

ANTIBIOTIC POLICY 2025

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ANTIBIOTIC POLICY MANUAL
2025

Antibiotic Policy Manual ABVIMS &Dr. RML Hospital, New Delhi - 110001	
LOCATION: ABVIMS &Dr. RML Hospital, New Delhi	Number:APM/ABVIMS&RMLH Version: 1.1
SUBJECT: Antibiotic Policy Manual	Effective date: 1/05/2025 Review Period: 1 year
FUNCTION: <ul style="list-style-type: none"> • To prepare and implement the policies, guidelines, regulations related to the safe and effective use of antimicrobials • To promote rational prescribing, formulating standard treatment guidelines • To ensure rational usage of antimicrobial drugs and promote the same through education and audit • To promote and supervise antimicrobial surveillance activities and to minimize antimicrobial misuse 	Pages: 53 Total No. of copies:
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***“As to diseases, make a habit of two things
— to help, or at least, to do no harm.”***

-Hippocrates

Introduction

Antimicrobial resistance (AMR) is a top global threat contributing to significant morbidity and mortality. Misuse and overuse of antimicrobials are driving forces for an ever increasing rise in AMR which has potential to revert us back to a pre-antibiotic era where infectious diseases could brutally kill. Through the Global Action Plan (GAP) on AMR, WHO is working to improve the antimicrobial resistance surveillance and reduce inappropriate antibiotic consumption. To improve antibiotic prescribing globally, the WHO AWaRe (Access, Watch, Reserve) antibiotic categories guide the choice of antibiotic, dose, route of administration, and duration of treatment for most common clinical infections in hospital settings in alignment with the Model Lists of Essential Medicines for adults and children. As per commitment in World Health Assembly, 2015, India released its National Action Plan (NAP) on AMR in April 2017 with the objective to improve antimicrobial use and combat AMR.

In alignment with NAP on AMR, this hospital antimicrobial policy is formulated to preserve the effectiveness of antimicrobial agents in the treatment and prevention of communicable diseases and to minimize antimicrobial-resistant infections.

These guidelines are developed by a multi-disciplinary working group to ensure balanced input. It has considered the antimicrobial choice for specific conditions, and the existing policies for the specific agents. The latest available evidence backed guidelines and recommendations such as ICMR Treatment Guidelines for Antimicrobial Use in Common Syndromes 2022, have been followed with due modification to the antibiotic choices where it was warranted by local antibiogram. The list of drugs includes commonly used antibiotics in the OPD and in patients. These guidelines do not include antitubercular, antiviral and antiretroviral drugs. We believe that by following the guidelines it will be possible to maintain a high standard of patient care, delivered in a consistent way.

This manual will be revised as and when fresh recommendations supported with scientific evidence are available or in situations of changes in the existing local antibiograms.

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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 minimise the emergence of bacterial resistance in the community
4. Strengthening the Institution based antimicrobial stewardship.

About antibiotic policy 2025

- I. These guidelines are based on the best available evidence.**
- II. A dose and duration of treatment is suggested but can be modified by consultants based on clinical scenarios.**
- III. Prescribe an antibiotic only when there is likely to be a clear clinical benefit**
- IV. Use simple generic antibiotics first whenever possible. Avoid broad spectrum antibiotics when standard and less expensive antibiotics remain effective, as they increase risk of Clostridium difficile, MRSA and resistant UTIs.**
- V. Adapted from pre-existing guideline to suit local needs**

General Principles for prescribing antimicrobials

1. First step should involve making a clinical diagnosis to predict causative pathogens and sending appropriate cultures to confirm the diagnosis. Antimicrobials should not be used in infections such as viral pharyngitis, viral rhinosinusitis and other non-bacterial causes. Discontinue antibiotics if a non-infectious mimic is identified.
2. Microbiological samples must always be sent prior to initiating antimicrobial therapy. Rapid tests, such as Gram stain, can help determine therapeutic choices when empiric therapy is required.
3. Use of empirical broad spectrum antibiotics should be limited to seriously ill patients after taking appropriate cultures viz. Febrile neutropenia, severe sepsis, septic shock, community acquired pneumonia, Ventilator associated pneumonia and Necrotizing fasciitis. Treatment should be altered/justified when microbiological results become available.
4. Follow policy for choosing antimicrobial therapy wherever possible. If alternatives are chosen, document the reason in the case records. Chose correct dose, route and duration of antimicrobials.
5. Check for factors which affect drug choice & dose, e.g. age, renal function, interactions, allergy, pregnancy and lactation.

6. The need for antimicrobial therapy should be reviewed on a daily basis and unnecessary prolongation or inadequate duration should be avoided.

7. Wait for at least 48 hours before labelling the patient as non-responding and switching to next higher antibiotic (unless patient's condition deteriorates).

8. Double or redundant gram negative or anaerobic coverage should be avoided.

9. Once culture reports are available, the physician should step down (deescalate) to the narrowest spectrum, single, most efficacious and most cost effective option. If the treatment is not aligned with the culture information, the reason for the same shall be documented.

10. Use of all intravenous antibiotics should be reviewed at 48 hours and consideration of oral alternatives should be done based on condition of patient status and culture report.

11. Avoid widespread use of topical antibiotics.

12. Antimicrobial may require being changed/de-escalated depending on changing antibiogram pattern or clinical condition of the treating patient.

- De-escalation includes stepping down the antibiotics from broad spectrum to narrow spectrum, switching over from Intravenous to oral route, and optimizing the dose and duration.
- De-escalation should be done once the culture reports are available and patient is clinically stable.
- Continued use of three or more antibiotics for more than three days should be avoided as far as practicable, based on clinical justifications and need to be documented.

HYPERSENSITIVITY

All patients should be asked about drug allergies. This is the responsibility of the doctor who writes the patient's history. If a patient reports a drug allergy clarify whether this is an allergy or drug intolerance. In some cases there will be an overlap between drug allergy and drug intolerance.

Clinical features suggestive of drug allergy:

One or more symptoms developed during or following drug administration including difficulty in breathing, swelling, itching, rash, and anaphylaxis, swelling of the lips, loss of consciousness, seizures or congestion involving mucous membranes of eyes, nose and mouth.

Clinical features suggestive of drug intolerance:

One or more symptoms developed during or following drug administration including gastrointestinal symptoms e.g. nausea, vomiting, diarrhoea, abdominal pain and dizziness.

If patients are unable to give an allergy history, the doctor should take reasonable steps to contact someone who can provide a reliable allergy history. It is the prime responsibility of the prescribing doctor to ensure that allergy history is documented in drug chart as

- No known allergy (NKA).
- History not available.

The drug allergy skin testing for beta lactam antibiotics should be performed. In case of penicillins, the patients without a positive skin reaction should be followed by a single oral dose of full strength penicillin to confirm that patient is not allergic.

EMPIRICAL THERAPY

Protocol for Starting Empirical Antibiotics

- *Identify the type of infection*
- *Define the origin/hospital setting of sample*
- *Sample should be collected before starting antibiotics*
- *Proper handling of sample and transport with maintaining sterility*
- *Empiric antibiotic therapy, if suspected*
- *Justified the initiation of empiric antibiotic therapy*
- *Follow hospital antibiotic policy*
- *Ensure appropriate dose and route of administration*
- *Need for therapy should be reviewed daily*
- *Organism and its susceptibility should be identified promptly*
- *Specific antimicrobial therapy should be initiated based on narrowest spectrum*
- *Escalate or de-escalate the antibiotics based on proper clinical justification*
- *Wait for at least 48hrs 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.*

Criteria for Starting Empirical Antibiotics

- Suspicion of infection based on fever & leucocytosis – culture have to be sent.
 - if patient has temperature > 101oF or moderate leucocytosis > 15000/c mm while culture reports pending (stable hemodynamically)
 - If fever / leucocytosis is less than mentioned above, but there is a clinical suspicion of foci of infection or if patient is toxic or immunosuppressed.
- In unstable patient where infection process is suspected to be main or primary reason for

instability.

iii. If culture / serological & other diagnostic tests prove negative and no particular focus is clinically identified, but patient is toxic, unstable. Continue antibiotics for 48 – 72 hours more & re-culture in those cases.

iv. A positive culture on a device without a similar growth in the appropriate body fluid may represent colonization & does not warrant treatment with antibiotics.

v. In case of Surgical prophylaxis, this should only be considered, when either there is a significant risk of infection or when the consequences of infection would be disastrous (e.g. joint replacement surgery):

- Dirty /infected wounds: These include old traumatic wounds with retained devitalized tissue and those that involve existing clinical infection or perforated viscera. Surgical antimicrobial prophylaxis is strongly recommended here.
- Contaminated surgery: Surgical antimicrobial prophylaxis is strongly recommended like bowel resection surgery, biliary or genito-urinary surgery or in case of trauma surgery due to RTA, etc
- Clean-contaminated surgery: Surgical antimicrobial prophylaxis is recommended where the mucosa is penetrated under controlled conditions without unusual contamination like uncomplicated appendectomy, cholecystectomy etc
- Clean surgery: Surgical antimicrobial prophylaxis is only recommended for insertion of a prosthesis or artificial device or for high risk areas like CNS, eye, major vessels etc.

Initial Choice of Empirical Therapy for Common Infections

These recommendations are for initial empiric treatment, based on likely microbial aetiology and antimicrobial susceptibility pattern observed in our setting. The antimicrobial agent with narrowest spectrum, least toxicity and cost should be chosen once culture reports are available.

Respiratory Tract Infections

Upper Respiratory tract infections (URTI)

	Diagnosis	Management
Viral URTI	Clinical feature such as coryza, conjunctivitis, cough, hoarseness, diarrhea, ulcerations and viral exanthema	Antibiotic not needed, paracetamol, nasal saline drops, rest, oral fluids, humidification and symptomatic management
Bacterial pharyngitis (Group A Beta haemolytic streptococcal Pharyngitis)	Examination findings: tonsillo-pharyngeal erythema and exudates, palatal petechiae, tender anterior cervical adenopathy & sometimes scarlatiniform rash. Centor score (3 of 4 criteria) to predict a bacterial etiology: exudative pharyngitis, tender cervical lymphadenopathy, fever, absence of cough. Throat swab (if possible)	Penicillin V/ Amoxicillin for 10 days Alternatives: Benzathine Pn Pnallergy: Clindamycin/clarithromycin/ azithromycin (if mild allergy-cephalexin/ cefadroxil)
Bacterial sinusitis	I. Persistence and non-improvement of symptoms and signs of acute rhinosinusitis beyond 10 days. II. Worsening of symptoms or signs including new onset fever, headache or increase in nasal discharge following a typical viral URI that lasted 5-6 days and was initially improving. III. iii. Acute onset of high fever with facial pain or purulent nasal discharge for at least 3-4 days.	Mild disease: Amoxicillin Severe cases/ history of prior antibiotic use or non-response to first line therapy: co-amoxiclav. Duration: 5-7 days (adult) 10-14 days (children) Alternatives: Ceftriaxone, cefpodoxime Pn allergy: Doxycycline, respiratory quinolones (if mild allergy-Cefixime and clindamycin)
Acute otitis media	Moderate or severe bulging of the tympanic membrane/new onset otorrhoea OR mild bulging of the	Amoxicillin coamoxyclav Duration:

	tympanic membrane AND recent onset of ear pain/ erythema of the tympanic membrane. With presence of middle ear effusion as demonstrated by pneumatic otoscopy or tympanometry	Severe disease and children <2 years:10 days 2-5 years & with mild disease:7 days >5 years: 5-7 days Alternatives: Cefpodoxime, cefuroxime, cefdinir, Ceftriaxone Pn allergy: azithromycin/ clarithromycin/(if mild allergy- cephalosporins)
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Lower Respiratory tract infections:

Acute tracheobronchitis:

Characterized by cough and phlegm production. The predominant etiology is viral. Antibiotics are not indicated even if sputum is purulent. Treatment is symptomatic; if cough lasts more than 14 days, suspect pertussis and TB. Use macrolides for pertussis and work up for AFB

Community Acquired Pneumonia:

Pneumonia is an inflammation in alveolar tissue, most often caused by a microbial agent. The community acquired pneumonia is most commonly caused by Streptococcus pneumoniae (typical) and less frequently by Mycoplasma pneumoniae, H. influenzae, Chlamydia pneumoniae, Staphylococcus aureus or Legionella pneumophila (atypical). Haemophilus influenzae infection is seen mostly in patients with chronic bronchitis. Nosocomial pneumonia is likely to be caused by Gram-negative bacilli or Staphylococcus aureus. Sudden onset of fever, productive cough, chest pain, shortness of breath and (in some cases) pleuritic chest pain; systemic symptoms like headache, bodyache and delirium are more severe with atypical pneumonia. For assessment of the severity of pneumonia “CURB- 65” severity score can be used.

Confusion, Urea >7 mmol/l, Respiratory rate ≥30/min, low Blood pressure (diastolic blood pressure (DBP) ≤ 60 mm Hg or systolic BP ≤ 90 mm Hg) and Age ≥65 years

Patients with scores 0 and 1 are at low risk of mortality (1.5%) might be suitable for management as hospital outpatients.

Patients with a score of 2 are at intermediate risk of mortality (9%) and should be considered for hospital supervised treatment.

Patients with a score of >2 are at high risk of mortality (>19%) and requires ICU care.

Empiric treatment for Community Acquired Pneumonias

Outpatients without co-morbidities	Co amoxiclav	Macrolides** Cefuroxime Cefpodoxime	5 days
Outpatients with co-morbidities* or use of antimicrobial in 3 months	Co-amoxiclav and macrolide/doxycycline	Cefuroxime/ cefpodoxime and macrolide/doxycycline	7 days Avoid FQ
Inpatient, non ICU	Ceftriaxone with macrolide/doxycycline	Cefotaxime/ amoxclav with macrolide/doxycycline	If there is hypersensitivity to beta lactams: respiratory fluoroquinolones (exclude TB first)
Inpatient ICU	Ceftriaxone with macrolide/doxycycline	Cefotaxime, piperacillin-tazobactam with macrolide	
Inpatient ICU with risk factors for <i>Pseudomonas aeruginosa</i> / other enteric gram negative bacteria	Piperacillin tazobactam/ macrolide/doxycycline	Cefepime/imipenem with macrolide/doxycycline	The use of carbapenems is preferred over beta lactam beta lactamase inhibitor combinations in patients with septic shock

If CA MRS is suspected then vancomycin or teicoplanin may be added

Empiric treatment for Ventilator Associated Pneumonias& Lung abscess

Ventilator-associated pneumonia (VAP) is defined as pneumonia that occurs 48-72 hours or thereafter following endotracheal intubation, characterized by the presence of a new or progressive infiltrate, signs of systemic infection (fever, altered white blood cell count), changes in sputum characteristics, and detection of a causative agent.

Etiology	Suggested regimens		Special remarks
	Preferred/early onset/minimum prior antibiotic exposure	Alternative/late onset/prior antibiotic exposure	

Empiric (VAP/HAP)	Cefoperazone – Sulbactam or Piperacillin-tazobactam Either alone or with Amikacin	Meropenem Or Imipenem-Cilastatin Plus either Amikacin Or Ceftazidime-Avibactam + Aztreonam OR Colistin/polymyxin B* *In settings where carbapenem resistance is >20%	Levofloxacin (750 mg IV q24h) may be used as an alternative to amikacin as a second anti-pseudomonal agent. Consider adding nebulized colistin for carbapenem resistant organisms along with IV colistin Empirical therapy for MRSA recommended if prevalence >10-20% in the setting
Culture proved VAP/HAP Most commonly (Acinetobacter baumannii, Klebsiella pneumoniae, Pseudomonas aeruginosa)	choose any one according to culture sensitivity from: Piperacillin-Tazobactam Cefoperazone – Sulbactam, Imipenem-Cilastatin, Meropenem, Colistin Polymyxin B		Colistin and Polymixin B should be used only when there is resistance to all the other tested antibiotics. For HAP/VAP due to CRE who remain in septic shock/ at high risk for the poor outcome, combination therapy using 2 antibiotics to which the isolate is susceptible rather than monotherapy is preferred
MRSA	Inj. Linezolid	Inj. Vancomycin or Inj. Teicoplanin	The choice between vancomycin and linezolid to be guided by patient-specific factors (renal functions, concomitant bacteraemia)
Lung abscess	Piperacillin or Cefoperazone-sulbactam + Clindamycin		

- In susceptible cases, Levofloxacin may be used as an oral step-down therapy.
- Tigecycline is not recommended routinely in the treatment of VAP.
- If a patient with suspected VAP has septic shock and rapidly deteriorating status, empiric coverage for MRSA and carbapenem resistant GNB can be added along with antipseudomonal beta-lactam.
- Antibiotic doses should be adjusted according to GFR and ideal body weight except in those with morbid obesity where the dose is calculated using this formula = (actual body weight + ideal body weight)/2
- De-escalation should be done once the culture reports are available.
- Recommended duration of therapy: 7 days if there is a good clinical response or longer if clinically indicated (immunodeficiency, empyema, lung abscess, cavitations, necrotising pneumonia, etc)
- Clinical picture and procalcitonin levels may be used to guide discontinuation of antibiotics

Empiric treatment for Enteric fever

Acute non-complicated disease: Acute typhoid fever is characterized by prolonged fever, altered bowel function (constipation in adults, diarrhea in children), headache, malaise and anorexia. Bronchitic cough and exanthem (rose spots on chest, abdomen, and trunk) may be seen in the early disease.

Complicated disease: Severe disease can have abdominal pain, occult blood in stools, malena, perforation peritonitis, myocarditis, pneumonitis and enteric encephalopathy.

Case definition:

- Confirmed case of typhoid fever: A patient with fever (38°C and above) that has lasted for at least three days, with a laboratory-confirmed positive culture (blood, bone marrow, bowel fluid) of S. Typhi.
- Probable case of typhoid fever A patient with fever (38°C and above) that has lasted for at least three days, with a positive serodiagnosis or antigen detection test but without S. typhi isolation.

	Antibiotic	Duration
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Uncomplicated enteric fever (OPD)	Cefixime/ cotrimoxazole/ Azithromycin/ Ofloxacin	Till 5 days after the fever subsides
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Complicated Enteric fever (IPD)	First line: Ceftriaxone	2g i.v BD (Adults) 100mg/K BW i.v (Paediatrics)	Till 5 days after the fever subsides
	#Second line: Azithromycin Or Ofloxacin	500mg BD(Adults) 10mg/KBW(Paediatrics) 400mgBD(Adults) 15mg/K BW in two divided doses(Paediatrics)	

If the patient does not respond to first line drugs, addition of second line drugs may be considered at an appropriate time.

Empiric treatment for Infective Endocarditis(Adults & Paediatrics)

Bacterial endocarditis is a life-threatening infectious disease. Clinical manifestations of bacterial endocarditis include fever, toxemia, clubbing, splenomegaly, anaemia, microscopic haematuria, a new onset or changing murmur, evidence of immune phenomena such as roth spots, osler nodes. The diagnosis of bacterial endocarditis is based on Modified Duke's criteria which involves clinical, laboratory and echocardiographic findings.

Definite IE

Pathological criteria: Microorganisms demonstrated by culture or on histological examination of a vegetation, vegetation that has embolized, or an intracardiac abscess specimen; or Pathological lesions; vegetation or intracardiac abscess confirmed by histological examination showing active endocarditis

Clinical criteria:

- 2 major criteria; or
- 1 major criterion and 3 minor criteria; or
- 5 minor criteria

Possible IE:

1 major criterion and 1 minor criterion; or
3 minor criteria

Rejected IE

Firm alternate diagnosis; or

Resolution of symptoms suggesting IE with antibiotic therapy for ≤ 4 days; or

No pathological evidence of IE at surgery or autopsy, with antibiotic therapy for ≤ 4 days; or

Does not meet criteria for possible IE, as above

Modified Duke's criteria for diagnosis of endocarditis

Major Criteria

1. Blood cultures positive

a. Typical microorganisms consistent with IE from 2 separate blood cultures

- Viridans streptococci, *Streptococcus gallolyticus* (*Streptococcus bovis*), HACEK group, *Staphylococcus aureus*; or
- Community-acquired enterococci, in the absence of a primary focus; or

b. Microorganisms consistent with IE from persistently positive blood culture

- ≥ 2 positive blood cultures of blood samples drawn >12 h apart; or
- All of 3 or a majority of ≥ 4 separate cultures of blood (with first and last samples drawn ≥ 1 h apart); or
- Single positive blood culture for *Coxiella burnetii* or phase I IgG antibody titre $>1:800$

2. Imaging positive for IE

a. Echocardiogram positive for IE

- Vegetation;
- Abscess pseudoaneurysm, intracardiac fistula
- Valvular perforation or aneurysm;
- New partial dehiscence of prosthetic valve

b. Abnormal activity around the site of prosthetic valve implantation detected by

“F-FDG PET CT [Fluorodeoxyglucose Positron Emission Tomography] (only if the prosthesis was implanted for >3 months) or radiolabelled leucocytes SPECT/CT [Single Photon Emission Computed Tomography]

c. Definite paravalvular lesions by cardiac CT

Minor Criteria

1. Predisposition such as predisposing heart condition, or injection drug use

2. Fever defined as temperature $>38^{\circ}\text{C}$

3. Vascular phenomena (including those detected by imaging only): major arterial emboli, septic pulmonary infarcts, infectious (mycotic) aneurysm, intracranial haemorrhage, conjunctival haemorrhages, and Janeway's lesions

4. Immunological phenomena: glomerulonephritis. Osler's nodes, Roth's spots, and rheumatoid factor

5. Microbiological evidence: positive blood culture but does not meet a major criterion as noted above or serological evidence of active infection with organism consistent with IE

	First Line	Duration	Doses
Empirical Treatment (No h/o skin/soft tissue infection or abscesses, no h/o IV drug abuse, no h/o CVC line or recent cardiac/prosthetic valve replacement)	Ampicillin-sulbactam plus Ceftriaxone Plus Gentamicin	awaiting cultures	3g q6h (Ampicillin- 150mg/kg/day or Sulbactam 50 mg/kg/day) in 4 divided doses or Ampicillin 2 g IV in q4h Or 200 mg/kg/day in six divided doses 2 g IV q24h Paed Dose: 50-100 (60 mg/kg/day) in two divided doses 1 mg/kg q8h
NVE (Native Valve Endocarditis)	Penicillin G / Ceftriaxone OR Penicillin G / Ceftriaxone + Gentamycin OR Vancomycin OR Daptomycin For Possible MSSA: Flucloxacillin or Cefazolin	4 weeks 4 weeks 2 weeks	<u>Penicillin G</u> : (12-18 million in 24 hrs) or in 4 to 6 hrly equally divided doses <u>Ceftriaxone</u> : 2g/ 24 hrs i/v/ i/m in 1 dose <u>Gentamycin</u> : 3 mg/ kg in 3 divided doses iv / im <u>Vancomycin</u> : 30 mg / Kg (24 hrly in two divided doses) Daptomycin 6 mg/kg q24h (for Right-sided IE) Or 8-10 mg/kg q24h (For left- sided IE) <u>Rifampicin</u> : 900 mg / 24 hrly IV in 3 divided doses

PVE (Prosthetic Valve Endocarditis)	Vancomycin	≥ 6 weeks	
	+		
	Rifampicin	≥ 6 weeks	
	+		
	Gentamicin	2 weeks	

Empiric treatment for cardiovascular devices implant infections

A] Antibiotic Protocol for Pacemaker implantation:

Without risk of MRSA	<p><u>Preprocedure and during admission</u></p> <p>Ceftriaxone OR Augmentin for 3 days</p> <p><u>On discharge</u></p> <p>Tab Cefixime /Augmentin for 5 days</p>
Patient at high risk of MRSA*	<p><u>Preprocedure and during admission</u></p> <p>Inj Teicoplanin</p> <p><u>On discharge</u></p> <p>Tab Linezolid + Levofloxacin/Faropenem</p>

***High risk for MRSA**

- Previous MRSA infection/colonisation
- Inpatient ≥ 1 week prior to procedure
- Patient with long term indwelling catheter or central line
- Admitted from a nursing home or residential home with long term breaks in the skin e.g leg ulcer or pressure sore
- Patients requiring a reintervention during the same admission or received flucloxacillin within the previous month (e.g for a previous procedure or as a treatment course)

B] Redo Surgery/Upgradation to high end model

<p>All CIED (Cardiac implantable electronic devices)</p>	<p><u>Loading and during admission</u></p> <p>Inj Teicoplanin</p> <p><u>On Discharge</u></p> <p>Tab Linezolid + Levofloxacin/Faropenem</p>
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C] Cardiac Implantable Electronic Device(CIED)Infections

<p>Pocket Infection/generator,lead erosion(10-14 days)</p>	<p><u>Loading and during admission</u></p> <p>Inj Teicoplanin (or) linezolid (or) Vancomycin + Inj Meropenem for 1 week</p> <p><u>On Discharge</u></p> <p>Tab Linezolid + Faropenem</p>
<p>CIED Infection(Lead + PG infection) (4-6 weeks)</p>	<p><u>Loading and during admission</u></p> <p>Inj Teicoplanin (or) linezolid (or) Vancomycin + Inj Meropenem/Inj Clindamycin for 2</p>

	week <u>On Discharge</u> Tab Linezolid + Faropenem/Clindamycin
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Empiric treatment for Urinary tract infections (Adults)

Asymptomatic bacteriuria NOT to be treated except pregnant women and immunocompromised patients. All cases of dysuria may not be UTI. Refer to Obstetrics and gynaecology infections for treatment of asymptomatic bacteriuria in pregnant women.

The term UTI encompasses a variety of clinical entities viz asymptomatic bacteriuria (ASB), cystitis, prostatitis and pyelonephritis.

Uncomplicated UTI refers to acute cystitis or pyelonephritis in non pregnant outpatient women without anatomic abnormalities or instrumentation of urinary tract.

Complicated UTI includes all other types of UTI.

Cystitis: The typical symptoms of cystitis are dysuria, urinary frequency, and urgency. Other symptoms are nocturia, hematuria, suprapubic discomfort, and hesitancy.

Pyelonephritis : severe pyelonephritis present as high fever, rigors, nausea, vomiting, flank or loin pain. symptoms are acute in onset and symptoms of cystitis may not be present. Fever is the main distinguishing feature between cystitis and pyelonephritis.

Prostatitis: Acute bacterial prostatitis presents as dysuria, frequency and pain in pelvis or perineal area. Fever and chills are usually present and symptoms of bladder outlet obstruction are common.

	Empiric antibiotic
Acute uncomplicated Cystitis	Nitrofurantoin 100 mg BD for 7 days Or Cotrimoxazole 960mg BD for 3-5 days Or Ciprofloxacin 500 mg BD for 3-5 days Or Fosfomycin
Acute uncomplicated Pyelonephritis	Amikacin 1 g OD IM/IV Or Gentamicin 7 mg/kg/day OD (Monitor renal function closely and rationalise according to culture report) Complete total duration of 14 days

Complicated Pyelonephritis	PiperacillinTazobactam 4.5gm IV 6 hourly Or Amikacin 1 g OD IV Or CefoperazoneSulbactam 3gm IV 12 hourly Or Ertapenem Complete total duration of 14 days
Acute prostatitis	Doxycycline 100 mg BD OR Co-trimoxazole 960 mg BDOR Piperacillin TazobactamOR ErtapenemOR Meropenem Treat for 3-4 weeks
Epididymo-orchitis (High risk of sexually transmitted)	Ceftriaxone plus doxycycline
Epididymo-orchitis (Low risk of sexually transmitted; likely due to enteric or urinary organisms)	Ofloxacin OR levofloxacin

Get urine cultures before start of antibiotics & modify therapy based on antimicrobial sensitivity report.

Monitor renal function if aminoglycosides are being used.

Empiric treatment for Urinary tract infections(Paediatrics)

	Empiric antibiotic
Uncomplicated UTI (age > 2 months with lower UTI, without any urinary tract obstruction)	Oral Cotrimoxazole 8-10mg of TMP component /kg/day oral BD OR Cefixime 8-10 mg/kg/day BD to be given for 7-10 days OR Co Amoxicillin+Clavulanic Acid (30-50 mg of Amoxicillin) for 7-10 days.
Complicated / Severe UTI (Febrile UTI, Systemic toxicity, renal angle tenderness or with any urinary structural abnormality) and all UTI in children less than 2 months should be treated with parenteral antibiotics.	Inj. Cefotaxime 150-200mg/kg/day 8h OR Inj. Ceftriaxone 100mg/kg/day OD OR Inj. Amikacin 15mg/kg OD To be given for 10-14 days
In Immunocompromised host/ severe systemic sepsis or as second line for complicated UTI	Inj. Piperacillin Tazobactam 90mg/kg/dose IV 6hOR Inj. Meropenem (20-40mg/kg/dose 8h) To be given for 10-14 days

- In IPD cases, empirical use of ciprofloxacin for UTI due to Esherichia coli may be considered only in the background of low rate of susceptibility.
- Follow up urine cultures may be considered only in patients with persistent symptoms.
- UTI in men is considered complicated as per convention based on scientific meta-analysis.

Catheter associated UTI

Category	Treatment	Comments
Asymptomatic CA-ASB	Not recommended	Only recommended in the following circumstances - Before urologic surgery or implantation of prosthesis in the urinary tract -In pregnancy
Symptomatic CA-UTI	Patients with CA-UTI -not severely ill/without upper UTI symptoms Nitrofurantoin 100 mg PO BID Fosfomycin 3 g PO once stat	Patients with CA-UTI who are severely ill -Piperacillin/tazobactam 4.5 g IV q6hr -Ertapenem 1 g IV q24hr

	Levofloxacin 750 mg PO daily Ciprofloxacin 500 mg PO BID Amikacin 15 mg/kg single dose	-Meropenem 1 g IV q8hr* * preferably used in patients with sepsis and septic shock
Candiduria – Indication Symptomatic Neutropenia (rule out candidemia) urological surgery	Flucanazole- Susceptible strains Flucytosine – Candida glabrata and Candida krusei	-Isolation of Candida in urine usually suggest a colonization -Always rule out obstructive uropathy with imaging if symptomatic candidal urinary infection is suspected
Post-op infections following solid organ transplant with CA-UTI (kidney, liver, heart, lung)	Piperacillin-tazobactam 4.5 g IV q6h or cefoperazone-sulbactam 3 g IVq12h Imipenem- cilastatin 1g IV q8h or Ertapenam 1 g IV q24hr /Meropenem 1g IV q8h	-Obtain blood and urine cultures before starting antibiotics -De-escalate to narrow spectrum agent on receipt of sensitivities

Empiric treatment for Burns & Plastic surgery infections

Condition	Empiric antibiotics	Alternative antibiotics	Comments
For burns wound that is clinically or microbiologically not infected			<ul style="list-style-type: none"> • Prophylactic parenteral antibiotics in burns are NOT indicated • Topical antibiotics to be given after debridement
For burns wound that are clinically or microbiologically infected	i. Burn wound sepsis Piperacillin-tazobactam or Cefoperazone-sulbactam or With or without: Vancomycin//Teicoplanin (if there is suspicion for MRSA) Antifungal Therapy –When	Carbapenem +/- Vancomycin/ Teicoplanin	<ul style="list-style-type: none"> • Antibiotic choices are dependent on the antibiogram of the individual institution. • Surgical debridement as necessary. • Amphotericin B is toxic to all burn patient as renal system compromised,

	<p>extensive burns and patient not responding to antibiotics</p> <ul style="list-style-type: none"> o If hemodynamically stable: fluconazole o If hemodynamically unstable: Echinocandin <p>Burn wound cellulitis Cefazolin or Clindamycin or Vancomycin if there is suspicion for MRSA With and without (for burns involving the lower extremity or feet or burns in patients with diabetes) Piperacillin-tazobactam or cefoperazone-sulbactam</p>		<p>hence Caspofungin may be used</p>
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Prophylaxis in Plastic Surgery

Surgical prophylaxis: Inj Cefuroxime 1.5 g/ Cefazolin IV just before incision single dose.

Empiric treatment for ENT infections

	First line	Alternate
Pharyngitis	Amoxicillin/Amoxicillin clavulanic acid for 5 days	If penicillin allergy, start Azithromycin
Sinusitis	Amoxicillin/Amoxicillin clavulanic acid for 5 days	If penicillin allergy, start Azithromycin
Laryngitis	Amoxicillin/Amoxicillin clavulanic acid for 5 days	If penicillin allergy, start Azithromycin

Middle ear infections	Amoxicillin/Amoxicillin clavulanic acid for 5 days	If penicillin allergy, start Azithromycin
Peritonsillar abscess*	Amoxicillin clavulanic acid + Metrogyl/Clindamycin for 5 days	
Deep neck abscess*	Amoxicillin clavulanic acid + Metrogyl/Clindamycin for 5 days	

***Drainage of the abscess to be decided by the treating clinicians**

Doses:

Antibiotic	Adult dose	Paediatric dose
Amoxicillin	Oral: 250-500mg q 8 hourly	Oral: 20-50mg/Kg/day, 3-4 doses
Amoxicillin clavulanic acid	Oral: 625mg 8hourly Intravenous: 625-1000mg 12 hourly	Oral: 40mg/kg/day (amoxicillin) in 2 doses Intravenous: 100mg/kg/day
Azithromycin	Oral: 500mg daily	Oral: 10 mg/kg/day once daily
Metrogyl	Oral: 400mg 8 hourly	Oral: 30-50mg/kg/day in 3 divided doses Intravenous: 7.5 mg/kg/day dose 3 times/day
Clindamycin	Oral/IV: 150-300 mg q 6-8 hourly IV: Severe infections 300-600 mg 8 hourly	Oral: 40-60mg/kg/day in 3- 4 divided doses

Empiric treatment for Eye infections

Disease	Type	First Line	Alternate
Conjunctivitis	Bacterial	Topical- Tobramycin 0.3% qid OR Moxifloxacin 0.5%, 6 times/day	Gentamycin 1.4 % 6times/day OR Gatifloxacin 0.3 %, 6 times/day
	Viral	Cold compresses + Artificial tears(topical CMC 0.5%,qid) + Topical antihistamine	
	Allergic	Topical-Olopatadine 0.1%bd	Topical- Bepotastine 1.5%bd
Infective Keratitis	Bacterial	Topical- Moxifloxacin 0.5%, 6 times/day OR Gatifloxacin 0.3% ,6 times/day OR Tobramycin 0.3%qid Subconjunctival injection (clinical decision to be taken depending on severity of infection) – Vancomycin: 25mg in 0.5ml OR Tobramycin/Gentamycin: 20mg in 0.5 ml	Fortified- Cefazolin OR ceftazidime(50mg/ml) + Tobramycin OR gentamycin(15mg/ml) + Vancomycin(25mg/ml) (Decision to start fortified on the basis of clinical evaluation)
	Fungal	Topical-Natamycin 5%, 2hourly/day	Topical- Fluconazole 0.2%, 2 hourly/day OR Amphotericin B 0.15%
	Viral	Topical- Acyclovir 3% (ointment), 5 times/day Ganciclovir 0.15 % (Gel) tds	Oral Acyclovir 400 mg 5 times a day x 7 days {For HZO : 800 mg 5 times x 7 days} (Decision to start fortified on the basis of clinical evaluation)

Infective Uveitis	Toxoplasmosis	Clindamycin 1mg/0.1ml (Intravitreal)	Dexamethasone 0.4 mg/0.1ml (Intravitreal)
	Fungal	Voriconazole i) Oral - 200mg twice a day ii) Intravitreal – 50-100g in 0.1 ml	
	Viral	Ganciclovir i) Topical (gel) - 0.15% tds ii) Intravitreal - 4-5 mg (vitrasert)	

**The dosage may vary according to the severity of the disease*

Endophthalmitis	Acute post cataract surgery	I/V or Oral cephalosporins/ fluoroquinolones	Intravitreal- V+C+D*
	Sub acute Cataract surgery	V (capsular bag) + D (Intravitreal)	
	Post intravitreal injection	Fluoroquinolones	Intravitreal- V+C+D*
	Flitering Bleb related	I/V or oral 3 rd generation cephalosporin / fluoroquinolones	Intravitreal- V+C+D*
	Post traumatic	I/V Vancomycin/ fluoroquinolones	V+C+D (No steroids if fungal)*
	Endogenous Fungal (Mould)	Oral Voriconazole (I/V if fulminant)	Intravitreal – Voriconazole or Amphotericin
	Endogenous Candida	Oral Voriconazole	Intravitreal – Voriconazole or Amphotericin
	Chronic post operative fungal	Oral Voriconazole; I/V Amphotericin (highly toxic); or Oral fluconazole	Intravitreal – Voriconazole or Amphotericin

**V- Vancomycin, C- ceftazidime/cephazoline, D-dexamethasone, I/V- intravenous.*

Surgical Antimicrobial prophylaxis for prevention of Surgical Site Infections

Criteria for defining a Surgical Site Infection (SSI)

Superficial incisional SSI

- a. Infection occurs within 30 days after the operation and infection involves only skin or subcutaneous tissue of the incision and at least one of the following:
 - b. Purulent drainage, with or without laboratory confirmation, from the superficial incision.
 - c. Organisms isolated from an aseptically obtained culture of fluid or tissue from the superficial incision.
 - d. At least one of the following signs or symptoms of infection: pain or tenderness, localized swelling, redness, or heat and the superficial incision are deliberately opened by the surgeon unless incision is culture-negative.
- e. Diagnosis of superficial incisional SSI by the surgeon or attending physician.

Do not report the following conditions as SSI:

- f. Stitch abscess (minimal inflammation and discharge confined to the point of suture penetration).
- g. Infection of an episiotomy or newborn circumcision site.
- h. Infected burn wound.

- i. Incisional SSI that extends into the fascial and muscle layers

Note: Specific criteria are used for identifying infected episiotomy and circumcision sites and burn wounds.

Deep incisional SSI

Infection occurs within 30 days after the operation if no implant is left in place or within 1 year if the implant is in place and the infection appears to be related to the operation and infection involves deep soft tissues (e.g., fascial and muscle layers) of the incision and at least one of the following:

1. Purulent drainage from the deep incision but not from the organ/space component of the surgical site.
2. A deep incision spontaneously dehisces or is deliberately opened by a surgeon when the patient has at least one of the following signs or symptoms: fever ($>38^{\circ}\text{C}$), localized pain or tenderness unless the site is culture-negative.
3. Abscess or other evidence of infection involving the deep incision is found on direct examination, during reoperation, or by histopathologic or radiologic examination.
4. Diagnosis of a deep incisional SSI by a surgeon or attending physician.

Notes:

- *Report infection that involves both superficial*

and deep incisional sites as deep incisional SSI.

- *Report an organ/space SSI that drains through the incision as a deep incisional SSI.*

Organ/spaceSSI:

Infection occurs within 30 days after the operation if no implant is left in place or within 1 year if implant is in place and the infection appears to be related to the operation and infection involves any part of the anatomy (e.g., organs or spaces) other than the incision, which was opened or manipulated during an operation and at least one of the following:

1. Purulent drainage from a drain that is placed through a stab wound into the organ/space.
2. Organisms isolated from an aseptically obtained culture of fluid or tissue in the organ/space.
3. An abscess or other evidence of infection involving the organ/space that is found on direct examination, during reoperation, or by histopathologic or radiologic examination.
4. Diagnosis of an organ/space SSI by a surgeon or attending physician.

Table:Classification of surgical wound and their antimicrobial prophylaxis

Surgical Wound Classification	Antimicrobial prophylaxis
<p>Class I/Clean: An uninfected operative wound in which no inflammation is encountered and the respiratory, alimentary, genital, or uninfected urinary tract is not entered. In addition, clean wounds are primarily closed and, if necessary, drained with closed drainage. Operative incisional wounds that follow non-penetrating (blunt) trauma should be included in this category if they meet the criteria.</p>	<p>None or single perioperative dose of cefuroxime/ cefazolin</p>
<p>Class II/ Clean-Contaminated: An operative wound in which the respiratory, alimentary, genital or urinary tracts are entered under controlled conditions and without unusual contamination. Specifically, operations involving the biliary tract, appendix, vagina, and oropharynx are included in this category, provided no evidence of infection or major break in technique is encountered.</p>	<p>Cefazolin or Ampicillin-sulbactam or Ceftriaxone or (Limited to patients requiring antimicrobial treatment for acute cholecystitis or acute biliary tract infections which may not be determined prior to incision. Factors that indicate a high risk of infectious complications in laparoscopic cholecystectomy include emergency procedures, diabetes, long procedure duration, intraoperative gallbladder rupture, age of >70 years, conversion from laparoscopic to open cholecystectomy, American Society of Anesthesiologists classification of 3 or greater, episode of colic within 30 days before the procedure, re-intervention in less than one month for noninfectious complication, acute cholecystitis, bile spillage, jaundice, pregnancy, nonfunctioning gallbladder, immunosuppression) Clindamycin or Vancomycin For procedures in which pathogens other than staphylococci and streptococci are likely, an additional agent with activity against those pathogens could be considered. For example, if there is surveillance data showing that gram-negative organisms are a cause of surgical-site infections (SSIs) for the procedure, practitioners may consider combining clindamycin or vancomycin with another agent like cefazolin, aztreonam, gentamicin, or single-dose fluoroquinolone if the patient is β-lactam allergic).</p>
<p>Class III/Contaminated: Open, fresh, accidental wounds. In addition, operations with major breaks in sterile technique (e.g., open cardiac massage) or gross spillage from the gastrointestinal tract, and incisions in</p>	<p>Cefuroxime + Metronidazole Metronidazole + Aminoglycoside/ Fluoroquinolone or as per culture sensitivity report</p>

<p>which acute, nonpurulent inflammation is encountered are included in this category.</p>	
<p>Class IV/Dirty-Infected: Old traumatic wounds with retained devitalized tissue and those that involve existing clinical infection or perforated viscera. This definition suggests that the organisms causing postoperative infection were present in the operative field before the operation.</p>	<p>Cefazolin + metronidazole, cefoxitin, cefotetan, ampicillin–sulbactam, ceftriaxone + metronidazole, ertapenem Clindamycin + aminoglycoside or aztreonam or fluoroquinolone + metronidazole or as per culture sensitivity report</p>

Choosing an appropriate prophylactic antibiotic for surgical procedures

- Skin flora (eg, *Staphylococcus*) are the usual target, so the first-generation cephalosporins are recommended (cefazolin) in most studies. Some studies also recommend cefuroxime.
- Patients with a history of anaphylaxis or urticaria or rash occurring immediately after penicillin therapy are at an increased risk of immediate hypersensitivity to penicillins and should not receive prophylaxis with a beta-lactam antibiotic.

Timing of prophylactic antibiotics

- Give the first dose within one hour before incision.
- Antibiotics should be administered before an incision is made to ensure that antimicrobial levels in the tissue are adequate and maintained for the duration of the procedure.

Route of administration and dose selection:

Prophylactic antibiotics for surgical procedures should be

administered intravenously. The dose of an antibiotic required for prophylaxis is the same as that for therapy of infection. The full therapeutic dose of an antibiotic should always be given.

Continuenolongerthan24hourspostoperatively

- Most studies have demonstrated efficacy of peri-operative antibiotic prophylaxis for only 12 hours or less. Whenever short and long courses are compared, the shorter course has proven equally effective. A single dose is as effective as multiple doses, and antimicrobial prophylaxis after wound closure is unnecessary.
- Prolonged antibiotic prophylaxis beyond 48 hours is not only ineffective in reducing infections but increases antimicrobial resistance and the risk of infection with *Clostridium difficile*.

Re-doseforlongsurgeries

- Patients undergoing surgery that extends beyond two half-lives of an antibiotic should be redosed intra-operatively.
- An additional dose of prophylactic agents is not indicated in adults unless there is blood loss of up to 1500 mL during surgery or haemodilution of up to 15

mL/kg.

The surgical prophylaxis according to the type of surgery:

SURGERY	MEDICATION
Breast	Inj.Cefazolin2gmorInj.Cefuroxime1.5gmIVstat
Gastroduodenal&biliary	Inj.Cefaperazone-Sulbactam2gmIVstat&BDfor24hrs(maximum)
ERCP	Inj.Piperacillin-Tazobactum4.5gmor Inj.Cefaperazone-Sulbactam2gmIVstat
Cardiothoracic	Inj.Cefuroxime1.5gmIVstat&BDfor48hrs
Colonic surgery	Inj.Cefaperazone-Sulbactam2gmIVstat&BDfor24hrs(maximum)
Abdominal surgery(hernia)	Inj.Cefazolin2gmorInj.Cefuroxime1.5gmIVstat
Head&Neck/ENT	Inj.Cefazolin2gmIVstat
Neurosurgery	Inj.Cefazolin2gmorInj.Cefuroxime1.5gmIVstat
Obstetrics&Gynecology	Inj.Cefuroxime1.5gmIVstat
Orthopaedic	Inj.Cefuroxime1.5gmIVstat&BDfor24hrs (maximum) or Inj.Cefazolin2gmIVstat Openreductionofclosedfracturewithinternalfixation- Inj.Cefuroxime1.5gmIV stat and q12 h or Inj. Cefazolin 2gm IV stat and q12 h for 24hrs
Trauma	Inj.Cefuroxime1.5gmIVstatandq12h(for24hrs) orInj.Ceftriaxone2gmIVOD
Urologic procedures	Antibioticsonlytopatientswithdocumentedbacteriuria
Trans-rectalprostaticsurgery	Inj.Cefaperazone-Sulbactam2gmIVstat

Treatment of Surgical Site Infection

<u>Surgery of Intestinal or Genitourinary Tract</u>
<i>Single-drug regimens</i>
Piperacillin-tazobactam 3.375 g every 6 h or 4.5 g every 8 h IV
Imipenem- 500 mg every 6 h IV/ Meropenem1 g every 8 h IV
<i>Combination regimens</i>
Ceftriaxone 1 g every 24 h + metronidazole 500 mg every 8 h IV
Ciprofloxacin 400 mg IV every 12 h or 750 mg po x 12 h + metronidazole 500 mg every 8 h IV
<u>Surgery of trunk or extremity away from axilla or perineum</u>
Cloxacillin or flucloxacillin

Cefazolin 0.5–1 g every 8 h IV
<u>Surgery of axilla or perineum</u>
Metronidazole 500 mg every 8 h IV Plus Ciprofloxacin 400 mg IV every 12 h or 750 mg po x 12 h
Surgery of Intestinal or Genitourinary Tract

Central Line-Associated Bloodstream Infections

Central line (CL): A central line is an intravascular access device or catheter that terminates at or close to the heart, or in one of the great vessels. The line may be used for infusion of intravenous fluids and drugs, or for haemodynamic monitoring. Central line (CL) infection can be local (e.g. phlebitis) or systemic.

Catheter-related bloodstream infection (CRBSI) is bloodstream infection (BSI) attributed to an intravascular catheter by quantitative culture of the catheter tip or by differences in growth between catheter and peripheral venipuncture blood culture specimens. This definition is primarily used in research. The BSI should not be related to an infection at another site.

Central Line-Associated Bloodstream Infections (CLABSI) is defined as a laboratory-confirmed BSI where an eligible BSI organism (see case definition of BSI) is identified, and an eligible central line is present on the day/ day before the event.

Eligible Central Line: A CL that has been in place for more than two consecutive calendar days, following the first access of the central line, in an inpatient location, during the current admission. Such lines are eligible for CLABSI events and remain eligible for CLABSI events until the day after removal from the body or patient discharge, whichever comes first.

CLABSI due to gram negative infection

- For all gram negative infection in patients on short-term catheters, catheter removal is essential.
- When CLABSI due to gram negative bacilli is suspected, initial empiric coverage with antibiotics belonging to two different classes is recommended when MDR organisms are prevalent, which may be de-escalated to a single appropriate antibiotic, once culture and susceptibility results are available.
- Antibiotic lock therapy may be used if catheter salvage is essential, but only in combination with systemic antimicrobial therapy. Response to therapy should be closely monitored and line removal considered if there is persistent bacteraemia.

- Duration of antimicrobial therapy is usually 7-14 days. In patients with gram-negative bacillary CLABSI involving a long-term catheter and persistent bacteraemia or severe sepsis despite systemic and antibiotic lock therapy, the device should be removed, an evaluation for endovascular infection and metastatic infection should be pursued, and the duration of antibiotic therapy should be extended beyond 7–14 days

Etiology	Suggested Regimens		Remarks
	Preferred	Alternative	
E. coli Carbapenem sensitive	Imipenem/cilastatin IV 500 mg q6h Or Meropenem IV 1g q8h	Cefoperazone Sulbactam(2:1) IV 3 g q12 h Or Piperacillin- tazobactam IV 4.5g q6h	Third generation cephalosporins may be used in E. coli/Klebsiella infections if the organism is susceptible When using fosfomycin for patients with estimated creatinine clearances of 40, 30, 20, and 10 ml/min, a reduction to 70%, 60%, 40%, and 20% of the daily recommended dose, respectively, is proposed. In patients undergoing intermittent dialysis (every 48 h), 2 g after each session is recommended (Falagas CMR 2016)
Klebsiellaspp Carbapenem sensitive	Imipenem/cilastatin IV 500 mg q6h Or Meropenem IV 1g q8h	Cefoperazone Sulbactam(2:1) IV 3 g q12 h Or Piperacillin- tazobactam IV 4.5g q6h	High dose imipenem may be combined with colistin when imipenem MICs are favourable. Meropenem is superior to Piperacillin-tazobactam while

			treating ceftriaxone resistant, carbapenem sensitive E.coli/ Klebsiella infections.
			Combinations of susceptible agents should be used with carbapenem, colistin resistant Enterobacteriaceae
Acinetobacter spp Carbapenem sensitive	Meropenem IV 1g q8h	Piperacillin-tazobactam IV 4.5g q6h	
Pseudomonas spp Carbapenem sensitive	Meropenem IV 1g q8h Or Piperacillin-tazobactam IV 4.5g q6h	Ceftazidime 2 g IV q8h Or Cefepime 2 g IV q8h	
Enterobacter/ Citrobacter/ Proteus/ Serratia	Imipenem/cilastatin IV 500 mg q6h Or Meropenem IV 1g q8h		
Burkholderiaceae complex	Meropenem IV 1g q8h	Ceftazidime 2 g IV q8h or Minocycline 200 mg loading dose and 100mg q12h	
Stenotrophomonas maltophilia	Minocycline 200 mg stat and 100mg q12h	Trimethoprim-sulfamethoxazole 3–5 mg/kg IV q8h	

Clostridium difficile Infection

Initial episode, non-severe :

Vancomycin 25 mg given 4 times daily for 10 days

Alternative : metronidazole, 400 mg 3 times per day by mouth for 10 days

Initial episode, fulminant : Hypotension or shock, ileus, megacolon:

Vancomycin, 500 mg 4 times per day by mouth or by nasogastric tube. If ileus, consider adding rectal instillation of Vancomycin.

Intravenously administered metronidazole (500 mg every 8 hours) should be administered together with oral or rectal Vancomycin, particularly if ileus is present

First recurrence

Vancomycin 125 mg given 4 times daily for 10 days if metronidazole was used for the initial episode

Second or subsequent recurrence

Vancomycin in a tapered and pulsed regimen

Vancomycin, 125 mg 4 times per day by mouth for 10 days followed by rifaximin 400 mg 3 times daily for 20 days.

ANTIMICROBIAL STEWARDSHIP PROGRAM

Antimicrobial resistance (AMR) has emerged as a major public health problem all over the world. Infections caused by resistant microbes fail to respond to treatment because of limited therapeutic options resulting in prolonged illness and greater risk of death. Treatment failures also lead to longer periods of infectivity, with increased numbers of infected people in the community. This in turn exposes the general population to the risk of contracting a resistant strain of microorganisms. As they become resistant to first-line antimicrobials, the forbidding high cost of the second-line drugs may result in failure to treat these diseases. Most alarming of all are the diseases caused by multidrug-resistant microbes, which are virtually non-treatable and thereby contributes to a “post-antibiotic era”. Inappropriate antimicrobial use is associated with the emergence of resistance. In addition, the misuse of antibiotics contributes to the growing problem of antimicrobial resistance and is considered as a most serious threat to public health.

An effective antimicrobial stewardship program with appropriate

- drug selection
- dosing
- route of administration
- duration of antimicrobial therapy

coupled with comprehensive infection control program has shown to limit the emergence and transmission of antimicrobial resistant pathogens. Patients who are exposed to inappropriate/unnecessary antibiotics are placed at risk for serious adverse events with no clinical benefit. Moreover, to restrict the misuse or unnecessary antibiotic prescription, the Policy Statement on Antimicrobial Stewardship by SHEA, IDSA, and PIDS strongly encourages healthcare institutions to develop stewardship programs.

WHO Access, Watch, Reserve (AWaRe) classification of antibiotics for evaluation and monitoring of use, 2023

This classification is intended to be used as a tool for countries to better support antibiotic monitoring and stewardship activities. It is not intended as model for the inclusion of

antibiotics on national essential medicine lists. Antibiotics classified under AWaRe and also included on the WHO Model Lists of Essential Medicines are indicated in the worksheets.

Access group antibiotics

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

Following are the Access group antimicrobials as per WHO AWaRe Classification of antibiotics 2023:

Amikacin	Aminoglycosides
Amoxicillin	Penicillins
Amoxicillin/clavulanic-acid	Beta-lactam/beta-lactamase-inhibitor
Ampicillin	Penicillins
Ampicillin/sulbactam	Beta-lactam/beta-lactamase-inhibitor
Azidocillin	Penicillins
Bacampicillin	Penicillins
Benzathine-benzylpenicillin	Penicillins
Benzylpenicillin	Penicillins
Brodimoprim	Trimethoprim-derivatives
Cefacetrile	First-generation-cephalosporins
Cefadroxil	First-generation-cephalosporins
Cefalexin	First-generation-cephalosporins
Cefaloridine	First-generation-cephalosporins
Cefalotin	First-generation-cephalosporins
Cefapirin	First-generation-cephalosporins
Cefatrizine	First-generation-cephalosporins
Cefazedone	First-generation-cephalosporins
Cefazolin	First-generation-cephalosporins
Cefradine	First-generation-cephalosporins
Cefroxadine	First-generation-cephalosporins
Ceftazole	First-generation-cephalosporins
Chloramphenicol	Amphenicols
Clindamycin	Lincosamides
Clometocillin	Penicillins
Cloxacillin	Penicillins
Dicloxacillin	Penicillins
Doxycycline	Tetracyclines
Epicillin	Penicillins
Flucloxacillin	Penicillins
Furazidin	Nitrofurans derivatives
Gentamicin	Aminoglycosides
Hetacillin	Penicillins

Mecillinam	Penicillins
Metampicillin	Penicillins
Meticillin	Penicillins
Metronidazole_IV	Imidazoles
Metronidazole_oral	Imidazoles
Nafcillin	Penicillins
Nifurtoinol	Nitrofurans derivatives
Nitrofurantoin	Nitrofurans-derivatives
Ornidazole_IV	Imidazoles
Ornidazole_oral	Imidazoles
Oxacillin	Penicillins
Penamecillin	Penicillins
Phenoxymethylpenicillin	Penicillins
Pivampicillin	Penicillins
Pivmecillinam	Penicillins
Procaine-benzylpenicillin	Penicillins
Propicillin	Penicillins
Secnidazole	Imidazoles
Spectinomycin	Aminocyclitols
Sulbactam	Beta-lactamase-inhibitors
Sulfadiazine	Sulfonamides
Sulfadiazine/tetroxoprim	Sulfonamide-trimethoprim-combinations
Sulfadiazine/trimethoprim	Sulfonamide-trimethoprim-combinations
Sulfadimethoxine	Sulfonamides
Sulfadimidine	Sulfonamides
Sulfadimidine/trimethoprim	Sulfonamide-trimethoprim-combinations
Sulfafurazole	Sulfonamides
Sulfaisodimidine	Sulfonamides
Sulfalene	Sulfonamides
Sulfamazone	Sulfonamides
Sulfamerazine	Sulfonamides
Sulfamerazine/trimethoprim	Sulfonamide-trimethoprim-combinations
Sulfamethizole	Sulfonamides
Sulfamethoxazole	Sulfonamides
Sulfamethoxazole/trimethoprim	Sulfonamide-trimethoprim-combinations
Sulfamethoxypyridazine	Sulfonamides
Sulfametomidine	Sulfonamides
Sulfametoxydiazine	Sulfonamides
Sulfametrole/trimethoprim	Sulfonamide-trimethoprim-combinations
Sulfamoxole	Sulfonamides
Sulfamoxole/trimethoprim	Sulfonamide-trimethoprim-combinations
Sulfanilamide	Sulfonamides
Sulfaperin	Sulfonamides
Sulfaphenazole	Sulfonamides
Sulfapyridine	Sulfonamides
Sulfathiazole	Sulfonamides
Sulfathiourea	Sulfonamides
Sultamicillin	Beta-lactam/beta-lactamase-inhibitor

Talampicillin
Tetracycline
Thiamphenicol
Tinidazole_IV
Tinidazole_oral
Trimethoprim

Penicillins
Tetracyclines
Amphenicols
Imidazoles
Imidazoles
Trimethoprim-derivatives

Watch group antibiotics

This group includes antibiotic classes that have higher resistance potential and includes most of the highest priority agents among the Critically Important Antimicrobials for Human Medicine and/or antibiotics that are at relatively high risk of selection of bacterial resistance. These medicines should be prioritized as key targets of stewardship programs and monitoring. Selected Watch group antibiotics are recommended as essential first or second choice empiric treatment options for a limited number of specific infectious syndromes and are listed as individual medicines on the WHO Model Lists of Essential Medicines.

Following are the Watch Group antimicrobials as per WHO AWaRe Classification of antibiotics 2023:

1.	Arbekacin	Aminoglycosides
2.	Aspoxicillin	Penicillins
3.	Azithromycin	Macrolides
4.	Azlocillin	Penicillins
5.	Bekanamycin	Aminoglycosides
6.	Biapenem	Carbapenems
7.	Carbenicillin	Penicillins
8.	Carindacillin	Penicillins
9.	Cefaclor	Second-generation-cephalosporins
10.	Cefamandole	Second-generation-cephalosporins
11.	Cefbuperazone	Second-generation-cephalosporins
12.	Cefcapene-pivoxil	Third-generation-cephalosporins
13.	Cefdinir	Third-generation-cephalosporins
14.	Cefditoren-pivoxil	Third-generation-cephalosporins
15.	Cefepime	Fourth-generation-cephalosporins
16.	Cefetamet-pivoxil	Third-generation-cephalosporins
17.	Cefixime	Third-generation-cephalosporins
18.	Cefmenoxime	Third-generation-cephalosporins
19.	Cefmetazole	Second-generation-cephalosporins
20.	Cefminox	Second-generation-cephalosporins
21.	Cefodizime	Third-generation-cephalosporins
22.	Cefonicid	Second-generation-cephalosporins
23.	Cefoperazone	Third-generation-cephalosporins
24.	Ceforanide	Second-generation-cephalosporins
25.	Cefoselis	Fourth-generation-cephalosporins
26.	Cefotaxime	Third-generation-cephalosporins
27.	Cefotetan	Second-generation-cephalosporins

28.	Cefotiam	Second-generation-cephalosporins
29.	Cefoxitin	Second-generation-cephalosporins
30.	Cefozopran	Fourth-generation-cephalosporins
31.	Cefpiramide	Third-generation-cephalosporins
32.	Cefpirome	Fourth-generation-cephalosporins
33.	Cefpodoxime-proxetil	Third-generation-cephalosporins
34.	Cefprozil	Second-generation-cephalosporins
35.	Cefsulodin	Third-generation-cephalosporins
36.	Ceftazidime	Third-generation-cephalosporins
37.	Cefteram-pivoxil	Third-generation-cephalosporins
38.	Ceftibuten	Third-generation-cephalosporins
39.	Ceftizoxime	Third-generation-cephalosporins
40.	Ceftriaxone	Third-generation-cephalosporins
41.	Cefuroxime	Second-generation-cephalosporins
42.	Chlortetracycline	Tetracyclines
43.	Cinoxacin	Quinolones
44.	Ciprofloxacin	Fluoroquinolones
45.	Clarithromycin	Macrolides
46.	Clofoctol	Phenol derivatives
47.	Clomocycline	Tetracyclines
48.	Delafloxacin	Fluoroquinolones
49.	Demeclocycline	Tetracyclines
50.	Dibekacin	Aminoglycosides
51.	Dirithromycin	Macrolides
52.	Doripenem	Carbapenems
53.	Enoxacin	Fluoroquinolones
54.	Ertapenem	Carbapenems
55.	Erythromycin	Macrolides
56.	Fidaxomicin	Macrolides
57.	Fleroxacin	Fluoroquinolones
58.	Flomoxef	Second-generation-cephalosporins
59.	Flumequine	Quinolones
60.	Flurithromycin	Macrolides
61.	Fosfomicin_oral	Phosphonics
62.	Fusidic-acid	Steroid antibacterials
63.	Garenoxacin	Fluoroquinolones
64.	Gatifloxacin	Fluoroquinolones
65.	Gemifloxacin	Fluoroquinolones
66.	Grepafoxacin	Fluoroquinolones
67.	Imipenem/cilastatin	Carbapenems
68.	Isepamicin	Aminoglycosides
69.	Josamycin	Macrolides
70.	Kanamycin_IV	Aminoglycosides
71.	Kanamycin_oral	Aminoglycosides
72.	Lascufloxacin	Fluoroquinolones
73.	Latamoxef	Third-generation-cephalosporins
74.	Levofloxacin	Fluoroquinolones
75.	Levonadifloxacin	Fluoroquinolones

76.	Lincomycin	Lincosamides
77.	Lomefloxacin	Fluoroquinolones
78.	Loracarbef	Second-generation-cephalosporins
79.	Lymecycline	Tetracyclines
80.	Meropenem	Carbapenems
81.	Metacycline	Tetracyclines
82.	Mezlocillin	Penicillins
83.	Micronomicin	Aminoglycosides
84.	Midecamycin	Macrolides
85.	Minocycline_oral	Tetracyclines
86.	Miocamycin	Macrolides
87.	Moxifloxacin	Fluoroquinolones
88.	Nemonoxacin	Quinolones
89.	Neomycin_IV	Aminoglycosides
90.	Neomycin_oral	Aminoglycosides
91.	Netilmicin	Aminoglycosides
92.	Norfloxacin	Fluoroquinolones
93.	Ofloxacin	Fluoroquinolones
94.	Oleandomycin	Macrolides
95.	Oxolinic-acid	Quinolones
96.	Oxytetracycline	Tetracyclines
97.	Panipenem	Carbapenems
98.	Pazufloxacin	Fluoroquinolones
99.	Pefloxacin	Fluoroquinolones
100.	Penimepicycline	Tetracyclines
101.	Pheneticillin	Penicillins
102.	Pipemidic-acid	Quinolones
103.	Piperacillin	Penicillins
104.	Piperacillin/tazobactam	Beta-lactam/beta-lactamase-inhibitor_anti-pseudomonal
105.	Piromidic-acid	Quinolones
106.	Pristinamycin	Streptogramins
107.	Prulifloxacin	Fluoroquinolones
108.	Ribostamycin	Aminoglycosides
109.	Rifabutin	Rifamycins
110.	Rifampicin	Rifamycins
111.	Rifamycin_IV	Rifamycins
112.	Rifamycin_oral	Rifamycins
113.	Rifaximin	Rifamycins
114.	Rokitamycin	Macrolides
115.	Rolitetracycline	Tetracyclines
116.	Rosoxacin	Quinolones
117.	Roxithromycin	Macrolides
118.	Rufloxacin	Fluoroquinolones
119.	Sarecycline	Tetracyclines
120.	Sisomicin	Aminoglycosides
121.	Sitafloxacin	Fluoroquinolones
122.	Solithromycin	Macrolides
123.	Sparfloxacin	Fluoroquinolones

124.	Spiramycin	Macrolides
125.	Streptoduocin	Aminoglycosides
126.	Streptomycin_IV	Aminoglycosides
127.	Streptomycin_oral	Aminoglycosides
128.	Sulbenicillin	Penicillins
129.	Tazobactam	Beta-lactamase-inhibitors
130.	Tebipenem	Carbapenems
131.	Teicoplanin	Glycopeptides
132.	Telithromycin	Macrolides
133.	Temafloxacin	Fluoroquinolones
134.	Temocillin	Penicillins
135.	Ticarcillin	Penicillins
136.	Tobramycin	Aminoglycosides
137.	Tosufloxacin	Fluoroquinolones
138.	Troleandomycin	Macrolides
139.	Trovaflaxacin	Fluoroquinolones
140.	Vancomycin_IV	Glycopeptides
141.	Vancomycin_oral	Glycopeptides

RESERVE ANTIMICROBIALS

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

These antibiotics should be accessible, but their use should be tailored to highly specific patients and settings, when all alternatives have failed or are not suitable.

These medicines could be protected and prioritized as key targets of national and international stewardship programs involving monitoring and utilization reporting, to preserve their effectiveness.

Following are the reserve antimicrobials as per WHO AWaRe Classification of antibiotics 2023:

1. Aztreonam
2. Cefiderocol
3. Ceftaroline-fosamil
4. Ceftazidime/avibactam
5. Ceftobiprole-medocaril
6. Ceftolozane/tazobactam
7. Colistin_IV
8. Colistin_oral

9. Dalbavancin
10. Dalfopristin/quinupristin
11. Daptomycin
12. Eravacycline
13. Faropenem
14. Fosfomycin_IV
15. Iclaprim
16. Imipenem/cilastatin/relebactam
17. Linezolid
18. Meropenem/vaborbactam
19. Minocycline_IV
20. Omadacycline
21. Oritavancin
22. Plazomicin
23. Polymyxin-B_IV
24. Polymyxin-B_oral
25. Tedizolid
26. Telavancin
27. Tigecycline

Multi-Drug Resistant Bacterial Pathogens & Treatment Protocol

The resistant organism categories and their treatment protocol are listed below

a) Methicillin-Resistant *Staphylococcus aureus* (MRSA)

Staphylococcus aureus that has tested Resistant (R) to at least one of the following: oxacillin or ceftiofloxacin

Treatment protocol:

- i. These organisms are considered resistant to all penicillins, cephalosporins and macrolides.
- ii. 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.
- iii. Rifampicin use should be avoided in diseases other than Mycobacterial diseases.
- iv. The drug of choice for treatment of infections due to MRSA is the glycopeptides i.e. Vancomycin and Teicoplanin.
- v. Linezolid can be used to treat skin and soft tissue infections caused by MRSA.
- vi. Mupirocin local application (intranasally bid x 5 days) for eradicating nasal carriage.
- vii. Daptomycin: Daptomycin is an intravenous antibiotic approved to be used for the treatment of complicated skin infections and *Staphylococcus aureus* bacteraemia. Daptomycin should NOT be used for treatment of pneumonia due to its inactivation by surfactant.

b) Vancomycin Resistant Enterococcus (VRE)

Enterococcus spp. that has tested Resistant (R) to vancomycin

Treatment protocol:

The treatment for VRE should be based on infection severity and in-vitro susceptibility of the strain to other antibiotics.

- i. Linezolid: Linezolid is the only drug specifically approved for the treatment of VRE-blood stream infections
- ii. Ampicillin: Isolates that remain relatively susceptible to penicillin or ampicillin may be treated with high doses of these agents
- iii. Daptomycin: Not approved for treatment of VRE infection.
- iv. Doxycycline: Not a first line therapy. For susceptible isolates, not for bacteremia or endocarditis.
It should not be used as monotherapy.
- v. Nitrofurantoin: Uncomplicated UTIs have been treated successfully with nitrofurantoin.
- vi. Fosfomycin: For urinary tract infections (cystitis) with isolates susceptible to Fosfomycin.
- vii. Chloramphenicol: For chloramphenicol-susceptible isolates of *E. faecium* and *E. faecalis*.
Not a first-line therapy and it should not be used as monotherapy.
- viii. Gentamicin: To 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.
- ix. Tigecycline (except primary blood stream infection)

c) Extended Spectrum β -Lactamases (ESBL) Producing Enterobacteriaceae

Resistant (R) to at least one of the following: cefepime, ceftriaxone, cefotaxime, or ceftazidime

Treatment protocol:

- i. CLSI (Clinical and Laboratory Standards Institute) recommends that laboratories should report ESBL producing isolates as resistant to all penicillins, cephalosporins (including cefepime and ceftazidime), and aztreonam irrespective of in-vitro test results.
- ii. The carbapenems (Ertapenem, Meropenem and Imipenem) are currently considered the drug of choice for serious infections caused by these pathogens.

iii. Piperacillin–Tazobactam and Cefoperazone- Sulbactam may be considered options in mild infections and when ESBL producers are demonstrably susceptible in vitro.

iv. The marker may be used in laboratory to assess potential ESBL production among Enterobacteriaceae is the resistance to Cefotaxime and Ceftazidime.

d) Carbapenem-Resistant Enterobacteriaceae (CRE):

Resistant (R) to at least one of the following: imipenem, meropenem, doripenem, ertapenem, eropenem/vaborbactam, or imipenem/relebactam

Treatment protocol:

i. Most carbapenemase-producers are extremely drug resistant: being resistant to β -lactam antibiotics, aminoglycosides, and β -lactam– β -lactamase inhibitor combinations.

ii. Polymyxins, tigecycline and fosfomycin are the agents with most frequent in vitro activity, but all have limitations. Dosage will vary with the patient and infection site.

iii. Colistin: Case reports of successful use in a range of infections due to carbapenemase producers.

iv. Tigecycline: Licensed for complicated skin and soft-tissue infections and complicated intra-abdominal infections.

v. Ceftazidime-avibactam alone if Oxa-48 producer suspected; and Ceftazidime-avibactam with Aztreonam if NDM producer suspected

vi. Others: a few isolates are susceptible to other antibiotics including e.g. chloramphenicol, ciprofloxacin and cotrimoxazole. Most producers, however, are resistant to these drugs.

e) Fluoroquinolone Resistant Enterobacteriaceae

Any *Escherichia coli*, *Klebsiella aerogenes*, *Klebsiella oxytoca*, *Klebsiella pneumoniae*, or *Enterobacter* spp. that has tested Resistant (R) to at least one of the following: ciprofloxacin, levofloxacin, or moxifloxacin

Treatment protocol:

i. Carbapenems like imipenem, meropenem, doripenem, ertapenem, meropenem/vaborbactam, or imipenem/relebactam

ii. 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.

iii. Colistin

iv. Tigecycline: Licensed for complicated skin and soft-tissue infections and complicated intra-abdominal infections.

v. Piperacillin-tazobactam

f) Fluoroquinolone Resistant *Pseudomonas aeruginosa*

Pseudomonas aeruginosa that has tested Resistant (R) to at least one of the following: ciprofloxacin or levofloxacin

Treatment protocol:

- i. Carbapenems like imipenem, meropenem, doripenem, ertapenem, meropenem/vaborbactam, or imipenem/relebactam
- ii. Polymyxins are with most frequent in vitro activity, but dosage will vary with the patient and infection site.
- iii. Ceftazidime, Ceftazidime / avibactam
- iv. Colistin
- v. Piperacillin-tazobactam

g) Multi-drug-resistant Pseudomonas aeruginosa

Pseudomonas aeruginosa that has tested either Intermediate (I) or Resistant (R) to at least one drug in at least three of the following six categories:

- Extended-spectrum cephalosporin (cefepime, ceftazidime, ceftazidime-avibactam, ceftolozane-tazobactam)
- Fluoroquinolones (ciprofloxacin, levofloxacin)
- Aminoglycosides (amikacin, gentamicin, tobramycin)
- Carbapenems (imipenem, meropenem, doripenem, imipenem/ relebactam)
- Piperacillin/tazobactam

Treatment protocol:

- i. Carbapenems like imipenem, meropenem, doripenem, ertapenem, meropenem/ vaborbactam, or imipenem/relebactam, if found sensitive
- ii. Polymyxins
- iii. Colistin

FUNGAL INFECTIONS

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. Evidence includes persistent sepsis / SIRS despite broad spectrum antibiotic (exclude sepsis, abscess, drug fever, DVT etc). Treat according to identification and antifungal sensitivity of *Candida* isolate.

Fluconazole IV/oral 800 mg OD first day (12mg/kg) and then 400 mg OD (6mg/kg from second day) if fluconazole naïve or sensitive

Or

2nd line Liposomal Amphotericin B (for *Candida krusei* and *C.glabrata* as inherently resistant to Fluconazole.) or Caspofungin (As Caspofungin is inherently inactive against Zygomycetes, *Cryptococcus*, *Fusarium* and *Trichosporon*Spp) Liposomal Amphotericin B IV 3mg/kg OD or Caspofungin dose: IV 70mg on Day 1 (loading), 50mg OD (<80kg) or 70mg OD (if >80kg) thereafter. Moderate to severe hepatic dysfunction: reduce the subsequent daily dose to 35mg OD. Check for drug interactions.

To be decided by Microbiologist/ID physician based on patient's hepatic / renal functions/Severity of infection /drug interactions e.g. rifampicin, carbamazepine, phenytoin, efavirenz, nevirapine, cyclosporin, dexamethasone, tacrolimus etc.

Alternative technologies to counter AMR

IMD'S (Immunomodulators), Technologies avoiding implantation of foreign materials, biotechnology (Use of PPMO's Peptides conjugated to PhosphorodiamidateMorpholino Oligomer), **Quantum Mechanics / Molecular Mechanics, Antibiotic biomaterials, . Antimicrobial nanoparticles, . Antimicrobial peptides, Anti-virulence materials, Bacteriophages (including lysins), .Fecal Microbiota Transplantation (FMT, Probiotics, . Rapid Point-of-Care Diagnostics, Vaccines, Therapeutic antibodies**

These are all the alternative methods which needs a lot of research to be in use.