDS 500 mg QDS	500 mg TDS 500 mg TDS
Enterococcus spp.	Amoxicillin	500 mg QDS	500 mg TDS
Pseudomonas spp.	Ciprofloxacin	750 mg BD	500 mg BD
Enterobacteriaceae	Ciprofloxacin TMP SMX Doxycycline	750 mg BD 800/160 mg BD 100 mg BD	500 mg BD 800/160 mg BD 100 mg BD
MSSA: Methicillin sensitive staphylococcus aureus; MRSA: Methicillin Resistance staphylococcus aureus			

2.7 CENTRAL NERVOUS SYSTEM INFECTIONS ANTIBIOTIC PROTOCOL: UCMS & GTBH

	ISOLATES	% SUSCEPTIBILITY PATTERN OF PATHOGENS
UCMS & GTB HOSPITAL ANTIBIOGRAM OF CENTRAL NERVOUS SYSTEM INFECTIONS (JAN 2025- DEC 2025).	Methicillin Resistant *Staphylococcus aureus (MRSA)*	Linezolid 100% > Gentamicin 70% > Cotrimoxazole 38% >
	Methicillin Sensitive *Staphylococcus aureus (MSSA)*	Linezolid 100% > Gentamicin 95% > Cotrimoxazole 53% >
	Acinetobacter baumannii	Gentamicin 61% > Meropenem 52% > Piperacillin-Tazobactam 46% > Ceftazidime 36%
	Escherichia coli	Amikacin100% > Meropenem 91% > Gentamicin 73%> Cotrimoxazole 44% > Piperacillin-Tazobactam 28% > Ceftazidime 13%> Ceftriaxone 11%> Cefotaxime 10%
	Pseudomonas aeruginosa	Aztreonam, Piperacillin-Tazobactam, Tobramycin, Ceftazidime, Meropenem 100%
	Klebsiella pneumonia	Gentamicin 80%> Meropenem 80% > Amikacin 75% > Cotrimoxazole 33% > Piperacillin-Tazobactam 30%
	Enterobacter spp.	Gentamicin 75% > Amikacin 67% > Meropenem 55% > Piperacillin-Tazobactam 38% > Cefotaxime 24% > Ceftazidime 20% > Ceftriaxone 12% > Cotrimoxazole 0%
	Enterococcus species	Linezolid, Vancomycin 100% > High level gentamicin 67% >

2.7.1 CENTRAL NERVOUS SYSTEM INFECTIONS ANTIBIOTIC PROTOCOL (*As per Standard Treatment Protocol, 2022-ICMR*)

Condition	Likely Causative Organisms	Empiric antibiotics (Presumptive antibiotics)	Alternative antibiotics	Comments
Acute bacterial Meningitis	*Streptococcus pneumoniae, H haemophilus influenzae, Neisseria meningitidis*	Ceftriaxone 2g IV 12hourly 10-14days treatment	Meropenem 1gm 8 hourly 7-14 days + Vancomycin 1gm BD x 14 days	Antibiotics should be started as soon as the possibility of bacterial meningitis becomes evident, ideally within 30 minutes. Do not wait for CT scan or LP results. No need to add vancomycin as primary agent, as ceftriaxone resistant Pneumococcus is not common in India. Listeria is also rare in India and so ampicillin is also not indicated Adjust therapy once pathogen and susceptibilities are known.
Acute bacterial Meningitis in Elderly (>55 yrs), alcoholics, Immune compromised	*Listeria monocytogenes*	Inj. Ampicillin 2gm IV 4 hrly Duration 2 weeks	-	
Meningitis-Post-neurosurgery or Penetrating head trauma	*S. epidermidis, S. aureus, P. acnes, P. aeruginosa, A. baumanii*	Meropenem 2gm IV 8hourly And Vancomycin15mg/kg IV 8hourly For 14days.	-	May need intraventricular therapy in severe cases
Meningitis with basilar skull fractures	*S. pneumoniae, H. influenzae*	Ceftriaxone 2gm IV 12hourly For 14 days	-	Dexamethasone 0.15mg/kg IV 6hourly for 2-4days (1st dose with or before first antibiotic dose)

Brain abscess, Sub dural empyema	*Streptococci, Bacteroides, Enterobacteriaceae, S. aureus*	Ceftriaxone 2gm IV 12 hourly or Cefotaxime 2 gm IV 4-6hourly AND Metronidazole 800mg IV 8hourly Duration of treatment to be decided by clinical & radiological response, minimum two months required.	2nd line Meropenem 2gm IV 8hourly Add Vancomycin 2gm/ day IV , 12 hrly if MRSA suspected	Exclude TB, Nocardia, Aspergillus, Mucor (If fungal etiology confirmed, Add Amphotericin B/ Voriconazole) If abscess <2.5cm & patient neurologically stable, await response to antibiotics. Otherwise, consider aspiration/surgical drainage and modify antibiotics as per sensitivity of aspirated/ drained secretions.
Neurocysticercosis	*Taenia solium*	Albendazole 400mg/Kg PO BD + Prednisolone 1mg/Kg PO OD Duration 15 days	-	Consider antiepileptic therapy for seizures

2.7.2 Drug doses, duration and route of antimicrobials drugs used in Central Nervous system infections. (*As per Standard Treatment Protocol, 2022-ICMR*)

Drug	Adult dose	Paediatric dose
Artesunate	2.4 mg/kg 0,12 and 24 hours and then q 24 hourly	< 20 kg 3 mg/kg at 0,12 and 24 hours and then q 24 hourly
Acyclovir	10 mg/kg 8 hourly	10 mg/kg 8 hourly and in children below 12 20 mg/kg 8 hourly
Ceftriaxone	2 gm 12 hourly	50 mg/kg 12 hourly
Ceftazidime	2 gm q 6-8 hourly	50 mg/kg 8 hourly
Cefepime	2 gm 8-12 hourly	50 mg/ kg 12 hourly
Cefotaxime	2 gm 6 hourly	50 mg/kg 6 hourly
Meropenem	2 gm 8 hourly	40 mg/kg 8 hourly
Colistin	9 million unit loading and then 4.5 million units 12 hourly	150,000 units/ kg loading and then 75000 units/kg 12 hourly
Polymyxin B	20000- 25000 units/kg loading and then 12500 to 15000 units/kg 12 hourly, single dose not to exceed 20,00,000 units	15-25,000 units/ kg loading and then 5000-7500 units/ kg 8 hourly
Fosfomycin	4 gm 6 hourly	75-100 mg/kg/dose 6 hourly
Cotrimoxazole	3-6 mg/kg of TMP thrice daily	
Vancomycin	15 mg/kg (max 2 gm) eight Hourly	15 mg/kg 6 hourly
Cloxacillin	2 gm 4 hourly	50 mg/kg 6 hourly
Doxycycline	100 mg 12 hourly	1.5-2 mg/kg 12 hourly
Chloramphenicol	1-2 gm 6 hourly	25 mg/kg 6 hourly
Rifampicin	600 mg once daily	10-20 mg/kg once daily
Metronidazole	400 mg 8 hourly	10 mg/kg 8 hourly
Amphotericin B deoxycholate	1 mg/kg/day	
Liposomal amphotericin B	3-5 mg/kg/day	
Fluconazole	800 mg loading and then 400 mg once daily	12 mg/kg loading and then 6 mg/ kg daily

2.8 OBSTETRICS & GYNAECOLOGY INFECTIONS ANTIBIOTIC PROTOCOL: UCMS & GTBH

	ISOLATES	% SUSCEPTIBILITY PATTERN OF PATHOGENS
UCMS & GTB HOSPITAL ANTIBIOGRAM OF OBSTETRICS & GYNAECOLOGY INFECTIONS (JAN 2025- DEC 2025).	*Escherichia coli*	Minocycline 100% > Imipenem 68% > Amikacin 61% > Meropenem 50% > Gentamicin 50% > Piperacillin/Tazobactam 39% > Ampicillin/Sulbactam 33% > Amoxicillin/Clavulanic acid 29% > Cefepime 29% > Ofloxacin 29% > Ceftazidime 21% > Ceftriaxone 18% > Ciprofloxacin 10%
	Klebsiella pneumonia	Ofloxacin 86% > Imipenem 72% > Cefepime 71% > Gentamicin 67% > Amikacin 63% > Meropenem 50% > Piperacillin/Tazobactam 31% > Ceftriaxone 24% > Ceftazidime 21% > Cefotaxime 20% > Ciprofloxacin 15% > Amoxicillin/Clavulanic acid 11%
	Acinetobacter baumannii	Minocyline (67%) > Ciprofloxacin (9%) > Ampicillin/Sulbactam (8%) > Gentamicin (5%) > Imipenem (5%) >Amikacin (4%)> Ceftriaxone (3%) > Piperacillin-Tazobactam (3%)
	Citrobacter species	Minocycline 100% > Imipenem 69% > Amikacin, Gentamicin, Cefepime, Ofloxacin 50% > Ceftazidime 36% > Piperacillin-Tazobactam 31% > Cefotaxime 28% > Ceftriaxone 14% > Ciprofloxacin 12%
	Proteus mirabilis	Ampicillin/Sulbactam, Ceftriaxone, Cefotaxime, Meropenem 100% > Cefepime, Gentamicin, Ciprofloxacin, Ofloxacin 50%
	Pseudomonas aeruginosa	Piperacillin/Tazobactam, Ceftazidime, Cefepime, Aztreonam, Imipenem, Meropenem, Netilmicin, Ciprofloxacin 100% > Tobramycin 89%
	Methicillin Resistant Staphylococcus aureus (MRSA)	Linezolid 100% > Doxycycline 96% > Chloramphenicol 86% > Tetracycline 64% > Gentamicin 53% > Clindamycin 39% > Trimethoprim/Sulfamethoxazole 35% > Ofloxacin 29% >Erythromycin 6%
	Methicillin Sensitive Staphylococcus aureus (MSSA)	Azithromycin, Linezolid, Doxycycline 100% > Chloramphenicol 97% > Gentamicin 89% > Tetracycline 71% > Clindamycin 57% > Ofloxacin 50% > Trimethoprim/Sulfamethoxazole 46% > Erythromycin 11%
	Enterococcus faecalis	Linezolid 100% > Vancomycin 100% > Doxycycline 100% > Teicoplanin 77% > Chloramphenicol 75% > Gentamicin-High 47%

2.8.1OBSTETRICS & GYNAECOLOGY INFECTIONS ANTIBIOTIC PROTOCOL: (*As per Standard Treatment Protocol, 2022-ICMR*)

Clinical condition/procedure	**Likely causative organisms**	**Preferred (Empirical) antimicrobial agent**	**Alternate antimicrobial agent**	**Comments**
Vaginal delivery (without episiotomy)	No antibiotics			
Vaginal delivery 2nd (episiotomy),3rd or 4th degree tear	*S. aureus, Enterobacteriaceae Anaerobes*	Inj. Amoxicillin – Clavulanic acid 1.2 gm IV (single dose)	Single dose - cefoxitin or cefotetan 1 gm IV Single dose- cefazolin 1 gm IV + metronidazole 500 mg Single dose – cefuroxime 1.5 gm + metronidazole 500 mg	Prophylaxis is considered to prevent adverse outcomes arising from infection e.g. fistulas
Operative Vaginal delivery	Inj Amoxicillin – Clavulanic acid 1.2 gm IV (single dose) – within 6 hours of birth	-		
Elective Lower segment caesarean section	-	Inj. Ceftriaxone IV 1 gm & Inj Metronidazole 500mg IV - half hour before surgery (single dose) OR Inj Ceftazidime IV 1 gm & Inj Metronidazole 500mg IV - half hour before surgery (single dose)	Single dose cefazolin 2 gm IV If allergic, single dose 600-900 mg IV + gentamycin 1.5 mg/ kg IV	-
Emergency Lower segment caesarean section	*Group b streptococcus Staphylococcus, Enterococcus*	Inj Ceftriaxone IV 1 gm Or Inj Ceftazidime IV 1 gm With (single dose) Inj Metronidazole 500mg IV (single dose) With Tablet Azithromycin 500 mg (single dose)	Single dose cefazolin 2 gm IV If allergic, single dose 600-900 mg IV + gentamycin 1.5 mg/ kg IV With Tablet	-

		Followed by Tablet Cefixime 200mg BD for 5 days	azithromycin 500 mg (single dose) Followed by Tablet Cefixime 200mg BD for 5 days	
Elective cervical encerclage	Vaginal flora	Inj Ampicillin 2 gm IV (single dose)	-	To prevent ascending infection from vaginal flora to exposed membranes
Rescue cervical encerclage	Vaginal flora	Inj Ampicillin 2 gm IV single dose	-	To prevent ascending infection from vaginal flora to exposed membranes
Preterm Premature Rupture of Membrane Preterm pre-labour rupture of membranes	*GBS* *Enteric gram-negative bacilli, Ureaplasma, mycoplasma* *Anaerobes (including G. vaginalis)*	Inj Ampicillin 2 gm followed by 1gm 6 hourly X 48 hours followed by Cap Amoxicillin 500 mg 8 hourly X 5 days PLUS Tablet Erythromycin sterate 250 mg 6 hourly X 7 days	-	-
GBS prophylaxis – For *Group B Streptococcus* prophylaxis in women who do not know their GBS status in the following situations: 1. Preterm labour (< 37 wks) 2. Prolonged rupture of membranes (>18 hrs) 3.Fever during labour or chorioamnionitis 4. History of the previous baby with GBS infection 5. Bladder or kidney infection due to GBS	*Group B Streptococcus*	Inj Ampicillin 2gm IV loading dose, followed by 1 gm IV 6 hourly till delivery	Cefazoline 2gm IV followed by 1 gm TDS till delivery If allergic then Vancomycin 1 mg BD till delivery	-
Puerperal sepsis /Septic abortion /chorioamnionitis	*Group A, B, D Streptococci* *S. aureus*	Inj Piperacillin & Tazobactam 4.5 gm	Clindamycin + gentamicin If the patient is in septic	Usually, polymicrobial Duration of antibiotic will

	Enterobacteriaceae including (E.coli, Klebsiella, Enterobacter, Citrobacter, Proteus mirabilis), Pseudomonas aeruginosa, Gardnerella vaginalis <u>*Anaerobes:*</u> *Bacteroides Clostridium perfringens*	IV 8 hourly X 7-14 days Inj metronidazole 500 mg TDS X 7 days	shock/critically ill, consider Imipenem 1g q6h or Meropenem 1g q8h with or without amikacin plus vancomycin, or to cover MRSA	depend on clinical response and laboratory parameters
Hysterectomy (Abdominal hysterectomy, Vaginal Hystrectomy, Laparoscopic) Postoperative period	Polymicrobial: *Staphylococci, Enterococcus, aerobic gram-negative, Anaerobes Bacteroides spp,*	Cefazolin 2 gm iv single dose Or Ceftazidime (Fortum) 2gm iv single dose Plus Inj metronidazole 500 mg IV single dose at time of incision Tab.Cefixime 200 mg BD X 5 days	If allergic to cephalosporin, Clindamycin 600-900 mg IV + Gentamycin 1.5 mg /kg IV single dose	-Administer 15-60 minutes prior to incision - Repeat dose if duration > 3 hrs or blood loss > 1500 ml -If bacterial vaginosis is suspected oral metronidazole 500 mg BD * 7 days is given, beginning at least 4 days pre-op
Laparoscopy (uterus and/or vagina not entered)/ Hysteroscopy/Ectopic pregnancy (Postoperative)	Skin commensals: *S. aureus*	Cefazolin 1 gm iv single dose Or Ceftazidime(Fortum) 1gm iv single dose Oral Doxycycline 100 mg BD X 5 days postoperatively if H/o PID or if fallopian tubes dilated at procedure	If allergic Inj Clindamycin 600 mg IV single dose	
Abortions (missed/ incomplete abortion) (After procedure)	*Chlamydia, Neisseria gonorrhoeae*	Azithromycin 1 gm orally PLUS Metronidazole 800 mg orally half hour before procedure Cap Doxycycline 100 mg BD X 7 D	Doxycycline plus metronidazole	No prophylaxis for missed / incomplete abortion
Endometrial biopsy Cervical biopsy		Azithromycin 1 gm orally PLUS Metronidazole 800 mg orally half hour before procedure	Cap Doxycycline 100 mg BD x 7 D in cases of PID	

Hystosalpingography	*Chlamydia, Neisseria gonorrhoeae*	Doxycycline 100 mg orally before procedure & Tab Doxycycline 500mg BD x 5 days		Doxycycline continued twice daily for 5 days if there is a history of PID or fallopian tubes are dilated at the procedure
Pelvic inflammatory disease (mild to moderate)	*N. gonorrhoeae, C. trachomatis E. coli, Bacteroides Group B streptococcus, Group A streptococcus, S. aureus*	Tab Cefixime 400 mg orally stat PLUS Tab.Metronidazole 400 mg BD x 14 D PLUS Capsule Doxycycline 100 mg BD x 14 D	Ceftriaxone 250 mg IM single dose PLUS Tab. Metronidazole 400 mg BD x 14 D PLUS Cap sule Doxycycline 100 mg BD x 14 D	**CDC based:** Levofloxacin with Metronidazole OR Ceftriaxone PLUS Doxycycline with or without Metronidazole
Pelvic inflammatory disease (severe) Tubo ovarian abscess, pelvic abscess	**Most commonly:** *N. gonorrhoeae, C. trachomatis, Bacteroides spp., Group B streptococcus, Group A streptococcus, S. aureus, Enterobacterales* **Less commonly:** *G. vaginalis, Haemophilus influenzae, cytomegalovirus (CMV), U. urealyticum, M hominis, M. genitalium*	Cefotetan 2gm IV BD PLUS Doxycycline 100 mg orally or IV BD Ceftriaxone 500 mg IM or IV only 1 dose or Cefixime (400 mg orally STAT), + Metronidazole 500 mg PO q12h for 14 days, + Doxycycline 100 mg PO q12h for 14 days Or Levofloxacin 500 mg PO once daily or Moxifloxacin 400 mg PO once daily) + Metronidazole 500 mg PO q12h x 14 days Ceftriaxone 1 gIV q24h + Doxycycline 100 mg IV/PO q12h + Metronidazole 500 mg IV q12h	Clindamycin 900 mg IV every 8 hrs PLUS Gentamycin loading dose IV or IM (2 mg/ kg) f/by maintenance dose (1.5 mg/kg) every 8 hours. Single daily dosing (3-5 mg/kg) can be substituted	Antibiotics may be altered after obtaining pus/ blood culture Duration is two weeks but can be extended depending upon the clinical situation. Antibiotics may be altered after obtaining culture reports of pus/or blood
Vaginal candidiasis	*C. albicans,* *C. glabrata,* *C. tropicalis*	Tab Fluconazole 150 mg orally single dose Or Local clotrimazole 100 mg vaginal tablet x 6 days	Miconazole, nystatin vaginal tablets/creams	Treat for 7 days in pregnancy, diabetes Recurrent infections: 150 mg Fluconazole on day 1,4,7 then weekly for 6 months

Vaginal trichomoniasis	*T. vaginalis*	Tab Metronidazole 400 mg twice daily x 7 days	Tab Secnidazole 2 g Single dose	Alcohol avoided during treatment and 24 hours after metronidazole or 72 hours after completion of tinidazole to reduce the possibility of a disulfiram-like reaction. Partner treatment essential
Bacterial vaginosis	*Overgrowth of anaerobes (Gardnerella vaginalis)*	Metronidazole 400 mg orally BD x 7 days OR Metronidazole gel 0.75% , one applicator (5g) intravaginal x 5 days	Tab Secnidazole 2 g Single dose Tab. Tinidazole	Refrain from sexual activity or use condoms during the treatment. Clindamycin cream is oil-based and might weaken latex condoms

2.9 ANTIBIOTIC PROPHYLAXIS/TREATMENT PROTOCOL IN SURGICAL PATIENTS

(National Treatment Guidelines for Antimicrobial Use in Infectious Diseases Syndromes, NCDC, Version 2.0, November 2025 & As per Standard Treatment Protocol, 2022-ICMR)

A. Classification of operative wounds and risk of infection

Classification	Criteria	Risk (%)
Clean	Elective; not emergency, non-traumatic, primarily closed; no acute inflammation; no break in technique; respiratory, gastrointestinal, biliary and genitourinary tracts not entered	< 2
Clean-contaminated	Urgent or emergency case that is otherwise clean; elective opening of respiratory, gastrointestinal, biliary or genitourinary tract with minimal spillage (e.g., appendectomy) not encountering infected urine or bile; minor technique break	< 10
Contaminated	Non-purulent inflammation; gross spillage from gastrointestinal tract; entry into biliary or genitourinary tract in the presence of infected bile or urine; major break in technique; penetrating trauma < 4 hours old; chronic open wounds to be grafted or closed	Approx. 20
Dirty	Purulent inflammation (e.g., abscess); preoperative perforation of respiratory, gastrointestinal, biliary or genitourinary tract; penetrating trauma > 4 hours old	Approx. 40

B. Surgical prophylaxis

Type of Infection	Common etiological agents	First Line (with Dosage and Duration)	Alternative (with dosage and Duration)	Comments
Classified as Clean, Clean Contaminated, Contaminated and Dirty (Detailed in table below)	Bacterial: *Staphylococcus aureus* Coagulase-negative Staphylococcus *Enterococcus faecium* and *E. faecalis* *Escherichia coli* *Pseudomonas aeruginosa* *Enterobacter spp.* *Klebsiella spp.*	Routine use of antibiotic prophylaxis for clean non-prosthetic uncomplicated surgery is not recommended.	-	Surgical prophylaxis is to ensure adequate serum and tissue levels of the drug at the time of incision, and for the duration of surgery. Antibiotics should be started within 60 min of the surgical incision. Antibiotics should be discontinued at the time of the incision's closure, except in implant-based breast reconstructions, joint arthroplasty and cardiac procedures where the optimal duration of antibiotic therapy remains unknown. Repeat the dose if the duration of surgery is more than 4 hours.

C. Antibiotic prophylaxis in different surgical procedures

Procedure / Operation	Expected Organisms	Antibiotic of Choice	Dosage in Adults
Esophagus	*S. aureus*, Streptococci	Cefazolin	1–2 g IV
Thoracic	*S. aureus*, *S. epidermidis*	Cefazolin	1–2 g IV
Gastroduodenal	Gram-positive cocci, enteric gram-negative bacilli	Cefazolin	1–2 g IV
Colorectal	Enteric gram-negative bacilli, anaerobes	Cefazolin + Metronidazole	1–2 g IV + 500 mg
Appendectomy (uncomplicated)	Enteric gram-negative bacilli, anaerobes	Cefuroxime	1–2 g IV
Biliary	Enteric gram-negative bacilli	Cefazolin	1–2 g IV
Vascular	*S. aureus*, *S. epidermidis*, enteric gram-negative bacilli	Cefazolin	1–2 g IV
Breast and hernia	*S. aureus*, *S. epidermidis*	Cefazolin	1–2 g IV
Urology – Clean with entry into urinary tract	—	Cefazolin (± single dose aminoglycoside if prosthetic material used, e.g., penile prosthesis)	—
Urology – Clean without entry into urinary tract	—	Cefazolin (± single dose aminoglycoside if prosthetic material used, e.g., penile prosthesis)	—
Genitourinary lower tract instrumentation (with risk factors; includes transrectal prostate biopsy)	—	Fluoroquinolones or Cefazolin	—
Liver transplantation	—	Piperacillin–tazobactam	4.5 g
Heart/Lung transplantation	—	Cefazolin	1–2 g IV
Hysterectomy	—	Cefazolin	1–2 g IV
Caesarean section	—	Cefazolin	1–2 g IV
Neurosurgery	—	Cefazolin	1–2 g IV
Small intestine – non-obstructed	—	Cefazolin	1–2 g IV + 500 mg
Small intestine – Obstructed	—	Cefazolin + Metronidazole	1–2 g IV + 500 mg

2.9.1 INTRA-ABDOMINAL INFECTIONS ANTIBIOTIC PROTOCOL: UCMS & GTBH

	Organism cultured	Antibiotic susceptibility pattern (AST)
UCMS & GTB HOSPITAL ANTIBIOGRAM OF INTRA-ABDOMINAL INFECTIONS (JAN 2025- DEC 2025).	*Escherichia coli*	Gentamicin (100%)> Amikacin (83%)> Imipenem (71%)> Ampicillin/Sulbactam (67%)> Ceftriaxone (41%)> Piperacillin-Tazobactam (25%)> Ciprofloxacin (21%)> Amoxicillin/Clavulanic acid (13%)> Ceftazidime (10%)
	Enterobacter sp.	Meropenem (100%)> Gentamicin (100%)> Minocycline (100%)> Amikacin (54%)> Cefepime (50%)> Imipenem (45%)> Ciprofloxacin (32%)> Piperacillin/Tazobactam (31%)> Ceftriaxone (30%)> Ofloxacin (25%)> Ceftazidime (16%)
	Klebsiella pneumonia	Imipenem (38%)> Ofloxacin (33%)> Amikacin (31%)> Amoxicillin/Clavulanic acid (14%)> Ceftriaxone (11%)> Ceftazidime (8%)
	Enterococcus species	Vancomycin (100%)> Chloramphenicol (100%)> Doxycycline (100%)> Gentamicin-High (75%)> Teicoplanin (75%)
	Methicillin Resistant Staphylococcus aureus	Doxycycline (100%)> Chloramphenicol (67%)> Trimethoprim/Sulfamethoxazole (33%)> Clindamycin (25%)
	Methicillin sensitive Staphylococcus aureus	Cefoxitin (100%)> Gentamicin (100%)> Clindamycin (100%)> Linezolid (100%)> Chloramphenicol (100%)> Doxycycline (100%)> Tetracycline (100%)> Erythromycin (43%)> Trimethoprim/Sulfamethoxazole (33%)
	Acinetobacter baumannii	Cefepime (100%)> Trimethoprim/Sulfamethoxazole (100%)> Imipenem (67%)> Gentamicin (67%)> Amikacin (60%)> Ampicillin/Sulbactam (40%)> Piperacillin/Tazobactam (33%)> Ciprofloxacin (29%)
	Pseudomonas aeruginosa	Piperacillin/Tazobactam (100%)> Ceftazidime (100%)> Aztreonam (100%)> Imipenem (100%)> Netilmicin (100%)> Tobramycin (100%)> Ciprofloxacin (60%)

2.9.2 Clinical condition, drug doses, duration and route of antimicrobials in Gastrointestinal and abdominal infection.

(National Treatment Guidelines for Antimicrobial Use in Infectious Diseases Syndromes, NCDC, Version 2.0, November 2025 & As per Standard Treatment Protocol, 2022-ICMR)

Condition / Syndrome	Common etiological agents	Type of Infection	First Line (Dosage & Duration)	Alternative (Dosage & Duration)	Comments
Acute Gastroenteritis	Bacterial: *Bacillus cereus* *Staphylococcus aureus* *Clostridium perfringens* *Vibrio cholerae* Enterotoxigenic *E. coli* *Klebsiella pneumoniae* *Aeromonas species* Enteropathogenic *E. coli* Enteroadherent *E. coli* Haemorrhagic *E. coli* *Clostridium difficile* *Salmonella spp* *Campylobacter* *Aeromonas spp* *Vibrio parahaemolyticus* *Yersinia spp* *Shigella spp* Enteroinvasive *E. coli*	Acute onset diarrhoea (no danger signs)	No antibiotic required	—	Usually viral/self-limiting. ORS recommended.
		Acute onset diarrhoea (with danger signs)	Azithromycin 500 mg OD × 3 days	Cefixime 400 mg BD × 5 days OR Ceftriaxone 2 g IV OD × 5 days	Rehydration essential. Avoid fluoroquinolones (resistance in India).
		Persistent / Chronic diarrhoea	Avoid empirical antibiotics	—	Stool microscopy, AFB stain, culture; treat based on pathogen.
Liver Abscess	Bacterial: *Escherichia coli* *Klebsiella pneumoniae* *Enterococcus faecalis* *Staphylococcus aureus* *Streptococcus spp.*	Without hepatobiliary abnormality / immunocompromised	Metronidazole 750 mg q8h (IV/oral) × 10 days	Tinidazole 2 g OD × 5 days	Add Diloxanide furoate. Amoebic origin common. Aspirate if large or non-responsive.
		With hepatobiliary abnormality / immunocompromised	Ceftriaxone 2 g IV OD + Metronidazole 750 mg q8h	Piperacillin-tazobactam 4.5 g IV q6h OR Meropenem 1 g IV q8h OR Cefoperazone-sulbactam 3 g IV q12h + Metronidazole	Empiric coverage for bacterial + amoebic. Duration 3–4 weeks.
Cholecystitis / Cholangitis	Bacterial: *Escherichia coli (25%-50%)* *Klebsiella species (15%-20%)* *Enterococcus spp* *Staphylococcus spp*	Without sepsis	Amoxicillin-clavulanic acid 1 g BD	Cefixime 400 mg BD OR Ceftriaxone 2 g IV OD	Duration 5–7 days
		With sepsis	Piperacillin-tazobactam 4.5 g IV q6h OR	Meropenem 1 g IV q8h OR Imipenem-	Drainage essential.

	Streptococcus spp *Enterobacter spp (5%-10%)* *Pseudomonas aeruginosa* *Proteus spp* Anaerobic bacteria (*Bacteroides fragilis* and *Clostridium perfringens* can also cause acute cholangitis, particularly in patients with previous biliary surgery and in the elderly population)		Cefoperazone-sulbactam 3 g IV q12h	cilastatin 0.5 g IV q6h	Duration 5–7 days
Appendicitis	In early stages of infection, the overgrowth is mainly aerobic organisms, but as the disease progresses, it transitions to a mix of aerobic and anaerobic bacteria. Members of family Enterobacteriaceae including *Escherichia coli*, *Bacteroides fragilis, Fusobacterium spp, Streptococcus spp.*	Without abscess	Amoxicillin-clavulanic acid 1.2 g IV q8h × 5 days	Ceftriaxone 2 g IV OD + Metronidazole 500 mg IV q8h	Surgery preferred
		Complicated (high severity/abscess)	Piperacillin-tazobactam 4.5 g IV q6h OR Cefoperazone-sulbactam 3 g IV q12h	Imipenem-cilastatin 500 mg IV q6h OR Meropenem 1 g IV q8h	Surgery primary
Diverticulitis	Acute diverticulitis involves micro- or macro-perforation with translocation of commensal bacteria across the colon mucosal barrier, sometimes resulting in frank infections, including abscess formation and peritonitis. Bacterial: *Bifidobacterium spp.* Enterobacteriaceae family *Clostridium spp.*	Without sepsis	Ceftriaxone 2 g IV q24h + Metronidazole 500 mg IV q8h OR Cefixime 400 mg BD + Metronidazole 400 mg TDS	Piperacillin-tazobactam 4.5 g IV q6h OR Cefoperazone-sulbactam 3 g IV q12h OR Ertapenem 1 g IV q24h	Switch to oral when stable; duration 5–7 days
		With sepsis	Meropenem 1 g IV q8h OR Imipenem-cilastatin 500 mg IV q6h	—	Duration 5–7 days
Peritonitis	Bacterial: *Escherichia coli* Streptococci Enterococci Pneumococci	Spontaneous bacterial peritonitis	Piperacillin-tazobactam 4.5 g IV q6h × 7–10 days	Cefoperazoe-sulbactam 3 g IV q12h	Tailor to culture

	Bacterial: Gram-negative bacilli, particularly *E. coli* *Bacteroides fragilis*	Secondary peritonitis	Piperacillin-tazobactam / Cefoperazone-sulbactam / Ertapenem	Meropenem OR Imipenem-cilastatin	Surgical drainage needed; duration 5–7 days
Splenic Abscess	Bacterial: *E. coli* *Streptococcus spp.* *Staphylococcus aureus* *Klebsiella spp* *Burkholderia pseudomallei* *Pseudomonas aeruginosa* *Bacteroides fragilis* Polymicrobial infections may be seen.	Stable	Defer antibiotics until microbiological diagnosis	—	Often due to endocarditis. Duration 3–4 weeks
		Unstable / shock	Meropenem 1 g IV q8h + Vancomycin 1 g IV q12h	Teicoplanin (loading then maintenance)	Culture-guided therapy
Pancreatitis	-	Without infection	No antibiotics	—	Surgery decision-based
	Escherichia coli *Klebsiella pneumoniae* *Enterococcus spp.* *Staphylococcus aureus* *Enterobacter spp.* *Pseudomonas aeruginosa* *Bacteroides fragilis* *Clostridium spp.* *Proteus spp.*	Infected necrosis / pseudocyst	Piperacillin-tazobactam 4.5 g IV q6h (5–7 days post source control)	Imipenem-cilastatin 500 mg IV q6h OR Meropenem 1 g IV q8h	Adjust per culture; consider antifungals if risk

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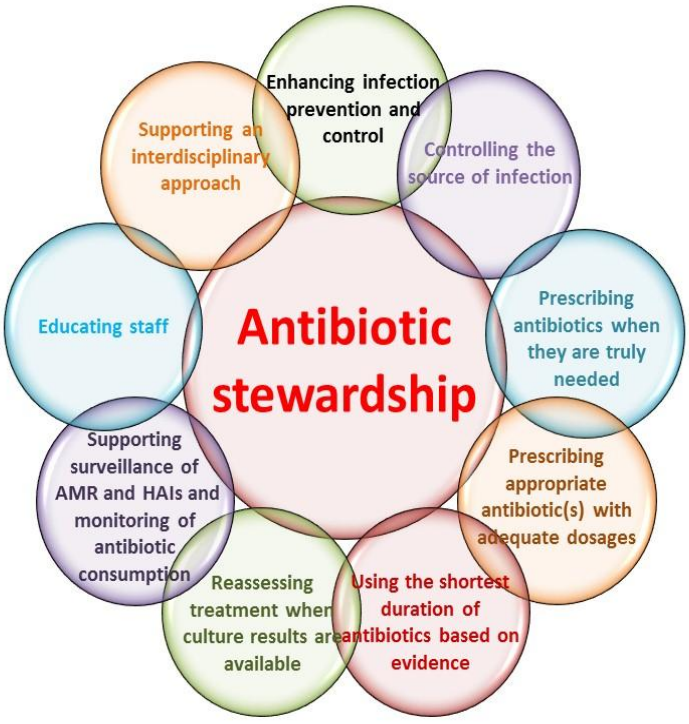


4. ANNEXURE-I

UNIVERSITY COLLEGE OF MEDICAL SCIENCES AND GURU TEG BAHADUR HOSPITALS-DELHI 110095.
DEPARTMENT OF MICROBIOLOGY
ANTIMICROBIAL/ ANTIFUNGAL SUSCEPTIBILITY TESTING LABORATORY

NAME: **SPECIMEN:**

AGE/SEX: **SPECIMEN DATE:**

OPD/Ward/ICU: **UNIT INCHARGE:**

DEPARTMENT: **C.R. NO/OPD NO:**

NAME OF ORGANISM: _____

ACCESS			WATCH			RESERVE		
Antibiotic	**Class**	**S/R**	**Antibiotic**	**Class**	**S/R**	**Antibiotic**	**Class**	**S/R**
Amikacin	AG		Tobramycin	AG		Aztreonam	MonoB	
Gentamicin	AG		Azithromycin	M		Colistin	Px	
Amoxicillin	P		Clarithromycin	M		Polymyxin B	Px	
Ampicillin	P		Erythromycin	M		Linezolid	Ox	
Amoxicillin/Clavulanate	BL/BLI		Piperacillin-tazobactam	BL/BLI+ Ps		Daptomycin	Lp	
Cephalexin	1st G C		Ceftriaxone	3rd G C		Tigecycline	GG	
Cefadroxil	1st G C		Cefotaxime	3rd G C		Fosfomycin	F	
Clindamycin	L		Ceftazidime	3rd G C		Ceftazidime-avibactam	3rd GC +BLI	
Nitrofurantoin	N		Imipenem	CP				
Co-trimoxazole	AF		Meropenem	CP				
Chloramphenicol	C		Ciprofloxacin	FQ				
Tetracycline	T		Levofloxacin	FQ				
			Norfloxacin	FQ				
			Teicoplanin	Gp				
			Vancomycin	Gp				
			Rifampicin	R				
Antibiotics of choice for most common infections, active against a wide range of pathogens while showing lower resistance potential, should be available, affordable and quality-assured.			**Most of the highest priority critically important antimicrobials with higher resistance potential. Recommended only for specific and limited indications.**			**Should be reserved for infections due to multi-drug resistant organisms. Should be treated as last resort options, their use should be tailored to highly specific patients, when all alternatives have failed.**		
Special comments (if any)								

ANTIFUNAL SUSCEPTIBILITY TESTING					
Yeast	**Fluconazole (DD)**	**Voriconazole (DD)**	**Posaconazole (MIC)**	**Amphotericin B (MIC)**	**Echinocandins (MIC)**

SEAT FACULTY IN CHARGE/RESIDENT: **DATE OF REPORTING:**

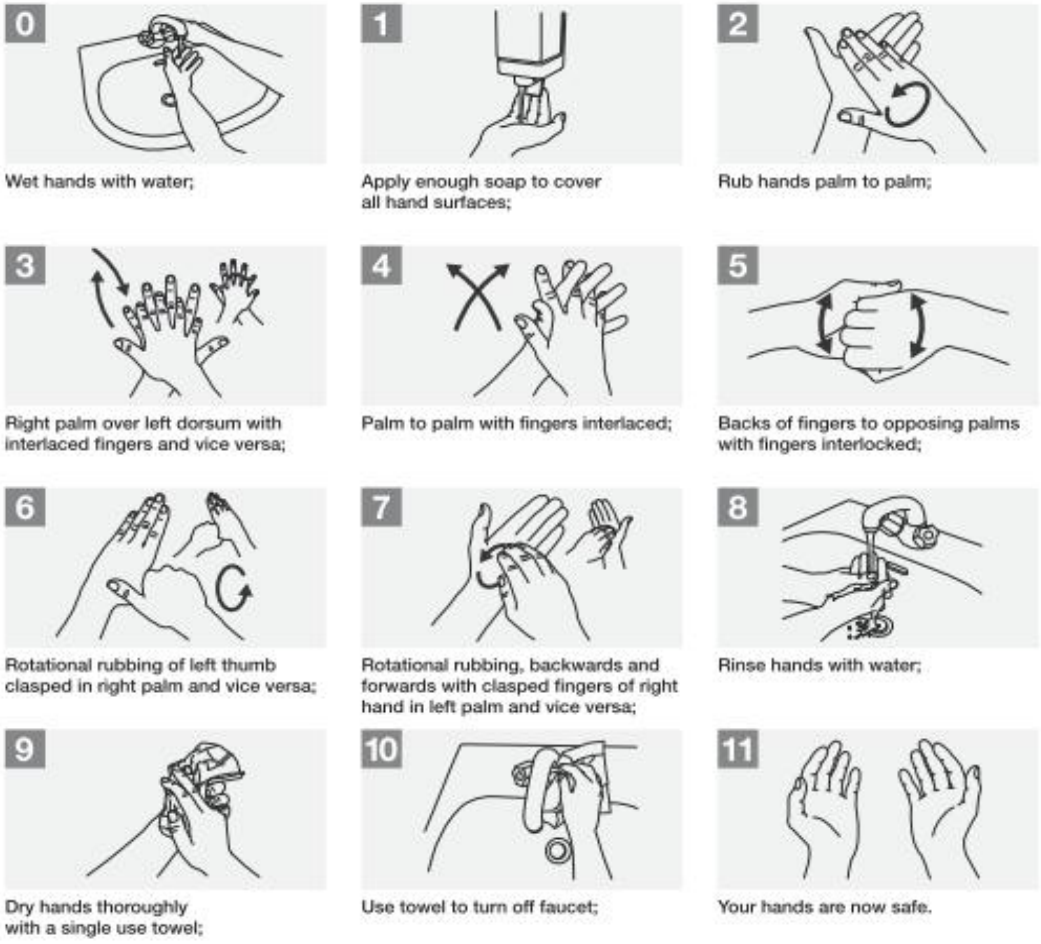
Instruction:

1. "AWaRe" by WHO, classifies three groups of antibiotics to emphasize the importance of antibiotics optimal uses and potential for antimicrobial resistance.
2. Kindly correlate clinically Laboratory reports before prescribing antibiotics to patients
3. Antibiotics testing done as per the standard antimicrobial susceptibility testing CLSI /EUCAST guidelines.
4. MRSA: Resistant to all currently available beta-lactam drugs (Except: 5th generation Cephalosporins). **Abbreviations**: **S**: Susceptible; **R**: Resistant, **DD**: Disk Diffusion; **MIC**: Minimal Inhibitory Concentration **VRE**: Vancomycin Resistant Enterococcus; **MRSA**: Methicillin Resistant Staphylococcus aureus; HLG: High Level Gentamicin. **Class of antibiotics**: **AG**: Aminoglycosides; **P**: Penicillins; **BL/BLI:** Beta-lactam/Betalactamase inhibitors; **1stGC:** 1st Generation Cephalosporins; **L**: Lincosamides; **AF:** Antifolates; **C:** Chloramphenicols; **T:** Tetracyclines**; M:** Macrolides; **CP:** Carbapenems; **FQ**: Fluoroquinolones; **Gp**; Glycopeptides; **R:** Rifamycins; **MonoB**: Monobactam; **Px**: Polymixins; **Ox**:Oxazolidiones; **Lp**: Lipopetides; **GG**: Glycylglycines; **F**: Phosphonics; **+Ps**: anti-pseudomonal.

How to Handwash?

WASH HANDS WHEN VISIBLY SOILED! OTHERWISE, USE HANDRUB

Duration of the entire procedure: 40-60 seconds



World Health Organization | Patient Safety — A World Alliance for Safer Health Care | SAVE LIVES Clean Your Hands