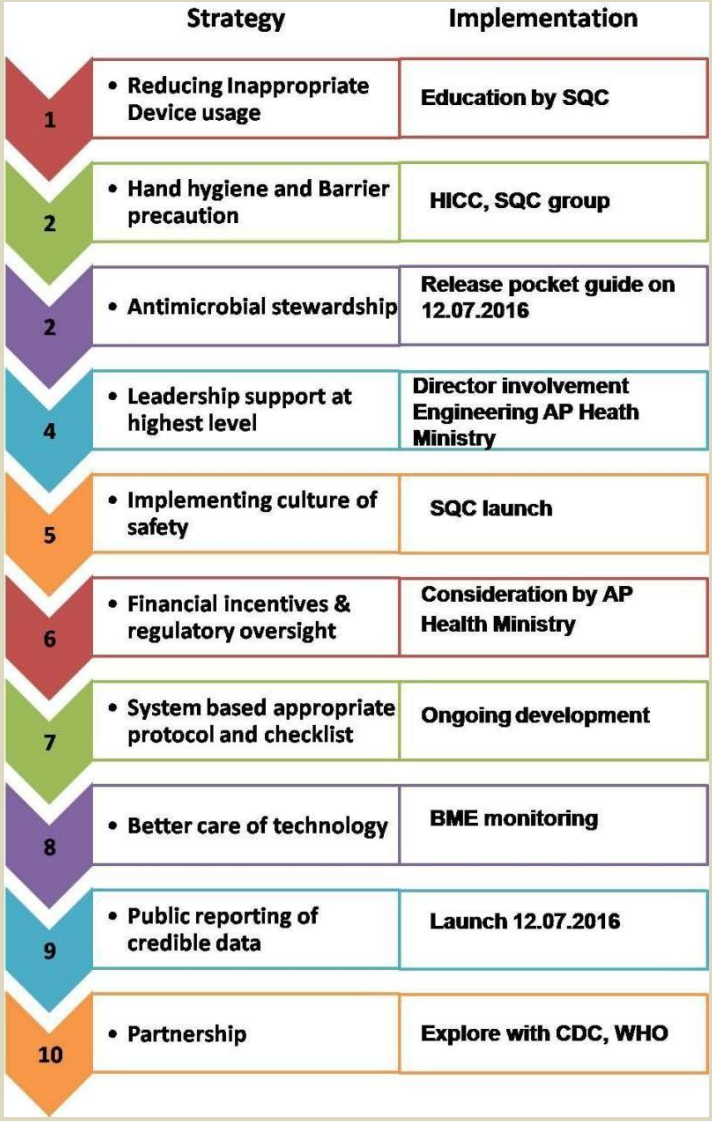



Healthcare Associated Infections (HAI)

About 5% - 10% of patients admitted to hospitals acquire one or more infections, as per the data reported from developed countries. In the USA, it is reported that 1 out of every 136 hospital patients becomes seriously ill as a result of acquiring an infection in the hospital. It is estimated that in developing countries (including India) the risk of Healthcare Associated Infections (HAI) is 2 to 20 times higher than in developed countries. In India, indiscriminate use of antibiotics both in community settings and in hospital settings contributes to development of antibiotic resistance. Further there is need for robust reporting of HAI in India. This ‘double-edged-sword’ of indiscriminate antibiotic use and lack of reporting of healthcare associated infections needs to be addressed. The Director-cum-Vice Chancellor of SVIMS **Dr. R.V.Kumar** announced that SVIMS is taking a step forward to contribute in containing HAI in India. Adapting international guidelines (eg WHO, CDC) SVIMS is invoking a ten pronged strategy. One key component is ‘Antimicrobial Stewardship’, which aims to optimize antibiotic use among patients in order to reduce antibiotic resistance, improve patient outcomes and safety and ensure cost effective therapy. Hon’ble Health Minister of Andhra Pradesh, released the first edition of “SVIMS Antimicrobial Stewardship pocket guide” on 12.07.2016. This is revised 6 monthly and new editions are released every January and July to inform all health care personnel (doctors, nurses, and allied health staff) of pathogen surveillance, antimicrobial use, infection control measures and outcomes. This programme is jointly monitored by Hospital Infection Control Committee and SVIMS Quality Council.

CONTENTS

1) Healthcare Associated Infections (HAI): SVIMS Ten Pronged Strategy



SQC = SVIMS Quality Council

HICC = Hospital Infection Control Committee

BME = Biomedical Engineering

CDC = Center for Disease Control and Prevention

WHO = World Health Organization

2) Hospital Infection Control (HIC) Committees

HICC Committee

HOSPITAL INFECTION CONTROL COMMITTEE (HICC) PROVIDES A FORUM FOR MULTIDISCIPLINARY INPUT AND COOPERATION AND INFORMATION SHARING.

- **Chairperson:** Dr R.V. Kumar (Director cum VC)
- **Co-chairman**: Dr R. Ram (Medical Superintendent)
- **Member Secretary**: Dr B. Venkata Ramana (HOD Microbiology)
- **HODs** of All Clinical Departments & **HOD** of Pathology & Transfusion Medicine
- **Officer in-charge Nursing Section**-A.D. Nursing- Mrs. T. Prabhavathi
- **Nursing Superintendents**
- **Link Nurses**
- **Hospital Infection Control Officer (HICO)** –Dr R. Jayaprada, Dr N. Ramakrishna
- **Hospital Infection Control Nurses (HICN) – Mrs.** V. Karpugam, Mrs. D. Redemma, Mrs. A. Shobharani, Mrs. Lakshmi.
- **Biomedical Waste Management In-charge**- Dr K.V. Koti Reddy
- **Needle stick injury reporting In-charge** – Dr A.R. Chaitanya
- **CSSD (Central Sterile Supply Department) In-charge** – Dr B. Srihari Rao
- **Linen and Landry In-charge**- Mrs. T. Prabhavathi
- **Notifiable Disease reporting- In-charge** – Dr V. Chandra sekhar
- **Engineer representative- A.E.** Civil & Electrical
- **Pharmacy In-charge**- Dr K.R.Subhash & Dr Peta Subramanyam
- **Sanitary Superintendent- Mr K. Kantha Rao**
- **Dietetics In-charge-** Dr M. Kusuma kumari, Dr C. Sreelekha & Mrs. M.Sunitha
- **Operating Theatre In-charge-** Mrs. V. Radha Rani

3) HIC Terms of Reference

1. **Health care associated infections**

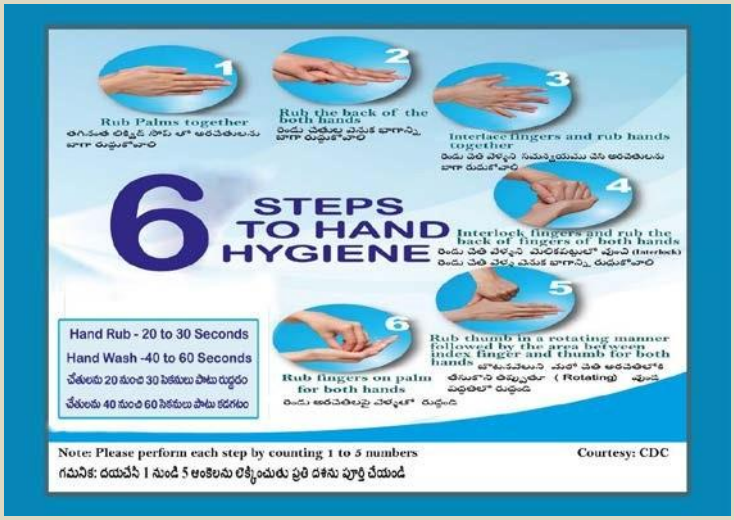
    i) Ventilator Associate Pneumonia (VAP)
    ii) Central Line Associated Blood Stream Infections (CLABSI)
    iii) Catheter Associated Urinary Tract Infections (CAUTI)
    iv) Surgical Site Infections (SSI)
    v) Standardized infection ratio (SIR)
    vi) Needle stick injury incidence
    vii) Hand hygiene compliance

2. Bed sore analysis
3. O.T. surveillance (Monthly)
4. Blood bank surveillance
5. Environmental surveillance (water& air) (Monthly)
6. Hand hygiene
7. Dialysate fluid testing
8. Needle-stick injuries incidence
9. Multi drug-resistant organisms (MDRO's) Surveillance
10. Outbreak investigation
11. Biomedical waste management
12. High end antibiotic monitoring
13. AMR surveillance
14. HBs Ag antibody titre testing
15. Endotoxin (LAL) assay for Dialysate fluid & water
16. Disinfectant testing-new and in-house
17. Stool for *Clostridium difficile* toxin A&B testing
18. Blood contamination rate
19. *Legionella* spp screening in humidifier water from ACs.
20. Audits: Bundle care audits for VAP, CLABSI, CAUTI and SSI, Hand hygiene audit, PPE audit, Biomedical waste audits

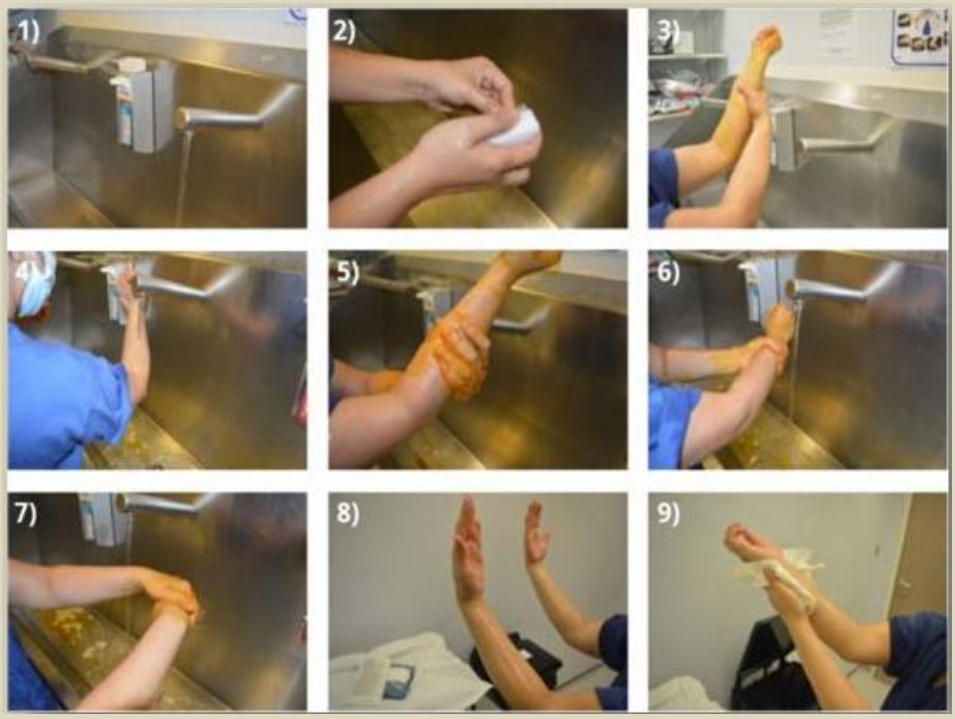
4) Hand Hygiene

- The organization adheres to standard precautions at all times regarding the use of PPE, prevention of sharp injury etc.
- Hand Hygiene guidelines are followed in all areas of the hospital-Posters regarding Hand Hygiene are available.
- Specific precautions are being followed when required. Safe Injection and Infusion practices are followed.
- Cleaning, disinfection and sterilization practices being followed

Steps of Procedure Hand Hygiene – Hand Rub (20-30 secs)



Surgical Hand Wash (3-5mts)



Greeting each other in Health care

Another dimension
in Hand Hygiene!

Spread Goodwill, not Germs

SVIMS

Prevent droplet spread
when coughing, sneezing

Director cum Vice-Chancellor

Sri Venkateswara Institute of
Medical Sciences, Tirupati.

SRI VENKATESWARA INSTITUTE OF MEDICAL SCIENCES, TTD, TIRUPATI

ANTIMICROBIAL STEWARDSHIP POCKET GUIDE

JUL-DEC 2023 (14TH EDITION)

14th Edition

Editors

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Preface

Healthcare Associated Infections (HAI)

Dr. R.V.Kumar, Director- cum-Vice Chancellor of SVIMS announced that SVIMS is taking a step forward to contribute in containing HAI in India. Adapting international guidelines (e.g. WHO, CDC), SVIMS is invoking a ten pronged strategy. One key component is 'Antimicrobial Stewardship', which aims to optimize antibiotic use among patients in order to reduce antibiotic resistance, improve patient outcomes and safety and ensure cost effective therapy. This will be revised 6 monthly and new editions will be released every January and July to inform all health care personnel (doctors, nurses, and allied health staff) of pathogen surveillance, antimicrobial use, infection control measures and outcomes. This programme is jointly monitored by Anti-Microbial Stewardship Committee Hospital Infection Control Committee and SVIMS Quality Council.

To learn how to use antibiotics, one must first learn how not to use antibiotics." -Unknown

Dr. R.V.Kumar
Director cum Vice Chancellor

From the desk of editors……..

Greetings from Anti-Microbial Stewardship team,

- Prevention of the emergence of antimicrobial resistance and the dissemination of resistant organisms will reduce the adverse effects and their costs.
- Antimicrobial resistance (AMR) results in increased morbidity, mortality and costs of health care.
- In SVIMS, major isolate was *Escherichia coli* (46.5%) followed by *Klebsiella spp*.(20.5%), *Pseudomonas spp*. (13.3%) and *Acinetobacter spp*.(8.7%) among Gram negative bacteria.
- As per our local antibiogram, empirical choice of antibiotic in ICUs in our institute is Piperacillin+ Tazobactam / Cefoperazone+sulbactam.
- **Based on Positive blood culture Gram staining report, empirical choice for Gram negative bacilli is Meropenem, and for Gram positive bacteria is Vancomycin in all ICUs for suspected cases of sepsis.**
- **Empirical choice of antimicrobials after collection of appropriate samples for suspected sepsis cases is Meropenem+Vancomycin.**
- In our hospital, Percentage of Methicillin resistance *Staphylococcus aureus* (MRSA) was 55.9%, Methicillin resistance Coagulase negative *Staphylococcus* (MRCoNS) was 62.6%,Vancomycin resistance *Staphylococcus aureus* (VRSA) was nil, Vancomycin resistance Coagulase negative *Staphylococcus* (VRCoNS) was 0.5 and Vancomycin resistant *Enterococci* (VRE) being 8.1% among Gram positive isolates.
- As percentage of Methicillin resistance being high, mandate recommendation for HCWs is to follow standard precautions (Hand Hygiene, Contact precautions) strictly at all times of patient care.

Carbapenem resistance was noted high in *Acinetobacter spp*. (79.7%) followed by *Klebsiellae spp.* (44.7%), *Pseudomonas spp*. (23.3%) and *Escherichia coli* (17.8%).

So cautious and judicious prescription of carbapenems is required.

Note : *Empirical therapy should be reviewed once the culture and susceptibility results are ready (usually within 72 hours) and targeted therapy should be started immediately and wherever possible give the narrowest spectrum antibiotic based on culture and sensitivity report, the site ofinfection and the clinical status of the patient.*

Foot notes: *All Betalactams must be given as 3 hour infusion as their concentration is time dependent to maintain the therapeutic levels as per Clinical laboratory Standard Institute (CLSI) 2022.*

Fig 1: Resistance pattern to various antimicrobials among *Acinetobacter spp.*

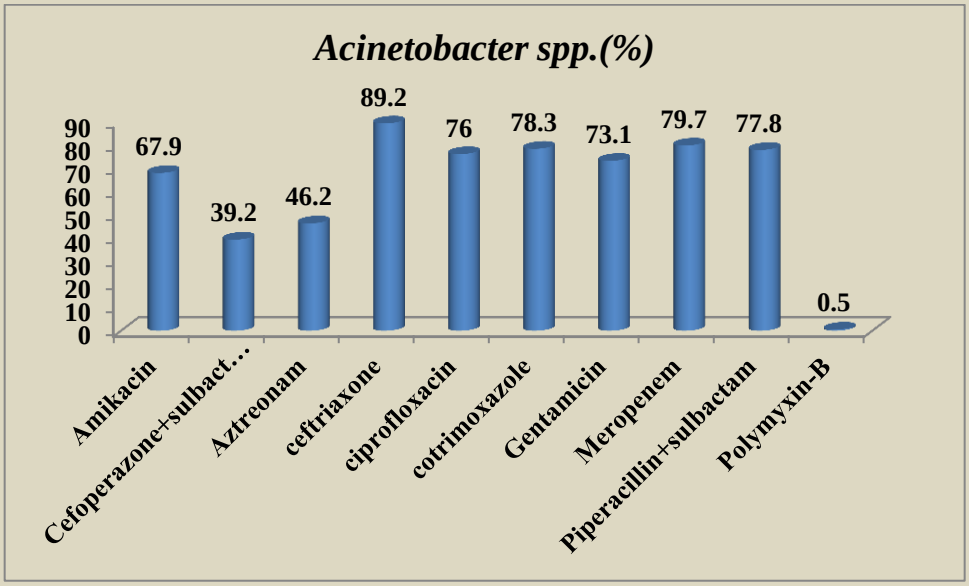


Fig 2: Resistance pattern to various antimicrobials among *Escherichia coli*

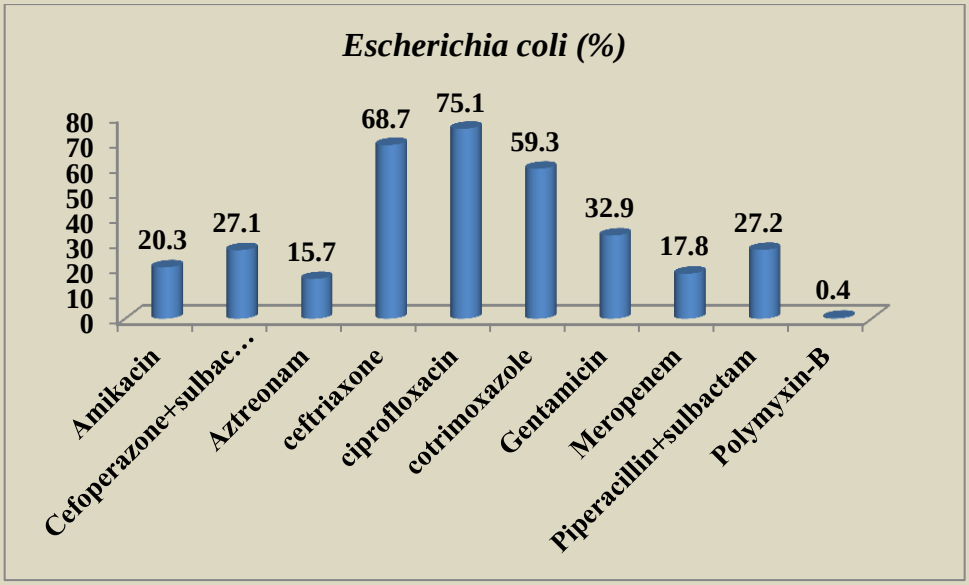


Fig 3: Resistance pattern to various antimicrobials among *klebsiella spp.*

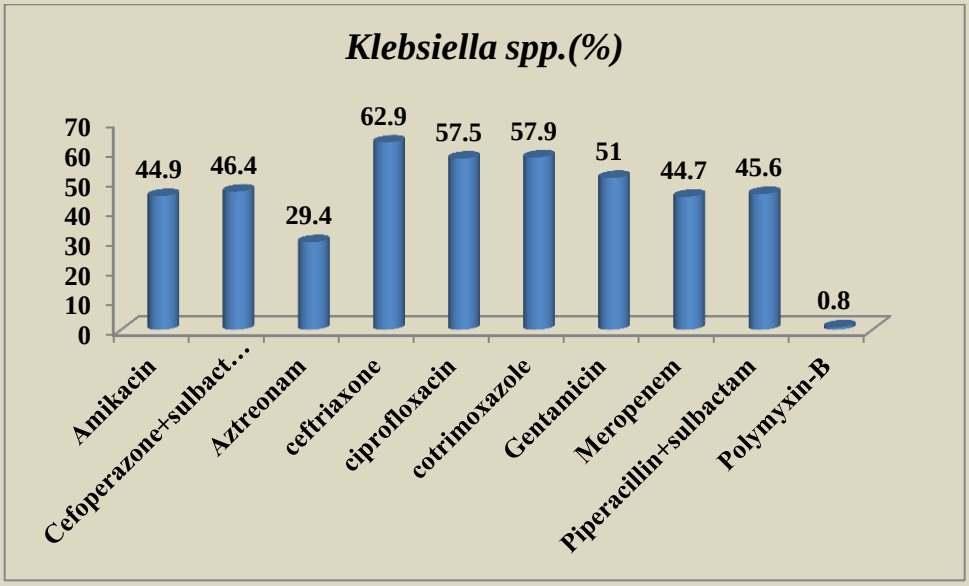
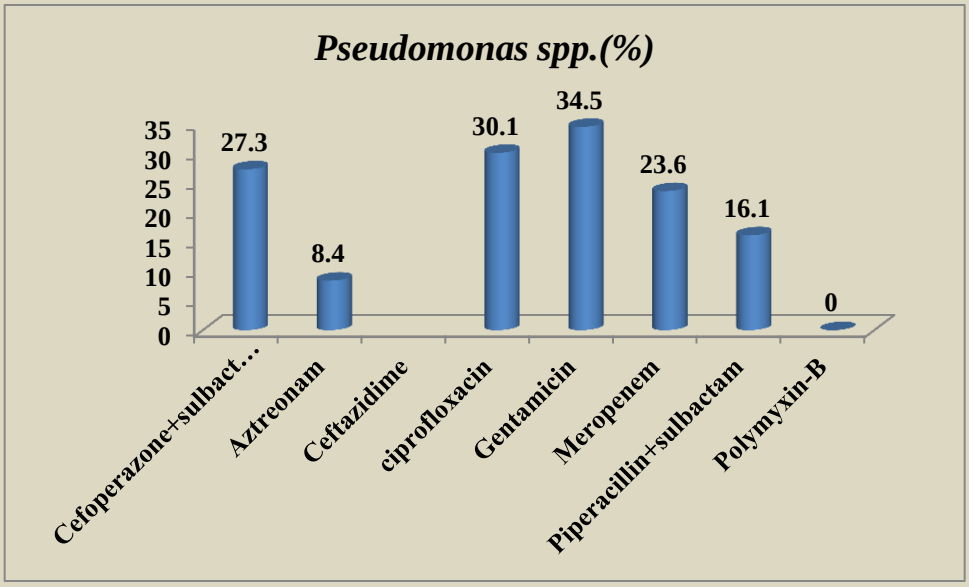


Fig 4: Resistance pattern to various antimicrobials among *Pseudomonas spp.*



Surgical departments

Fig 5: Resistance pattern to various antimicrobials among *Acinetobacter spp.*

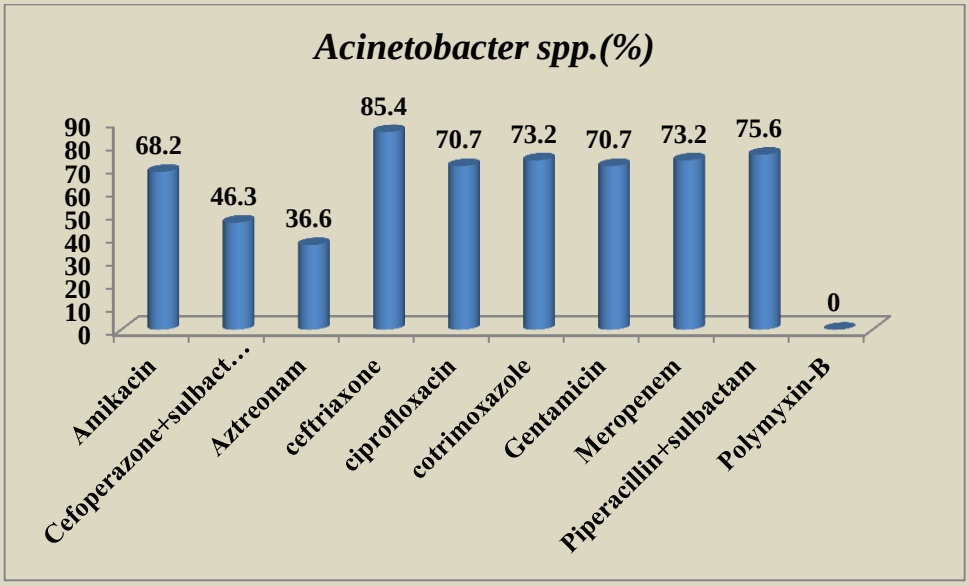


Fig 6: Resistance pattern to various antimicrobials among *Escherichia coli*

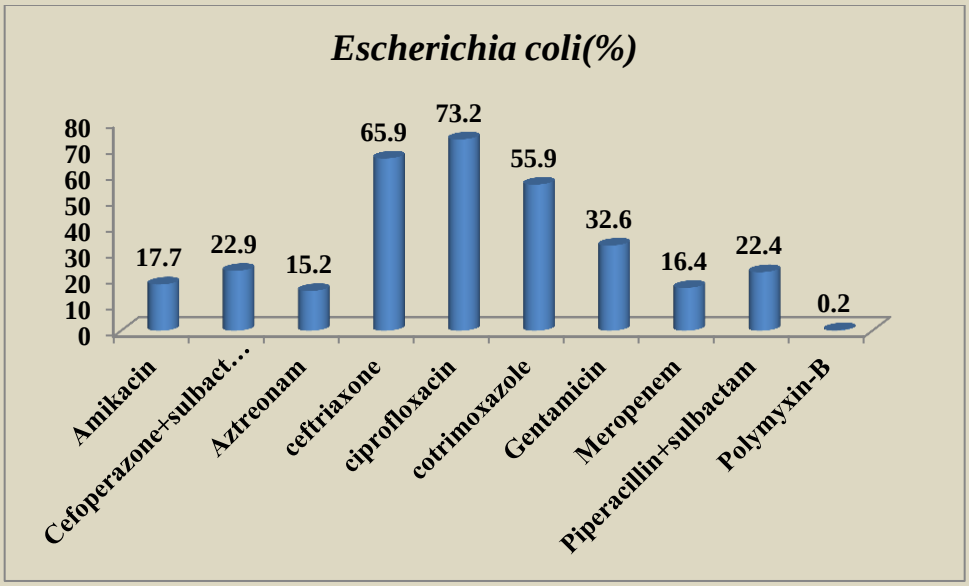


Fig 7: Resistance pattern to various antimicrobials among *Klebsiella spp*.

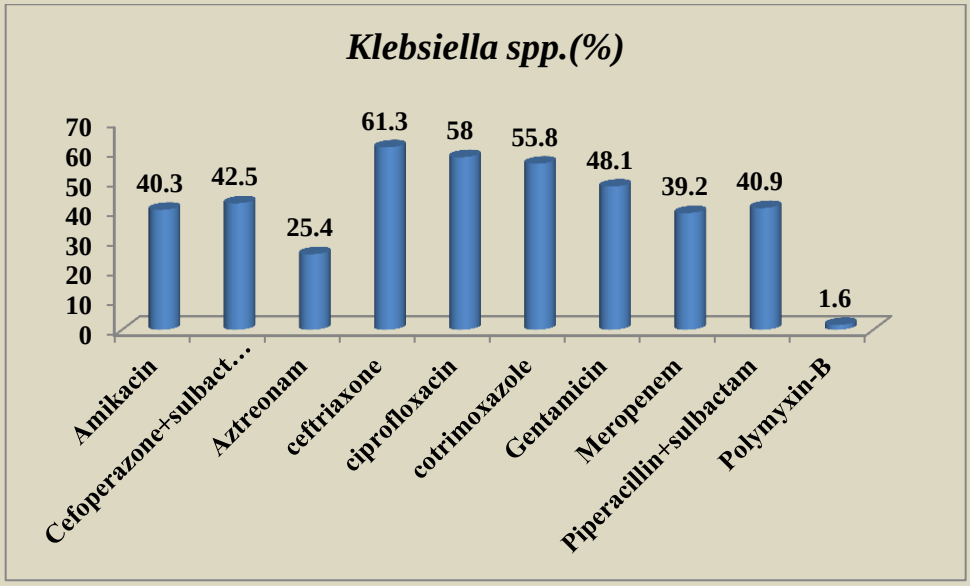
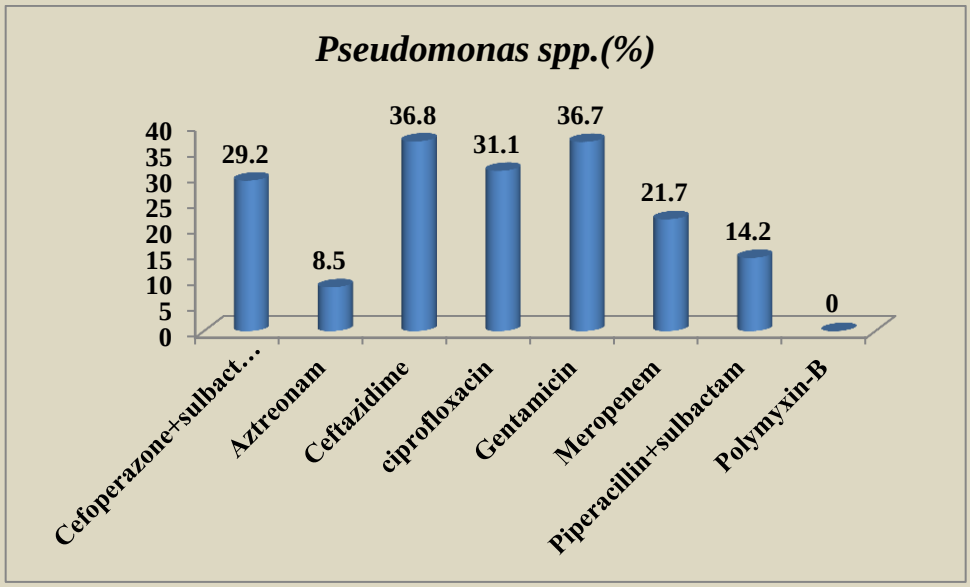


Fig 8: Resistance pattern to various antimicrobials among *Pseudomonas spp.*



Medical departments

Fig 9: Resistance pattern to various antimicrobials among *Acinetobacter spp.*

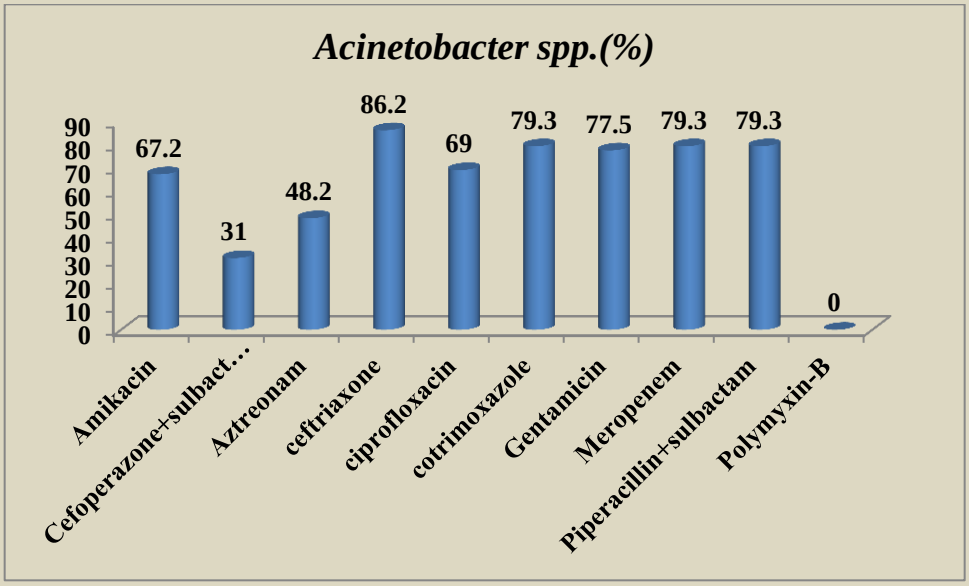


Fig 10: Resistance pattern to various antimicrobials among *Escherichia coli*

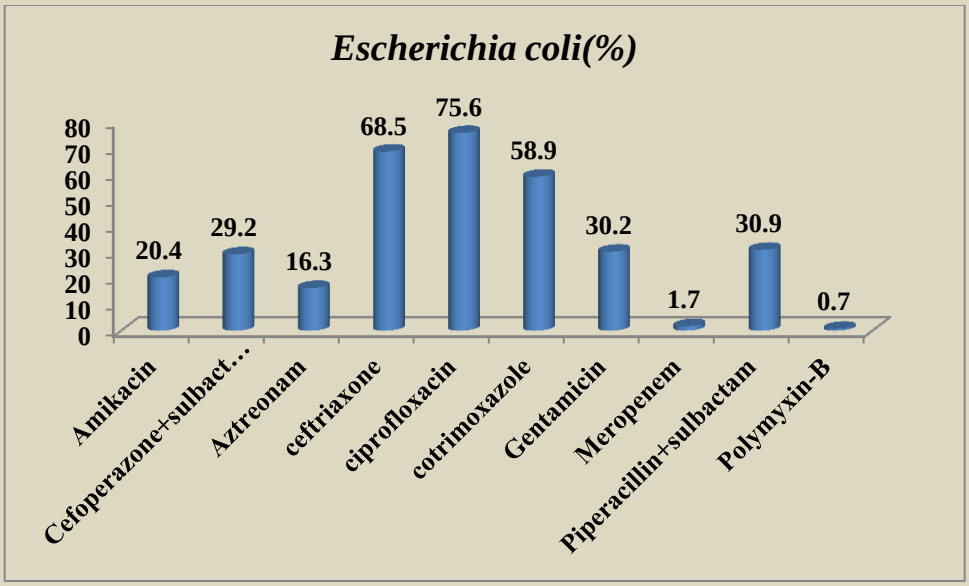


Fig 11: Resistance pattern to various antimicrobials among *Klebsiella spp.*

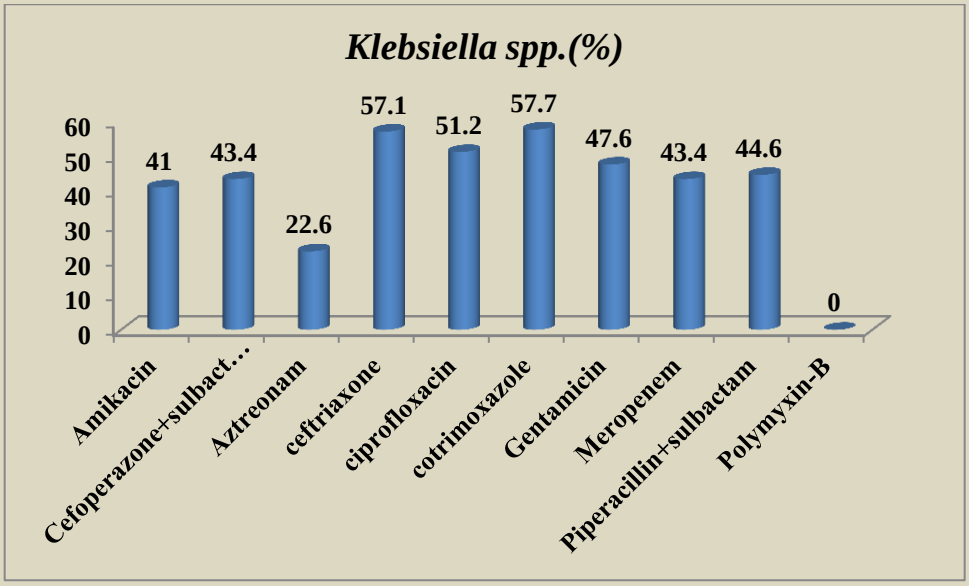
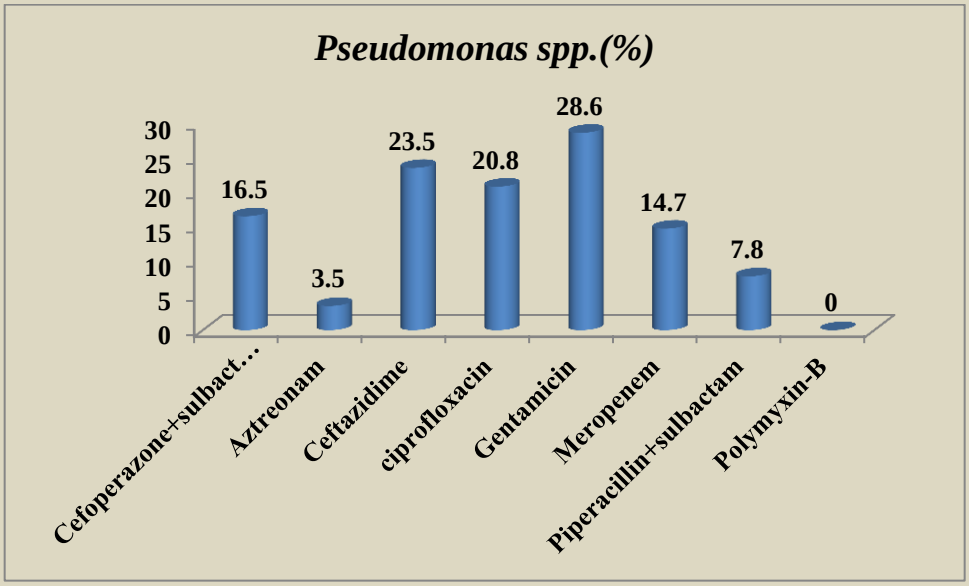


Fig 12: Resistance pattern to various antimicrobials among *Pseudomonas spp.*



ICUs

Fig 13: Resistance pattern to various antimicrobials among *Acinetobacter spp.*

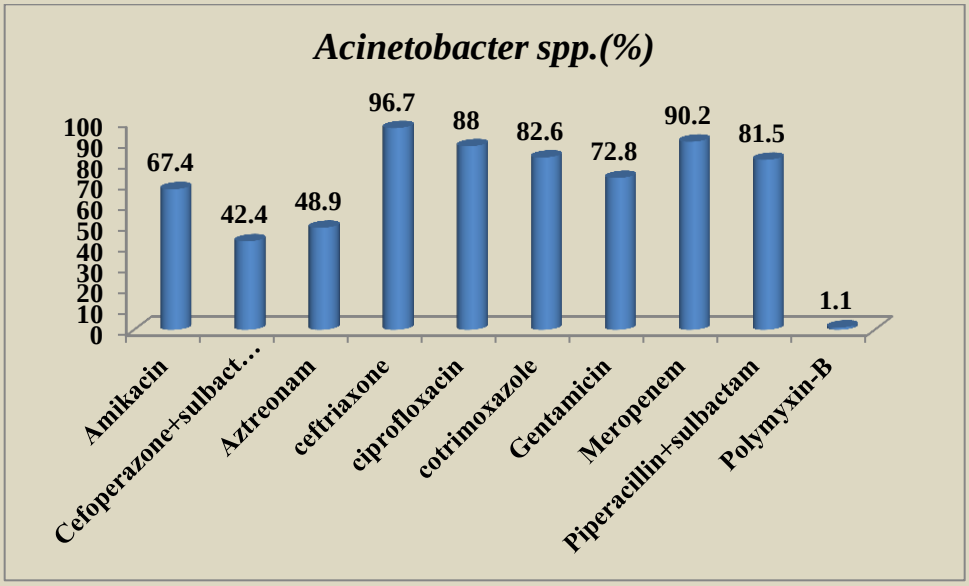


Fig 14: Resistance pattern to various antimicrobials among *Escherichia spp.*

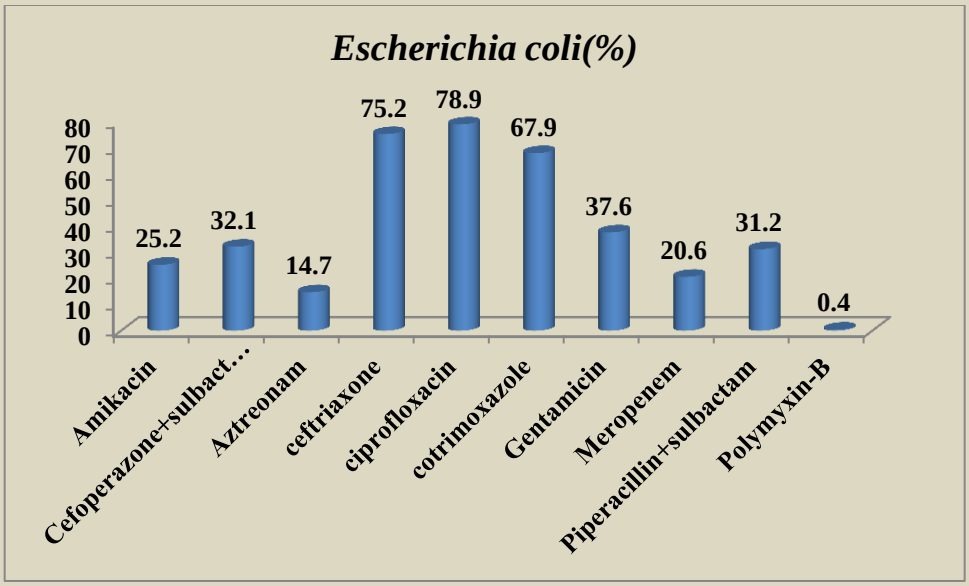


Fig 15: Resistance pattern to various antimicrobials among *Klebsiella spp.*

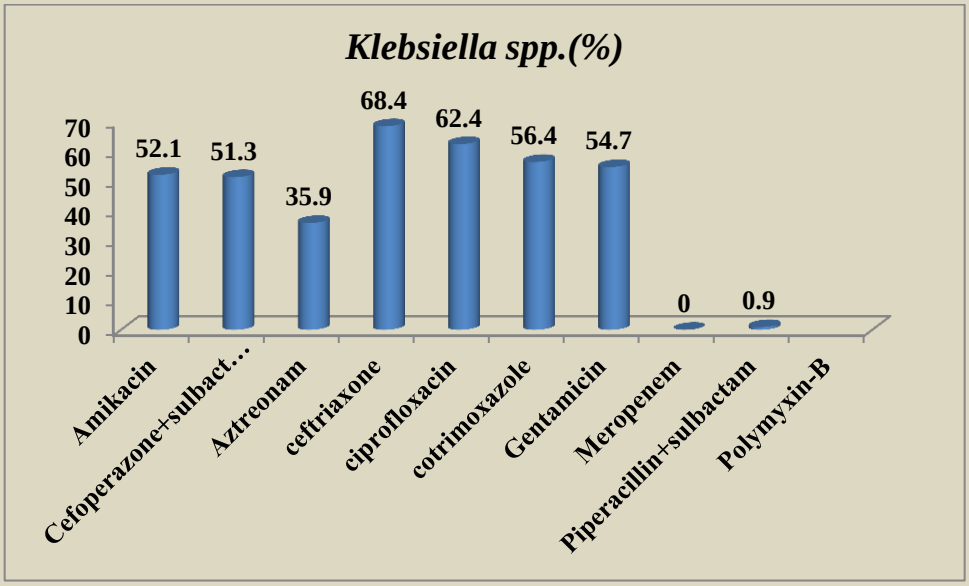
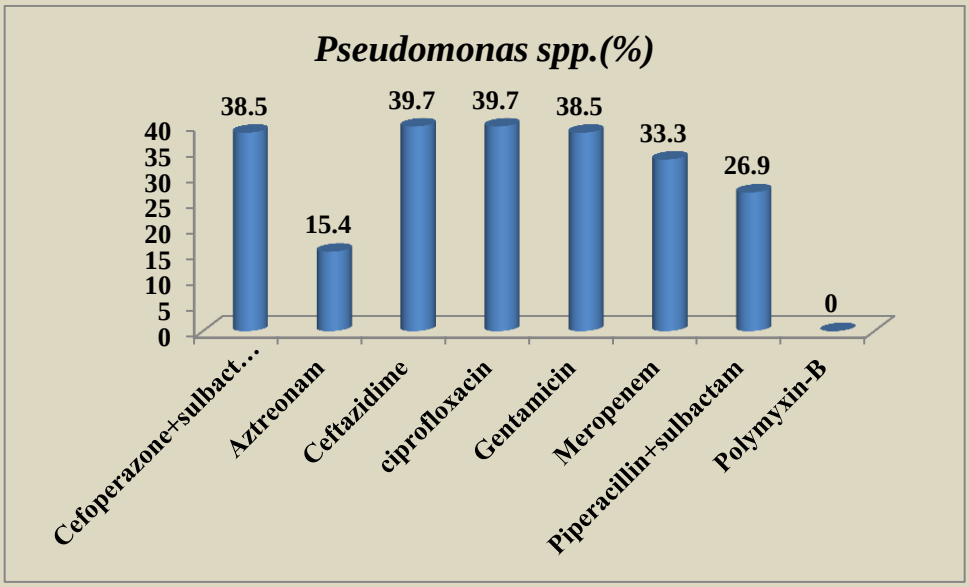


Fig 16: Resistance pattern to various antimicrobials among *Pseudomonas spp.*



Resistance pattern of Gram positive isolates

Fig 17: Resistance pattern to various antimicrobials among *Staphylococcus aureus*

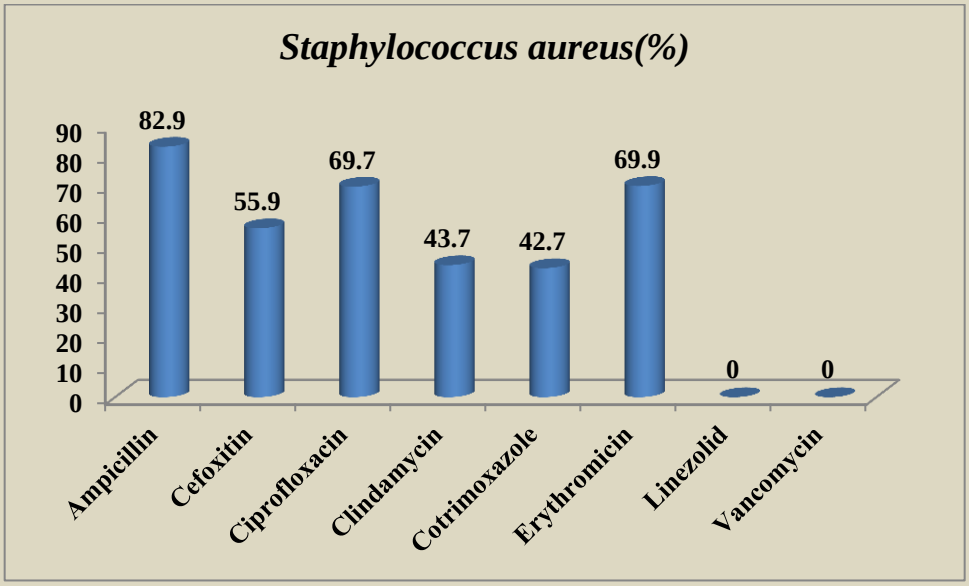


Fig 18: Resistance pattern to various antimicrobials among Coagulase negative *Staphylococcus* (CoNS)

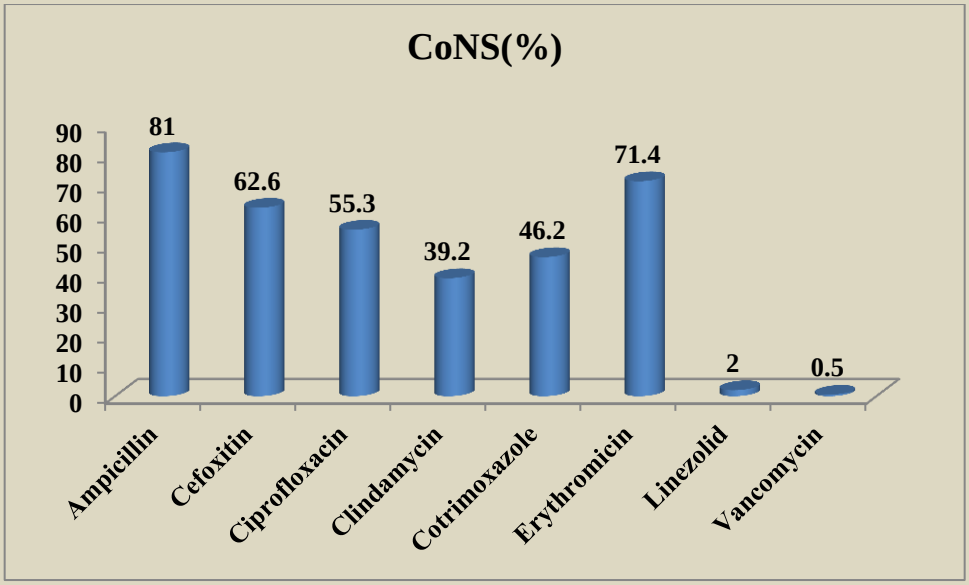


Fig 19: Resistance pattern to various antimicrobials among *Enterococcus spp.*

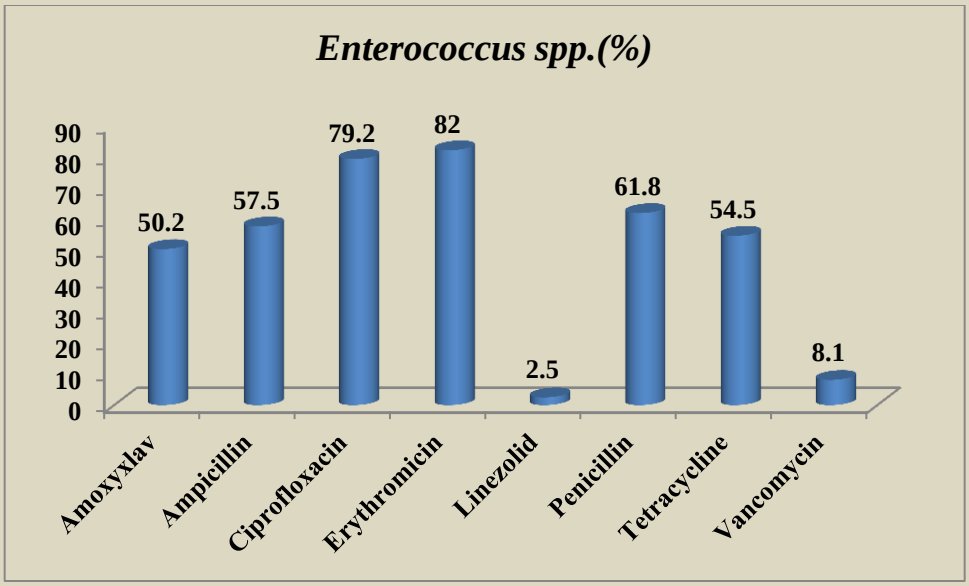


Fig 20: Resistance pattern to various antimicrobials among Carbapenem resistance Enterobacteriaceae (CRE)

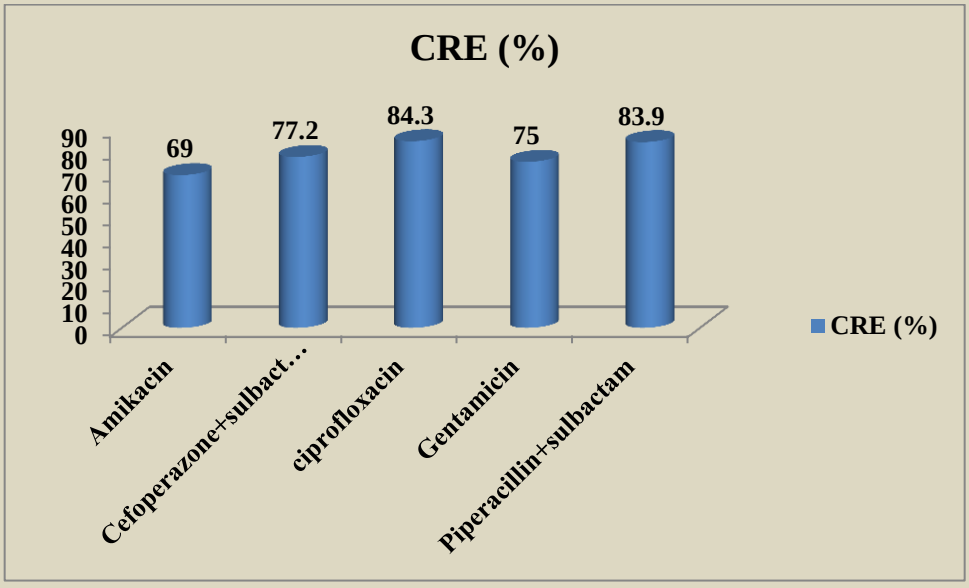


Fig 21: Resistance pattern to various antimicrobials among isolated Gram Negative Bacilli (GNB)

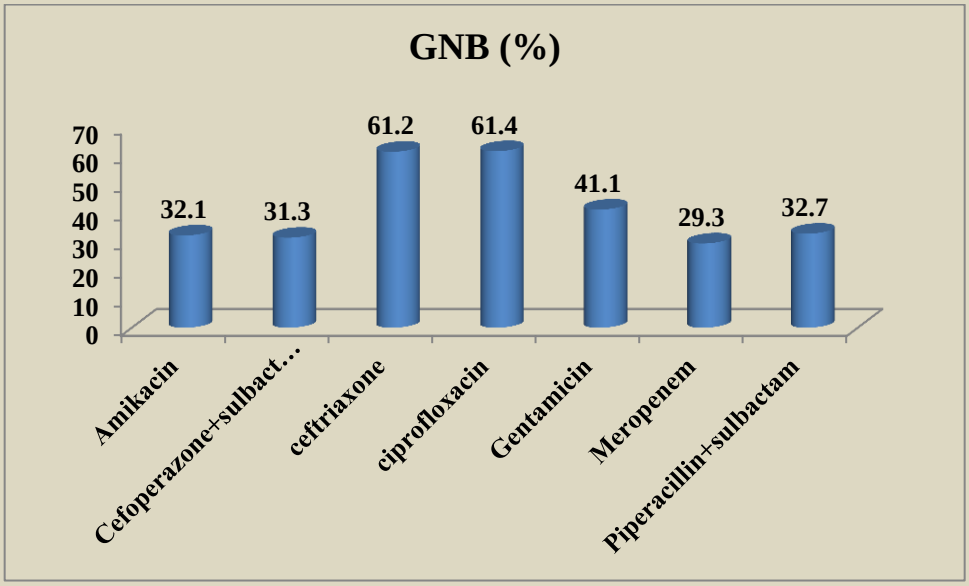


Fig 22: Department wise distribution of CRE

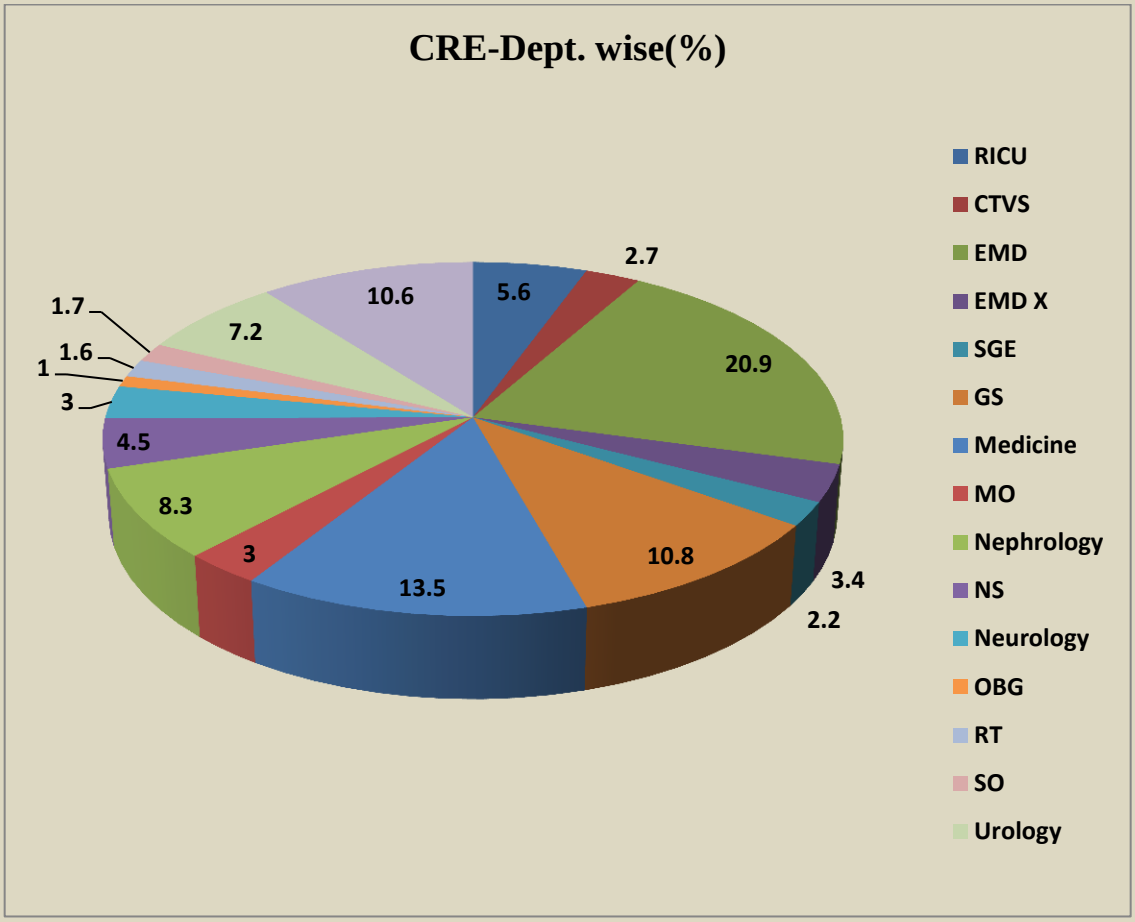


Fig 22: Resistance pattern to various antimicrobials among Methicillin resistance Staphylococcus aureus (MRSA)

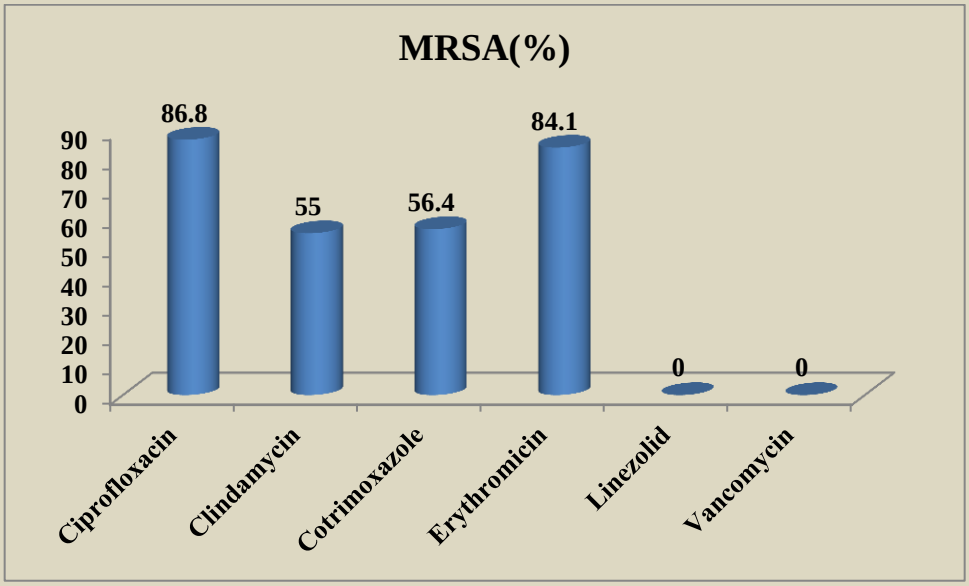
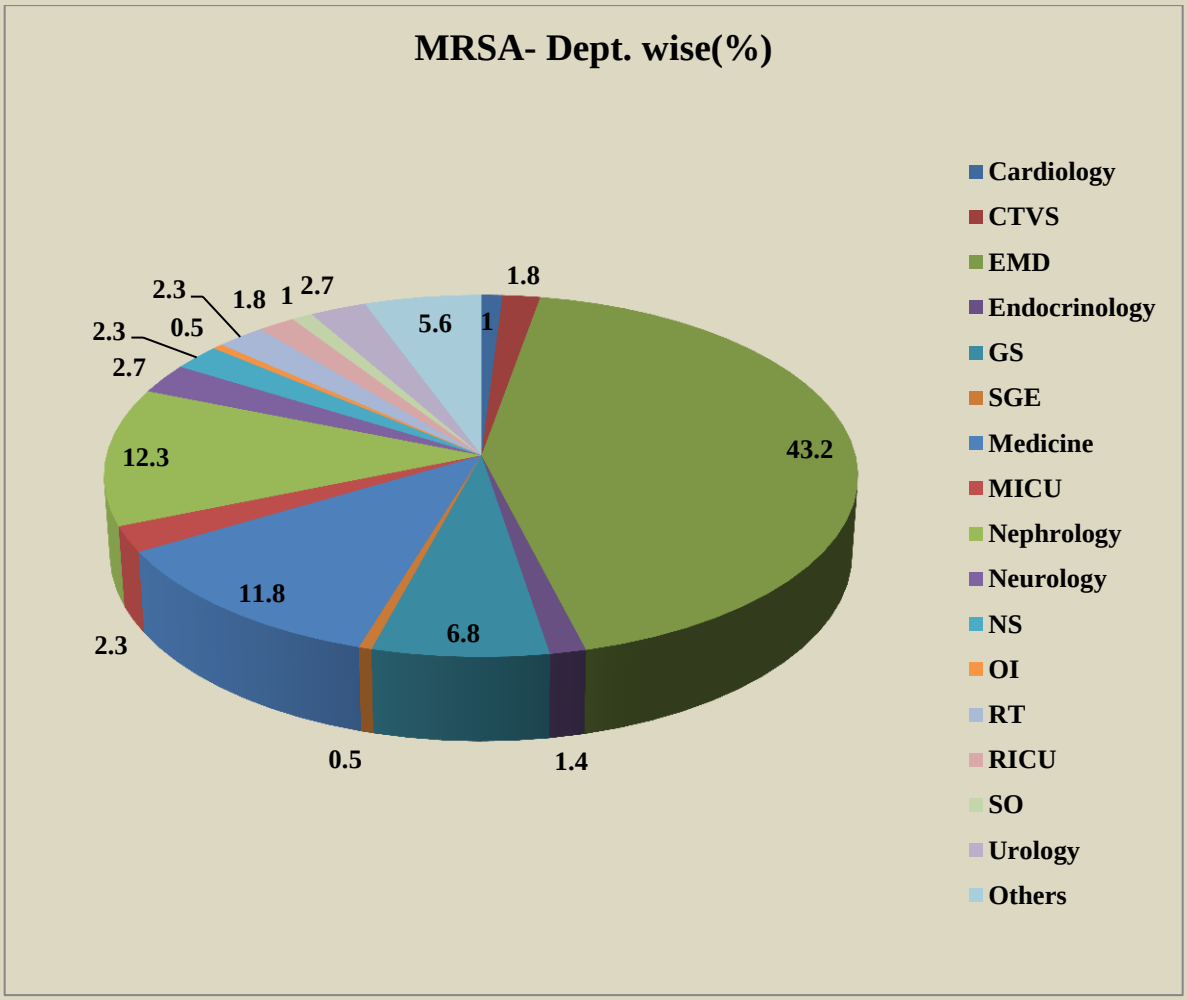
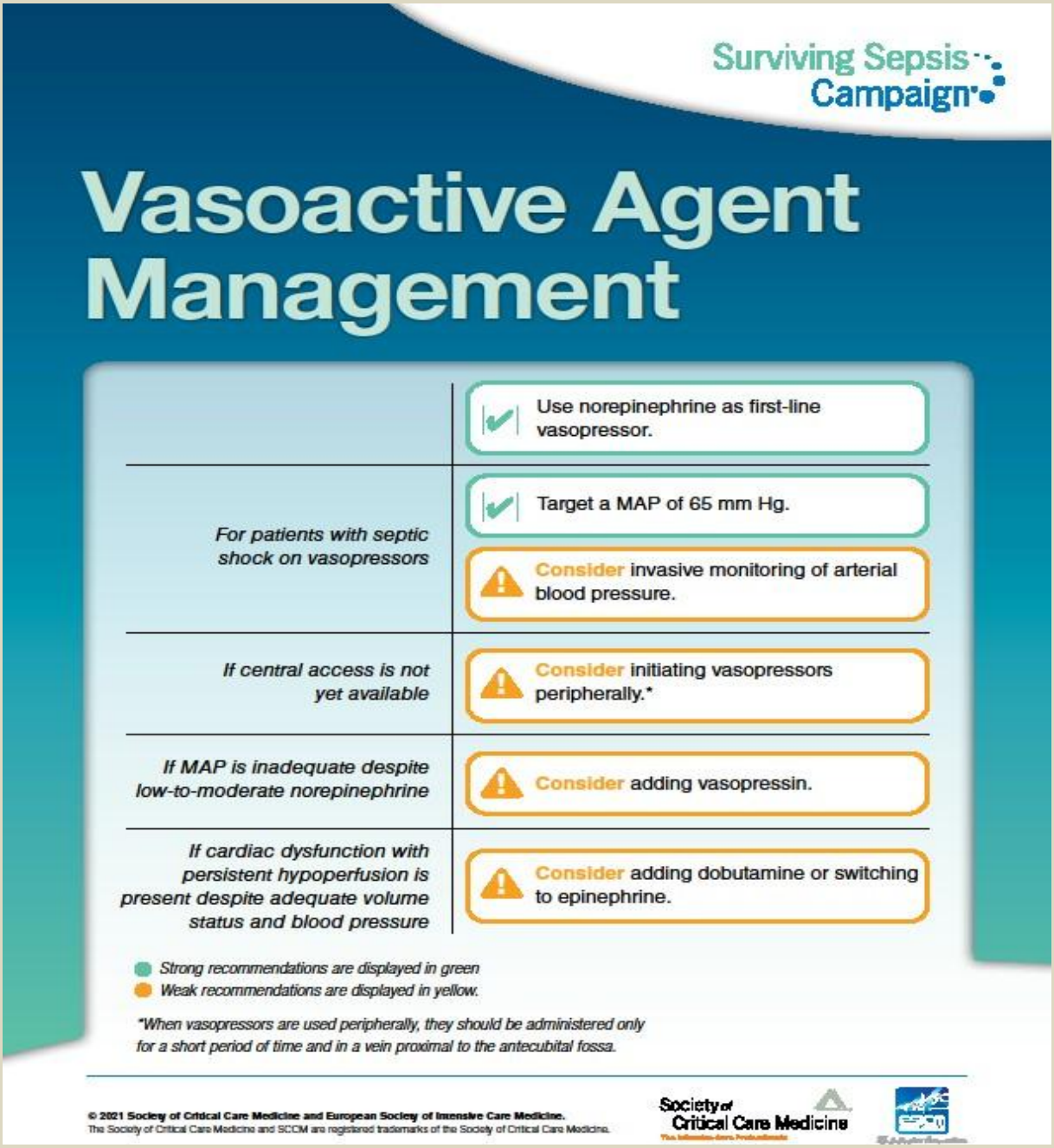


Fig 23: Department wise distribution of MRSA



International Guidelines for Management of Sepsis and Septic Shock 2021:



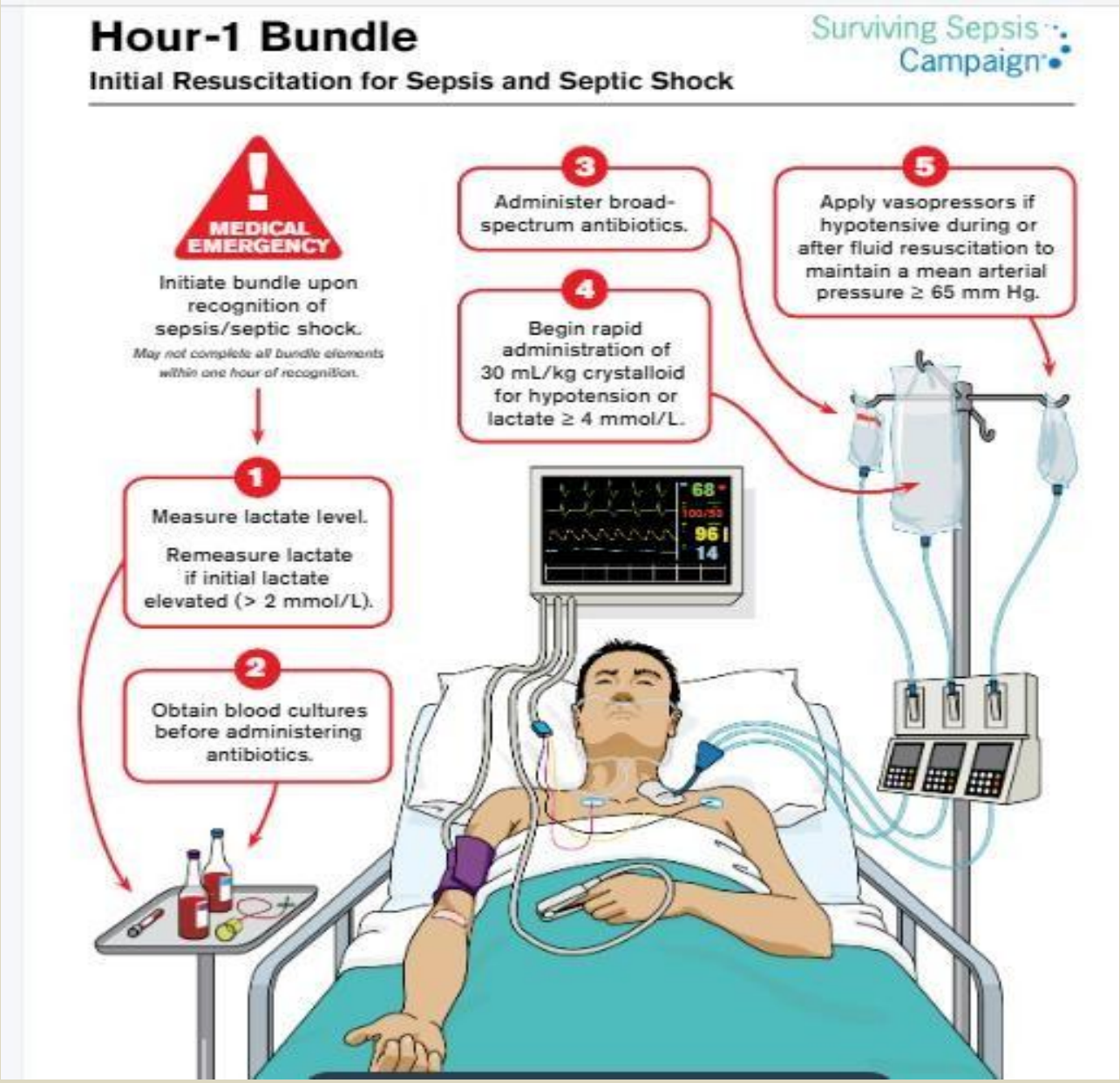
Surviving Sepsis Campaign

Antibiotic Timing

	Shock is present	Shock is absent
Sepsis is definite or probable	✔ Administer antimicrobials ***immediately***, ideally within 1 hour of recognition.	✔ Administer antimicrobials ***immediately***, ideally within 1 hour of recognition.
Sepsis is possible	✔ Administer antimicrobials ***immediately***, ideally within 1 hour of recognition.	✔ Rapid assessment* of infectious vs. noninfectious causes of acute illness. ✔ Administer antimicrobials ***within 3 hours*** if concern for infection persists.

**Rapid assessment includes history and clinical examination, tests for both infectious and noninfectious causes of acute illness, and immediate treatment of acute conditions that can mimic sepsis. Whenever possible, this should be completed within 3 hours of presentation so that a decision can be made as to the likelihood of an infectious cause of the patient's presentation and timely antimicrobial therapy provided if the likelihood is thought to be high.*

Society of Critical Care Medicine



Reference: https://www.sccm.org/Clinical-Resources/Guidelines/Guidelines/Surviving-Sepsis-Guidelines-2021.

Sequential Organ Failure Assessment (SOFA) Score

The SOFA Score*

Organ System, Measurement	SOFA Score				
	0	1	2	3	4
Respiration PaO_2/FiO_2, mmHg	Normal	<400	<300	<200 (with respiratory support)	<100 (with respiratory support)
Coagulation Platelets $x10^3/mm^3$	Normal	<150	<100	<50	<20
Liver Bilirubin, mg/dL (µmol/l)	Normal	1.2-1.9 (20-32)	2.0-5.9 (33-101)	6.0-11.9 (102-204)	>12.0 (<204)
Cardiovascular Hypotension	Normal	MAP<70 mmHg	Dopamine ≤5 or dobutamine (any dose)**	Dopamine >5 or epinephrine ≤0.1 or norepinephrine ≤0.1	Dopamine >15 or epinephrine >0.1 or norepinephrine >0.1
Central Nervous System Glasgow Coma Score	Normal	13-14	10-12	6-9	<6
Renal Creatinine, mg/dL (µmol/l) or Urine output	Normal	1.2-1.9 (110-170)	2.0-3.4 (171-299)	3.5-4.9 (300-440) or <500 mL/day	>5.0 (>440) or <200 mL/day

* Source: Vincent et al., 1996.

**Adrenergic agents administered for at least 1 hour (doses given are in mcg/kg/min).

Quick Sequential Organ Failure Assessment (SOFA) score

qSOFA (Quick SOFA) Criteria	Points
Respiratory rate ≥22/min	1
Change in mental status	1
Systolic blood pressure ≤100 mmHg	1

A qSOFA score ≥ 2 is suggestive of sepsis.

System wise antimicrobial usage guidelines (ICMR & NCDC)

Diagnosis (System involved)	Preferred choice	Alternative	Remarks
Sepsis or septic shock with focus unclear	Imipenem- Cilastatin/ Meropenem +/- Vancomycin	Cefoperazone –Sulbactam +/- Amikacin+/- Vancomycin	Septic shock patient must receive empiric combination therapy with at least two antibiotics of different antimicrobial classes.
CAP-Outpatientswith co- morbidities* or use of antimicrobial in 3 months	Co-amoxiclav and macrolide/doxycycline	Cefuroxime/ cefpodoxime and macrolide/doxycycline	Doxycycline monotherapy not recommended
CAP-Inpatient ICU withrisk factors for *Pseudomonas aeruginosa*/ other enteric gram negative bacteria#	Piperacillin tazobactam/ macrolide/doxycycline	Cefepime/imipenem with macrolide/ doxycycline	Antibiotics should be tailored as per the culture and sensitivity data.
CAP- Inpatient ICU	Ceftriaxone withmacrolide/ doxycycline	Cefotaxime, piperacillin-tazobactam with macrolide	Antibiotics should be tailored as per the culture and sensitivity data.
Community acquired intra-abdominal infection of mild to moderate severity	Cefoperazone-sulbactam	Piperacillin-tazobactam	
Healthcare associated intra-abdominal infections	Imipenem/ Meropenem+ vancomycin	Colistin, Tigecyline	Antibiotics should be tailored as per the culture and sensitivity data.
Infected pancreatic necrosis, pancreatic abscess	Imipenem- cilastatin and vancomycin		Therapy to be adjustedas per the culture and sensitivity results from pancreatic aspirate or necrosectomy.
SBP	Piperacillin/ tazobactam or cefoperazone-sulbactam	For multi-drug resistant organism Imipenem or meropenem may be more reasonable	Antibiotics should be tailored as per the culture and sensitivitydata.
Necrotizingfasciitis (polymicrobial)	Piperacillin- tazobactam + Clindamycin	Generally, 14 days if adequatesource control achieved	Antibiotics should be tailored as per the culture and sensitivity data.
Community acquired bacterial meningit is	Meropenem (Addvancomycin if risk of MRSA) - Gram Negative Klebsiella, Enterococcus, Pneumococcus,	Cefotaxime and gentamicin	

Diagnosis (System involved)	Preferred choice	Alternative	Remarks
	Ceftriaxone+ vancomycin (S.pneumoniae, Haemophilus influenzae,Meningococcus)	Cefotaxime + vancomycin	
Health care associated meningitis and ventriculitis	Ceftriaxone/Meropenem + if S.aureus add vancomycin	Ceftriaxone, Linezolid/ Cotrimoxazole if susceptible	Antibiotics should be tailored as per the culture and sensitivity data.
brain abscess	Meropenem metronidazole with/without vancomycin	Ceftriaxone metronidazole with/without vancomycin	Antibiotics should be tailored as per the culture and sensitivitydata.
Acute Pyelo-nephritis	Piperacillin – tazobactam/ Ertapenem	Imipenem/Meropenem/Amikacin (recommended For children aswell)	Antibiotics should be tailored as per the culture and sensitivity data.
Acute Prostatitis	Ertapenem 1 gIVonce daily	Piperacillin- tazobactam/ Imipenem/ Meropenem/ Trimethoprim- Sulfamethoxazole	
CLABSI	Imipenem/meropenem *plus* Gentamicin *plus* Inj. Vancomycin	Cefoperazone +sulbactam *plus* Gentamicin *plus* Inj. Vancomycin	Antibiotics should be tailored as per the culture and sensitivity data.
	Enterococcus-Ampicillin +/- gentamicin	*Enterococcus*- Vancomycin+/-gentamicin (Linezolid-if vancomycin resistant)	
HAP/VAP	Cefoperazone + sulbactam or piperacillin + tazobactam	Imipenem+colistin	Antibiotics should be tailored as per the culture and sensitivity data.
	MRSA-Linezolid	Vancomycin	
SymptomaticCA-UTI	Nitrofurantoin 100mg PO BID	Piperacillin/tazobactam 4.5 g IV q6hr or Ertapenem 1 g IVq24hr	Antibiotics should be tailored as per the culture and sensitivitydata.
Puerperal sepsis / Septic abortion / chorioamnionitis	Inj. piperacillin-tazobactam	Clindamycin +gentamicin If the patient is inseptic shock, consider imipenem/ mer openem with or without amikacinplus vancomycin,or to cover MRSA	
Infectivendocarditis	Ampicillin + ceftriaxone + gentamicin		Antibiotics should be tailored as per the culture and sensitivity data.

Operations and likely Surgical Site Infection (SSI) pathogens

Operations	**Likely Pathogens**	**Prophylactic antibiotic beforesurgery**
Placement of all grafts, prostheses, or implants	*Staphylococcus aureus*;CoNS	Cefazolin OR Cefuroxime
Cardiac	*Staphylococcus aureus;CoNS*	Cefazolin OR Cefuroxime
Neurosurgery	*Staphylococcus aureus;CoNS*	Cefazolin OR Cefuroxime
Breast	*Staphylococcus aureus;CoNS*	Cefazolin OR Cefuroxime
Ophthalmic	*S. aureus*; CoNS;streptococci; Gram negative bacilli	Topical moxifloxacin given as1 drop every 5–15 min for 5 doses
Orthopedic Total joint replacement, closed fractures/use of nails, bone plates, other internal fixation devices, functional repair without implant/device, trauma	*Staphylococcus aureus*; CoNS; Gram-negative bacilli	Cefazolin For 'below-the-belt' surgeries, Piperacillin-Tazobactam + Clindamycin
Non-cardiac thoracic (lobectomy, pneumonectomy, wedge resection, other non-cardiacmediastinal procedures),closed tube thoracostomy	*Staphylococcus aureus; CoNS; Streptococcus pneumonia; gram- negative bacilli*	Cefazolin OR Cefuroxime OR Ampicillin-sulbactam
Vascular	*Staphylococcus aureus;CoNS*	Cefazolin OR Cefuroxime
Appendectomy	*Gram-negative bacilli; anaerobes*	Piperacillin-Tazobactam OR Cefoperazone-sulbactam
Biliary tract	*Gram-negative bacilli; anaerobes*	Piperacillin-Tazobactam OR Cefoperazone-sulbactam
Colorectal	*Gram-negative bacilli; anaerobes*	Piperacillin-Tazobactam OR Cefoperazone-sulbactam
Gastroduodenal	*Gram-negative bacilli; Streptococci; oropharyngeal anaerobes (e.g., peptostreptococci)*	Piperacillin-Tazobactam OR Cefoperazone-sulbactam
Head and neck (major procedures with an incision through oropharyngeal mucosa)	*Staphylococcus aureus; streptococci; oropharyngeal anaerobes (e.g., peptostreptococci)*	Amoxicillin-clavulanate ORAmpicillin-sulbactum OR Cefazolin+metronidazole
Obstetric and gynecologic	*Gram-negative bacilli; enterococci; group B streptococci; anaerobes*	Cefazolin OR Ampicillin - sulbactam
Urologic	*Gram-negative bacilli*	Prophylaxis based on pre-operative urine culture susceptibility pattern OR Cefazolin, Cotrimoxazole

STEPS OF RATIONAL ANTIBIOTIC USE

Step 1: Making a clinical diagnosis-

Diagnosis of infection

- Is it an infection?
- A risk assessment of how likely is it that the patient has an infection?
- What are the possible non-infectious mimics?
- Have we taken the appropriate cultures to confirm the final diagnosis?

Step 2: Limiting empiric antibiotic therapy-Febrile neutropenia

- Severe sepsis and septic shock
- Community acquired pneumonia
- Ventilator associated pneumonia
- Necrotizing fasciitis

Step 3: Know your bugs-Predict possible microbial pathogens

- Predict the local resistance pattern based on institutional antibiogram

Step 4: Choose the appropriate antibiotic-

Based on the spectrum of the antibiotic taking into account possible resistant patterns

- Use the correct dose, route and duration
- Ensure chosen antibiotic has adequate tissue penetration at the site of infection
- Optimize PK-PD parameters according to co-morbidities

Step 5: De-escalation/modification-

Modify empiric broad spectrum antibiotics depending on culture and antimicrobial susceptibility reports and patient status

De-escalate combination therapy to a single agent

- Change a broad spectrum antibiotic to a narrow spectrum one
- Change IV to oral antibiotics

De-escalation is safe in all patients including febrile neutropenia and septic shock and reduces mortality and length of hospital stay.

Step 6: when to stop antibiotics in clinical situations-

Respiratory tract syndromes

- Viral pharyngitis
- Viral rhinosinusitis
- Viral bronchitis
- Non-infectious cardio-pulmonary syndromes misdiagnosed as pneumonia

II. Skin and Soft Tissue Infections

- Lower extremity stasis dermatitis

Step 7: Reduce the duration of therapy-

Community acquired pneumonia: 5 days

Hospital acquired pneumonia: 8 days

Skin and Soft tissue infections: 5 days

Urinary tract infections

- cystitis: 3-5 days
- Pyelonephritis: 5-14 days
- Catheter associated: 7 days

Reference: Treatment guidelines for antimicrobial use in common syndromes-2019 **(ICMR)**

1. Antibiotic policy

Antimicrobial policy should be implemented through the Antimicrobial stewardship committee or Hospital infection control committee.

- Antibiotic use must be justifiable on the basis of the clinical diagnosis and known or expecting micro-organisms.
- Appropriate specimens for bacteriological examination must be obtained before initiating antibiotic treatment, in order to confirm the treatment is appropriate.
- The selection of antibiotic must be based not only on the nature of the disease and that of the pathogenic agents, but on the sensitivity patterns, patient tolerance, and cost.

Selection based on

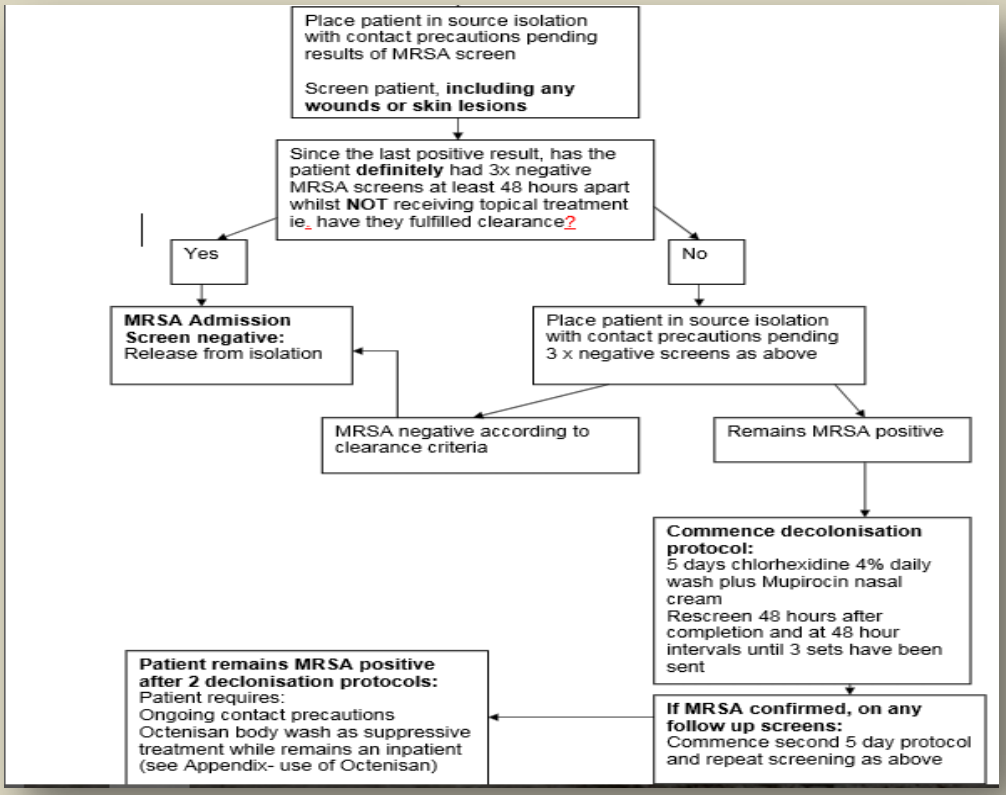
- Based on the spectrum of the antibiotic taking into account possible resistant patterns.
- Use the correct dose, route and duration.
- Ensure chosen antibiotic has adequate tissue penetration at the site of infection.
- Optimize PK-PD parameters according to co-morbidities

De-escalation/modification

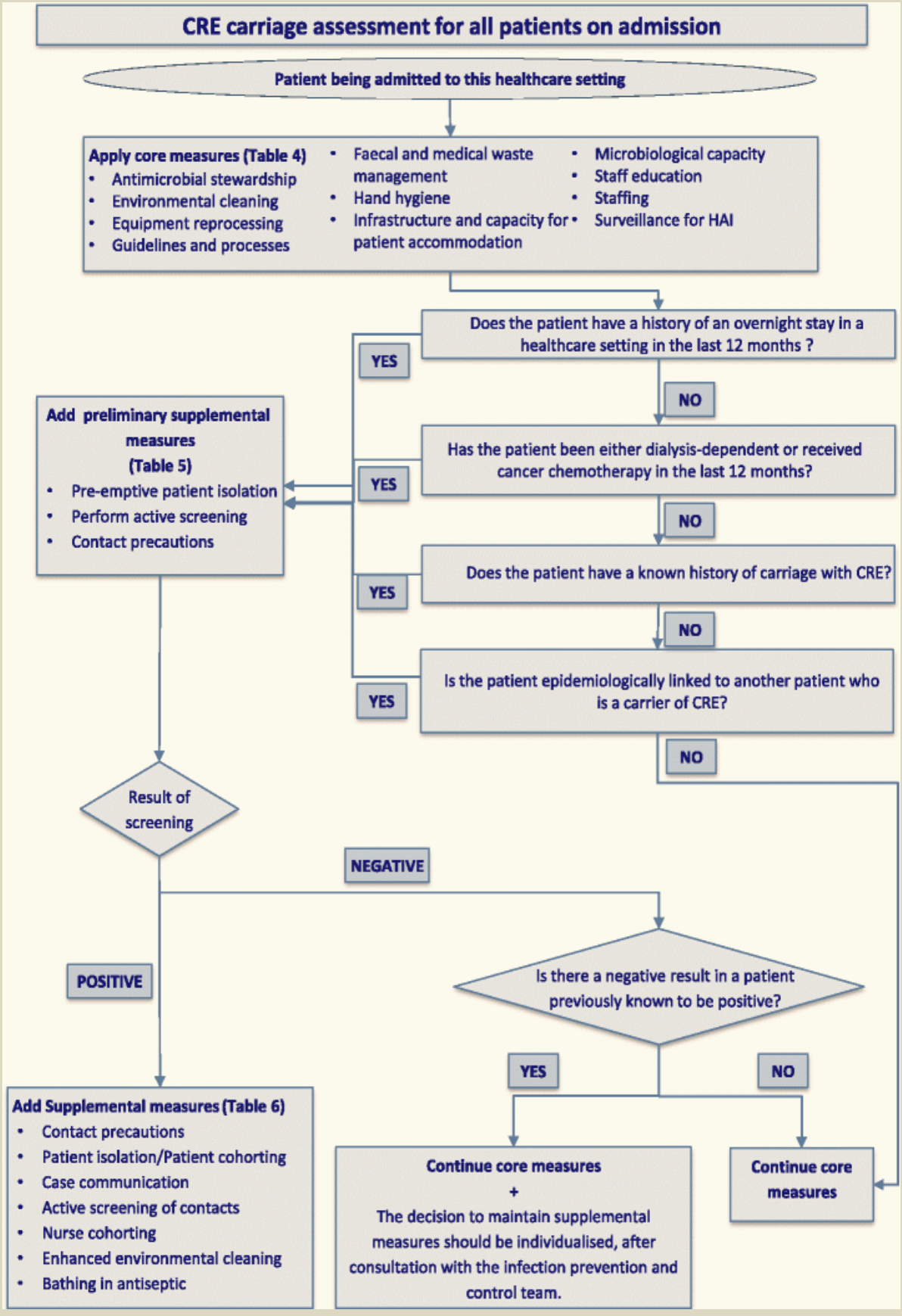
a. Modify empiric broad spectrum antibiotics depending on culture and antimicrobial susceptibility reports and patient status
b. Stop polymyxins and glycopeptides if no carbapenem resistant organisms (CRO) or methicillin resistant *Staphylococcus aureus*(MRSA) identified on cultures
c. Avoid double or redundant gram negative or anaerobic coverage
d. Discontinue antibiotics if a non-infectious mimic identified
e. De-escalate combination therapy to a single agent
f. Change a broad spectrum antibiotic to a narrow spectrum one
g. Change IV to oral antibiotics
h. De-escalation is safe in all patients including febrile neutropenia and septic shock and reduces mortality and length of hospital stay.

- The physician should receive timely, relevant information of the prevalence of resistance in the facility.
- An agent with as narrow a spectrum as possible should be used.
- Antibiotic combinations should be avoided, if possible,
- Selected antibiotics may be restricted in use (like vancomycin, linezolid, Carbapenems etc..)
- The correct dose must be used (low doses may be ineffective for treating infections, and encourage the development of resistance, while excessive doses may have adverse effects, and may not prevent resistance)

Flow diagram for known MRSA positive patients



Routinely assess all patients on admission for CPE status
Guideline for Infection Prevention and Control (IPC) of Carbapenemase-Producing Enterobacteriaceae (CPE)



Revision of Antibiotic AWaRe Classification as per WHO 2019 guidelines

As part of the review of antibacterial agents, a new categorization of antibacterial agents into three groups was proposed:

- **ACCESS** – first and second choice antibiotics for the empiric treatment of most common infectious syndromes;
- **WATCH** – antibiotics with higher resistance potential whose use as first and second choice treatment should be limited to a small number of syndromes or patient groups; and
- **RESERVE** – antibiotics to be used mainly as 'last resort' treatment options

ACCESS Group

Beta-lactam medicines		Other antibacterials	
Amoxicillin	Cefotaxime*	Amikacin	Gentamicin
Amoxicillin + clavulanic acid	Ceftriaxone*	Azithromycin*	Metronidazole
Ampicillin	Cloxacillin	Chloramphenicol	Nitrofurantoin
Benzathinebenzylpenicillin	Phenoxymethylpenicillin	Ciprofloxacin*	Spectinomycin (EML only)
Benzylpenicillin	Piperacillin + tazobactam*	Clarithromycin*	Sulfamethoxazole + Trimethoprim
Cefalexin	Procaine benzyl Penicillin	Clindamycin	Vancomycin (oral)*
Cefazolin	*Meropenem**	Doxycycline	Vancomycin (parenteral)*
Cefixime*			

Watch group antibiotics

Quinolones and fluoroquinolones e.g. Ciprofloxacin, Levofloxacin, Moxifloxacin, Norfloxacin
3rd-generation cephalosporins (with or without beta-lactamase inhibitor) e.g. Cefixime, eftriaxone, Cefotaxime, Ceftazidime
Macrolides e.g. Azithromycin, Clarithromycin, Erythromycin
Glycopeptides e.g. Teicoplanin, Vancomycin
Anti-Pseudomonalpenicillins with beta-lactamase inhibitor e.g. piperacillin +tazobactam
Carbapenems e.g. Meropenem, Imipenem + Cilastatin, Penems e.g. Faropenem

Reserve group ('last-resort') antibiotics

Aztreonam	Fosfomycin (IV)
4th generation cephalosporins e.g. Cefepime	Oxazolidinones e.g. Linezolid
5th generation cephalosporins e.g.Ceftaroline	Tigecycline
Polymyxins e.g. Polymyxin B, Colistin	Daptomycin

2. Biomedical Waste Management

Segregation of Biomedical Waste

Yellow (Non-Chlorinated Plastic Bags)	Red (Non-Chlorinated Plastic Bags)	Blue Card Board Boxes	White (Translucent Puncture Proof Container)
Human Anatomical, Infectious Waste & Cytotoxic Waste ➢ Human tissues, organs, body parts and foetus ➢ Items contaminated with blood, body fluids like dressings, plaster casts, cotton swabs ➢ Bags containing residual or discarded blood and blood components ➢ Antibiotics, cytotoxic drugs along with glass or plastic ampoules, vials (with cytotoxic labelled bag) ➢ Discarded disinfectants ➢ Discarded linen, mattresses, beddings contaminated with blood or body fluid ➢ Blood bags ➢ Laboratory culture, stocks or specimens of microorganisms ➢ Live or attenuated vaccines	**Contaminated Waste (Recyclable)** ➢ Disposable items ➢ Tubing ➢ Bottles ➢ Intravenous tubes & sets ➢ Catheters ➢ Urine bags ➢ Gloves ➢ Syringes (without needles and fixed needle syringes) ➢ Vaccutainers with their needles cut	**Glassware** ➢ Broken or discarded and contaminate glass including medicine vials and ampoules except those contaminate with cytotoxic wastes **metallic body implants**	**Waste Sharps Including Metals** ➢ Needles ➢ Syringes with fixed needles ➢ Needles from needle tip cutter or burner ➢ Scalpels ➢ Blades ➢ Any other contaminated sharp object that may cause puncture and cuts ➢ Contaminated sharps
Black/ Green – General Garbage (domestic waste, papers, packaging material, left over food)			

Biomedical Waste Management (BMW) RULES 2016

Category	Type ofwaste	Type of Bag/ container	Treatment/ Disposal options
Yellow	Human anatomical waste	Yellow coloured	Incineration/ Plasma pyrolysis/ deep burial
	Animal anatomical waste		
	Soiled waste	non chlorinated plastic bags	Incineration/ Plasma Pyrolysis/ deep burial/ autoclaving or hydroclaving + shredding/mutilation
	Expired/ discarded medicines- pharmaceutical waste, cytotoxic drugs	Yellow coloured containers/ non chlorinated plastic bags	Incineration (cytotoxic drugs at temperature > 1200□C)
	Chemical waste	Yellow coloured containers/ non chlorinated plastic bags	Incineration or Plasma pyrolysis or Encapsulation
	Discarded linen contaminated with blood/ body fluids	Non- chlorinated yellow plastic bags / suitable packing material	Non- chlorinated chemical disinfection followed by incineration/ plasmapyrolysis
	Microbiology, other clinical lab waste, blood bags, live/attenuated vaccines	Autoclave safe plastic bag/container	Pre-treat to sterilize with non-chlorinated chemicals on-site as per NACO/ WHO guidelines + Incineration
Red	Contaminated Waste(Recyclable)	Red coloured non-chlorinated Plastic bags or containers	• Autoclaving/ micro- waving/ hydroclaving + shredding • Mutilation/ sterilization+ shredding. Treated waste sent to registered or authorized recyclers or for energy recovery or plastics to diesel or fuel oil or for road making,
White (Translucent)	Waste sharps including Metals	Puncture proof, Leak proof, tamper proof containers	• Autoclaving/dry heat sterilization+ shredding/ mutilation • Encapsulation in metal container or cement concrete • Sanitary landfill/ designated concrete waste sharp pit
Blue	Glassware, Metallic body implants	• Glass test tubes • Empty glass Bottles • Contaminated glass bottles • Broken glass ampoules containing discarded/Expired medicines except chemotherapeutic medicines • Metallic body implants • Reusable glass slide	Disinfection (by soaking the washed glass waste after cleaning with detergent and Sodium Hypochlorite treatment)/ through autoclaving/ microwaving/ hydroclaving + recycling

BMW 2018 Amendment

- Establish a Bar- code system for bags
- Phase out use of chlorinated plastic bags (excluding blood bags) and gloves (By the 27th March, 2019)
- Health Care Facilities having less than ten beds shall have to install Sewage Treatment Plant by the 31st December, 2019.
- All the health care facilities (any number of beds) shall make available the annual report on its web-site within a period of two years from the date of publication of Bio-Medical Waste Management (Amendment) Rules,2018;"

h) Microbiology, Biotechnology and other clinical laboratory waste: Blood bags, Laboratory cultures, stocks or specimens of micro-organisms, live or attenuated vaccines, human and animal cell cultures used in research, industrial laboratories, production of biological, residual, toxins, dishes and devices used for cultures.	Autoclave safe plastic bags or containers	Pre-treat to sterilize with non-chlorinated chemicals on-site as per National AIDS Control Organization or World Health Organization guidelines thereafter for Incineration.

- Autoclave, Microwave and Hydroclave
- As per World Health Organisation guidelines on Safe management of wastes from healthcare activities and WHO Blue Book, 2014 and thereafter sent for incineration
- Routine mask and gown –yellow
- Cardboard boxes with blue colored marking - Puncture proof and leak proof boxes or containers with blue colored marking
- Chemical treatment using at least 10% Sodium Hypochlorite – corrected1-2%

Autoclave

Condition:

- 121°C, 15 pounds pressure for 60minutes
- 135°C, 31 pounds pressure for 45minutes
- 149°C, 52 pounds pressure for 30minutes

- Validation:
  - *Geobacillusstearothermophilus* with at least $1X10^6$ spores
  - Three monthly interval
- Daily - Chemical indicator strip

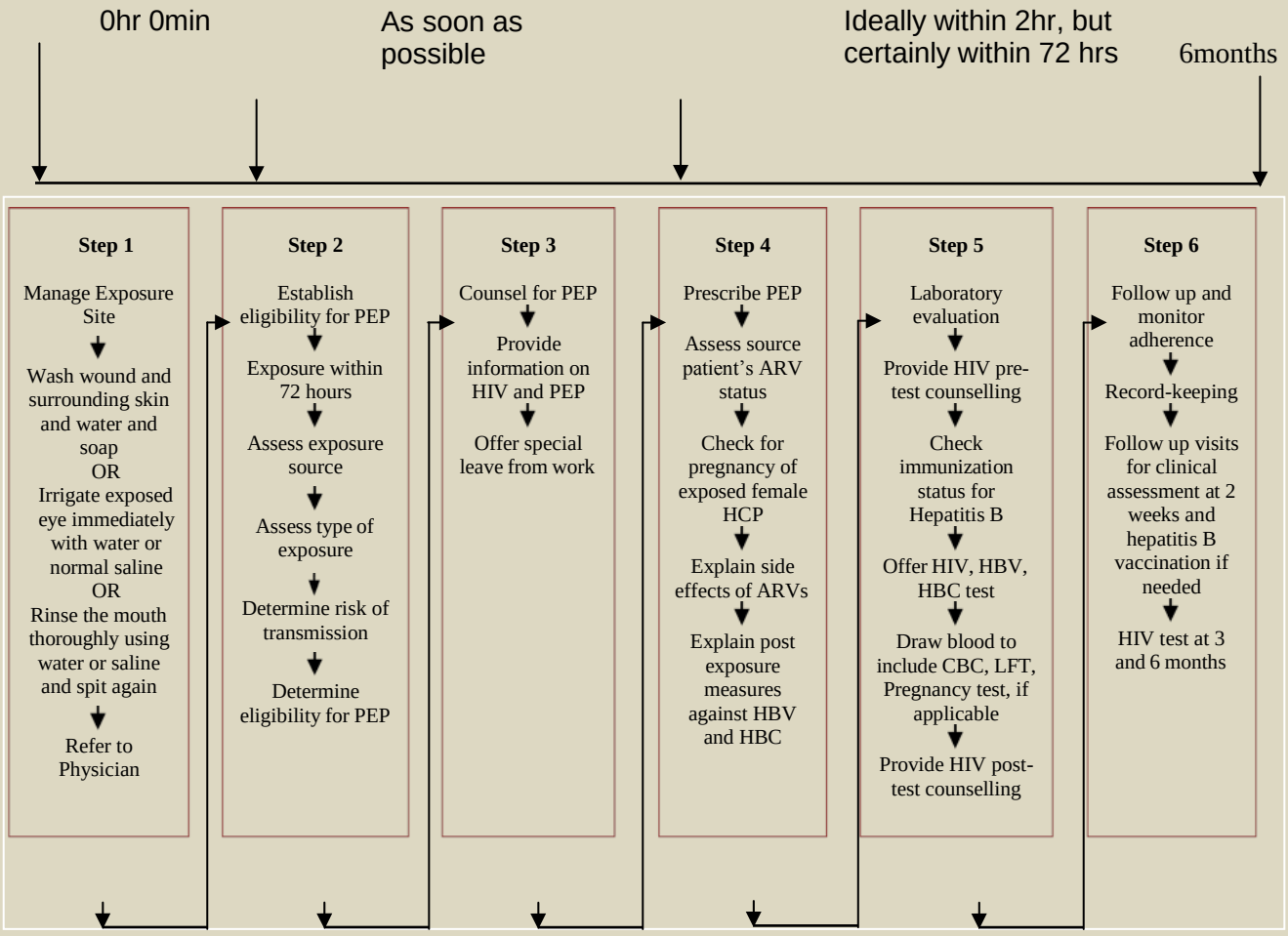
BMW 2019 Amendment

1. Update on day to day basis the bio-medical waste management register and display the monthly record on its website according to the bio-medical waste generated in terms of category and colour coding as specified in Scheduled.
2. Annual report on its web-site within a period of two years from the date of publication of the Bio- Medical Waste Management (Amendment) Rules, 2018 is made available.
3. Health Care Facilities having less than ten beds shall have to comply with the output discharge standard for liquid waste by 31st December,2019.

4. Post exposure prophylaxis (PEP)

"Post exposure prophylaxis" (PEP) refers to the comprehensive management given to minimize the risk of infection following potential exposure to blood-borne pathogens (HIV, HBV, HCV).

Steps for Managing Occupational Exposure



PEP : Post Exposure Prophylaxis ARV : Anti Retroviral
HCP : Health Care Professional CBC: Complete Blood Count
LFT : Liver Function Test.

References:

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