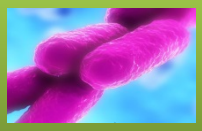
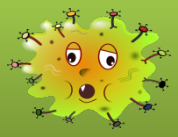


Healthcare Associated Infections (HAI)

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. B. Vengamma** 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 editionof “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 programmeis jointly monitored by Hospital Infection Control Committee and SVIMS QualityCouncil.

CONTENTS

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

	Strategy	Implementation
1	• Reducing Inappropriate Device usage	Education by SQC
2	• Hand hygiene and Barrier precaution	HICC, SQC group
2	• Antimicrobial stewardship	Release pocket guide on 12.07.2016
4	• Leadership support at highest level	Director involvement Engineering AP Heath Ministry
5	• Implementing culture of safety	SQC launch
6	• Financial incentives & regulatory oversight	Consideration by AP Health Ministry
7	• System based appropriate protocol and checklist	Ongoing development
8	• Better care of technology	BME monitoring
9	• Public reporting of credible data	Launch 12.07.2016
10	• Partnership	Explore with CDC, WHO

SQC = SVIMS Quality Council

HICC = Hospital Infection Control Committee

BME = Biomedical Engineering

CDC = Centers for Disease Control and Prevention

WHO = World Health Organization

2) Hospital Infection Control (HIC) Committees

HIC Committee Members:

- HICC Chairman – Dr B. Vengamma, Director cum Vice Chancellor
  HICCCo-Chairman
- Dr. Ram, MedicalSuperintendent
- Member Secretary- Dr B. Venkataramana, HOD i/c, Microbiology
- Hospital Infection Control Officers-Dr.R.Jayaprada, Dr.N.Ramakrishna, Dr S. Yamini
- Senior Consultant- Dr A. Mohan, Senior professor& HOD of Medicine-
  Member All the heads of the departments-Members
- Nursing AD- Mrs T. Prabhavathi
- Nursing Superintendent Grade I-Mrs.C.Sunitha-Member
- Infection Control Nurses- V. Karpugam, D.Redemma, A.Shobharani& all 47 Head nurses-Members
- Infection Control technicians: Mr P.Yashodhar, Mr V. Venkatesh
- Operating theatre Incharge- MrsShakira, Mrs Munilakshmi -Members
- In-charge of Central Sterile Supplies Department-Mrs. T. Prabhavathi-Member
- Health inspector – Mrs.A.Umamaheswari-Member
- In-charge of pharmacy- Dr.P.Subramanyam-Member In-charge of
  hospital linen- Mrs.C.Sunitha-Member
- In-charge of hospital laundry- D.Indiramma-Member
- In-charge of hospital kitchen- MrsM.Sunitha, Mrs Geetha-Member
- Epidemiologist- Dr V. Chandrasekhar, Assistant professor, Social &
  Preventive medicine-Member

3) HIC Terms ofReference

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 injuryincidence
    vii) Hand hygiene compliance

2. Bed soreanalysis
3. O.T. surveillance(Monthly)
4. Blood banksurveillance
5. Environmental surveillance (water& air)(Monthly)
6. Handhygiene
7. Dialysate fluidtesting
8. Needle-stick injuriesincidence
9. Multi drug-resistant organisms (MDRO's)Surveillance
10. Outbreakinvestigation
11. Biomedical wastemanagement
12. High end antibioticmonitoring
13. AMRsurveillance
14. HBs Ag antibody titretesting
15. Endotoxin (LAL) assay for Dialysate fluid &water
16. Disinfectant testing-new andin-house
17. Stool for *Clostridium difficile* toxin A&Btesting
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) HandHygiene

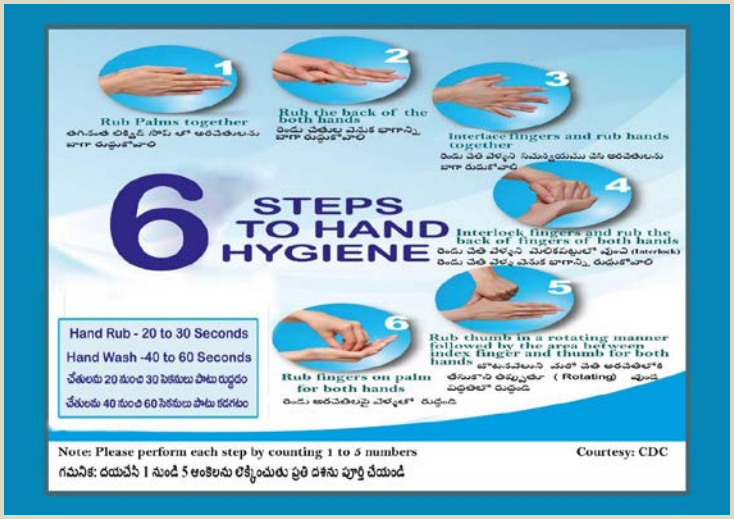
- The organization adheres to standard precautions at all times regarding the use of PPE, prevention of sharp injuryetc.

- Hand Hygiene guidelines are followed in all areas of the hospital-Posters regarding Hand Hygiene areavailable.

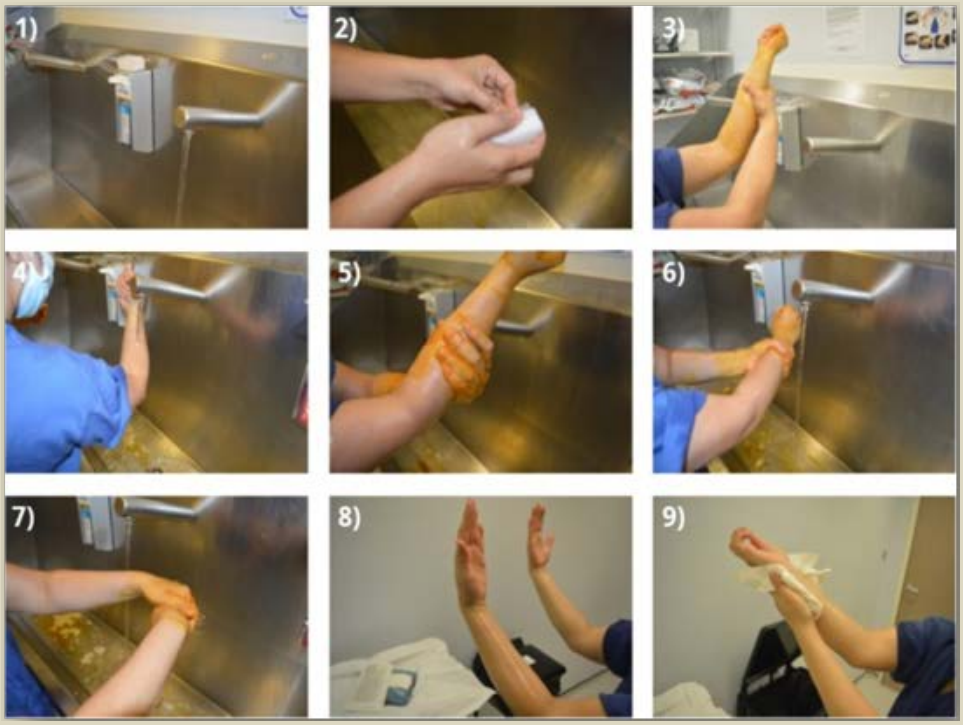
- Specific precautions are being followed when required. Safe Injection and Infusion practices are followed.

- 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

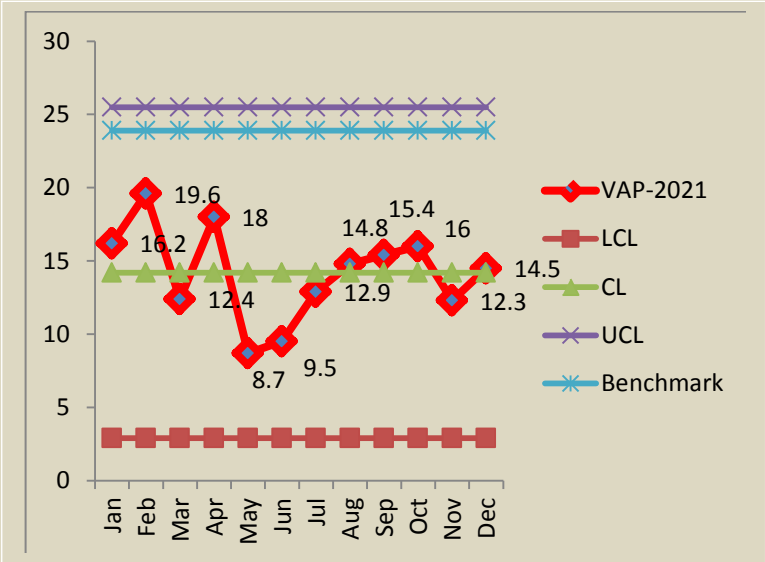
Prevent droplet spread
when coughing, sneezing

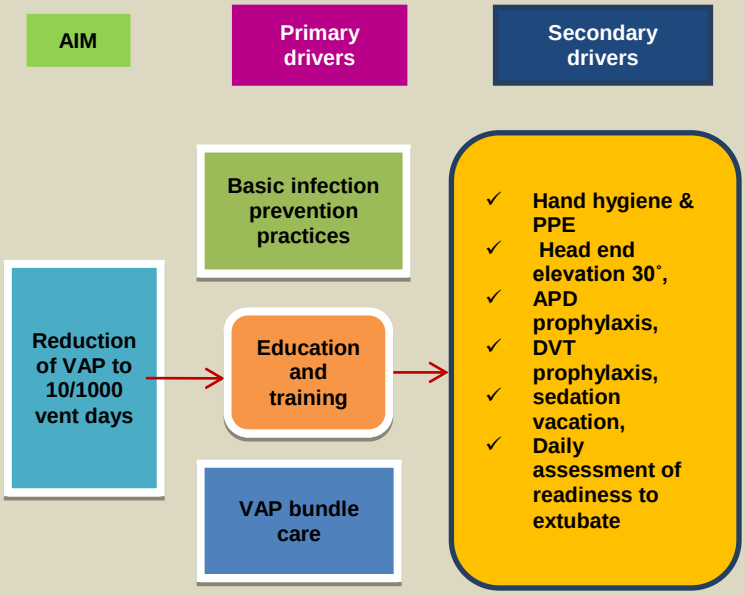
Director cum Vice-Chancellor

Sri Venkateswara Institute of
Medical Sciences, Tirupati.

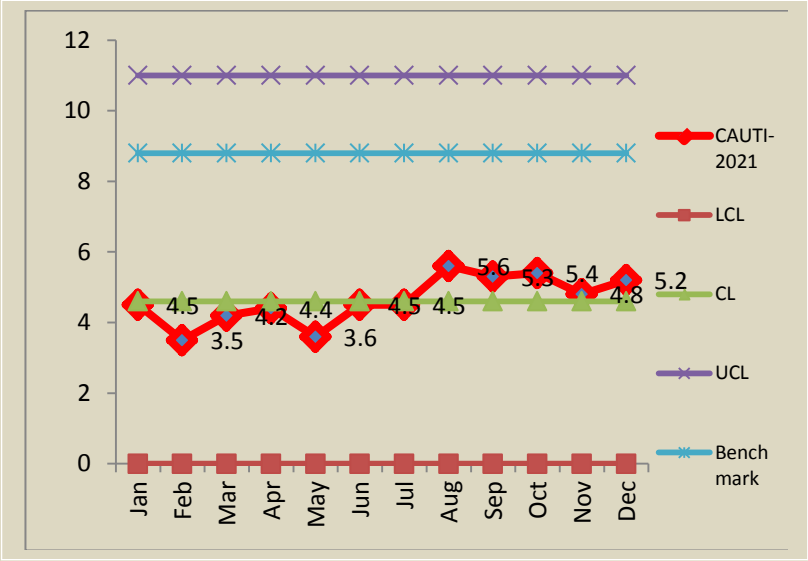
5) Outcomes & KPIs for Infections

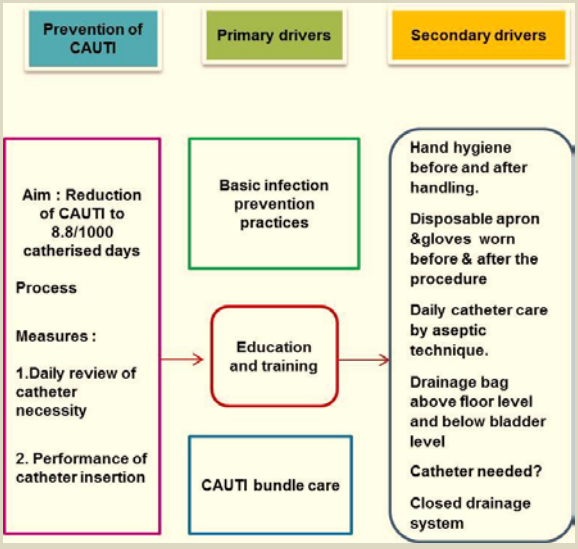
i) Control chart for VAP from Jan to Dec 2021



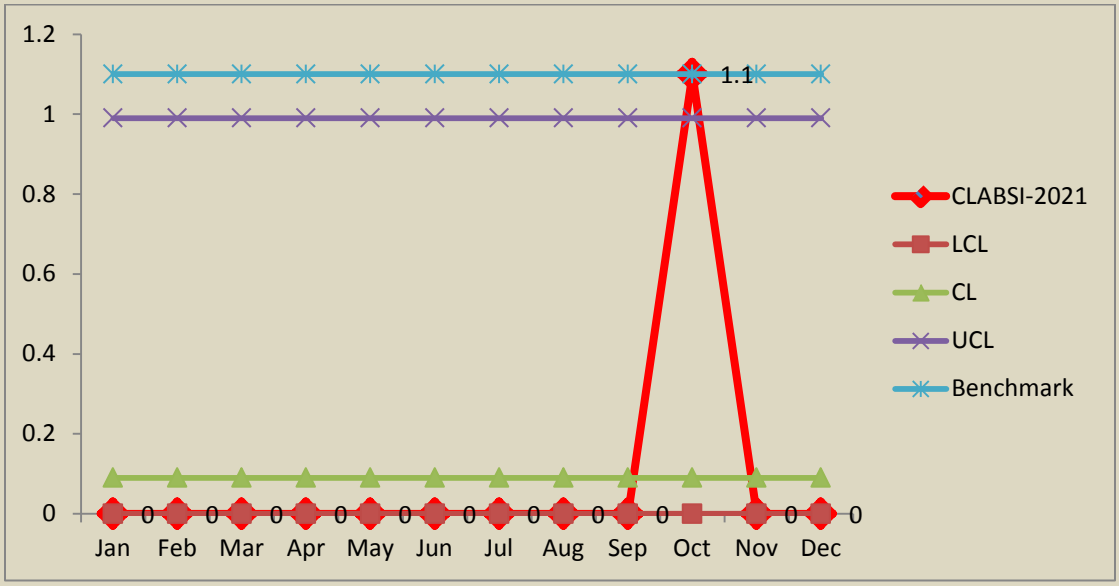


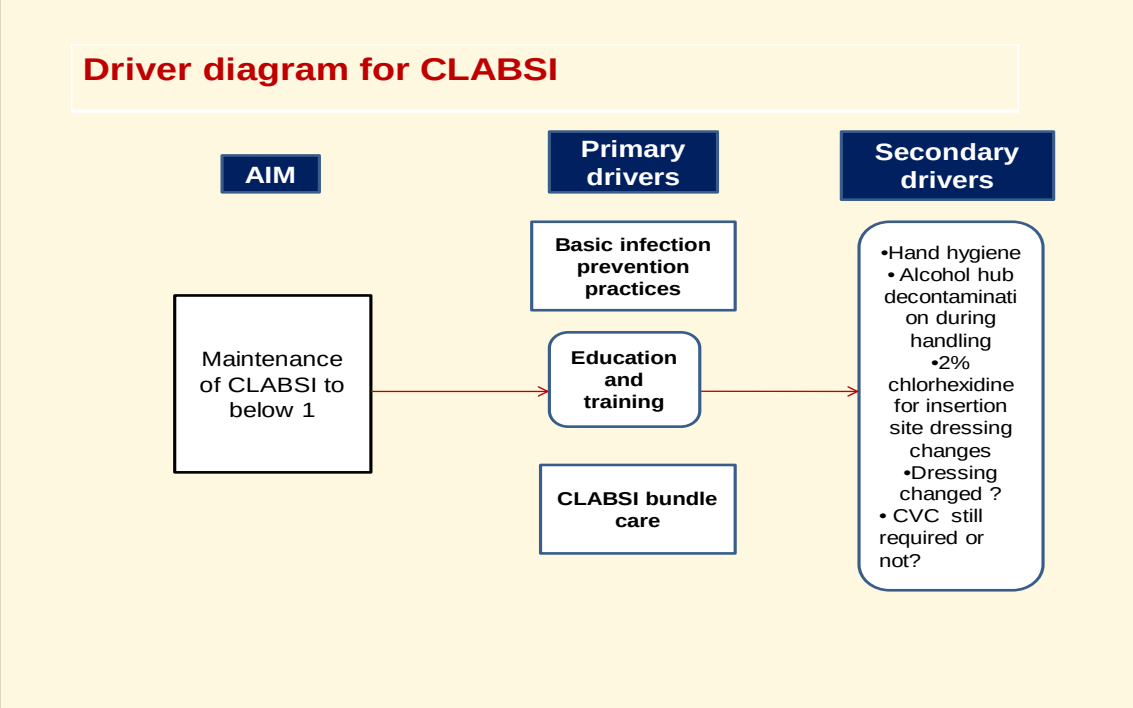
ii) Control chart for CAUTI from Jan to Dec 2021





iii) Control chart for CLABSI from Jan to Dec 2021





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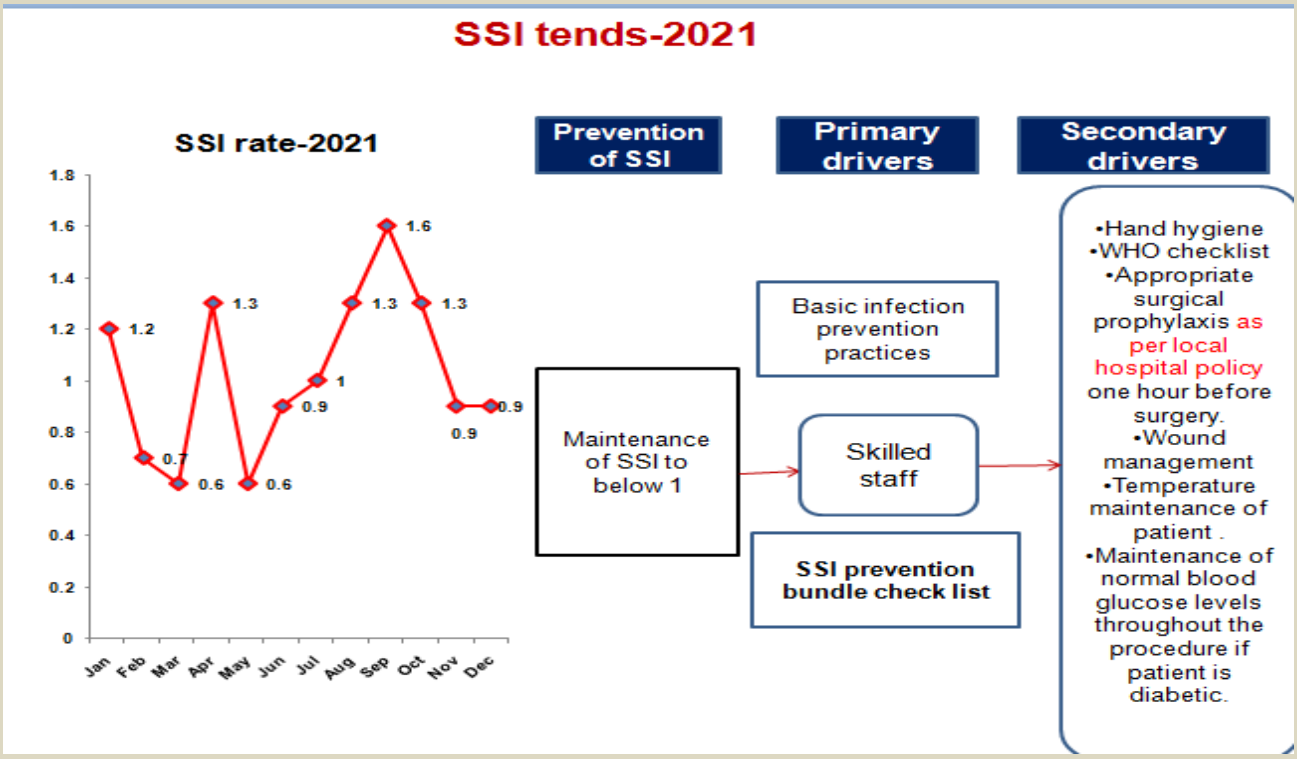
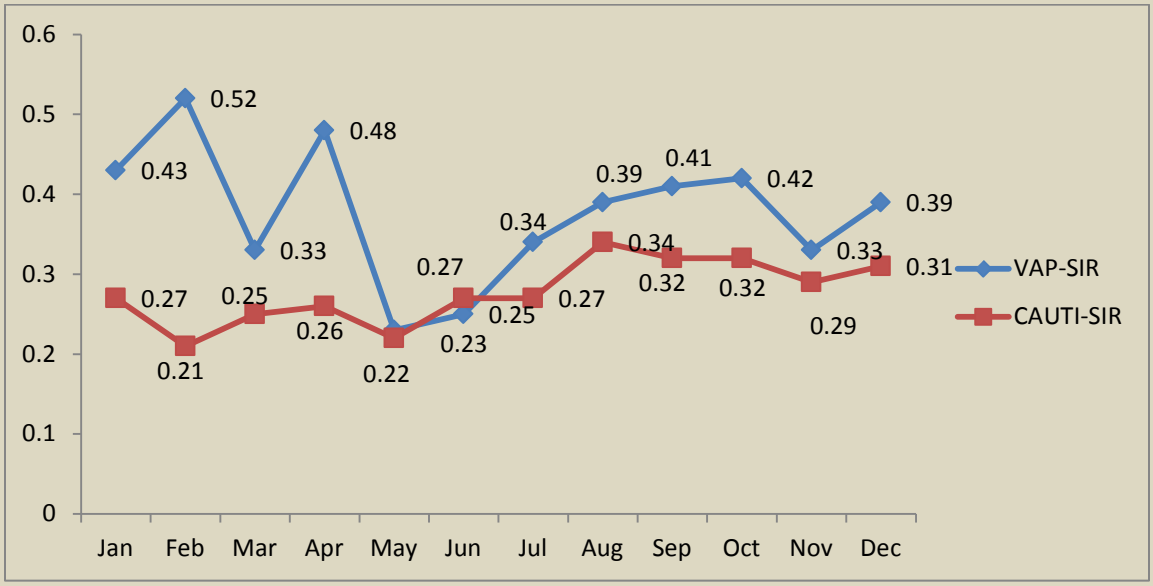
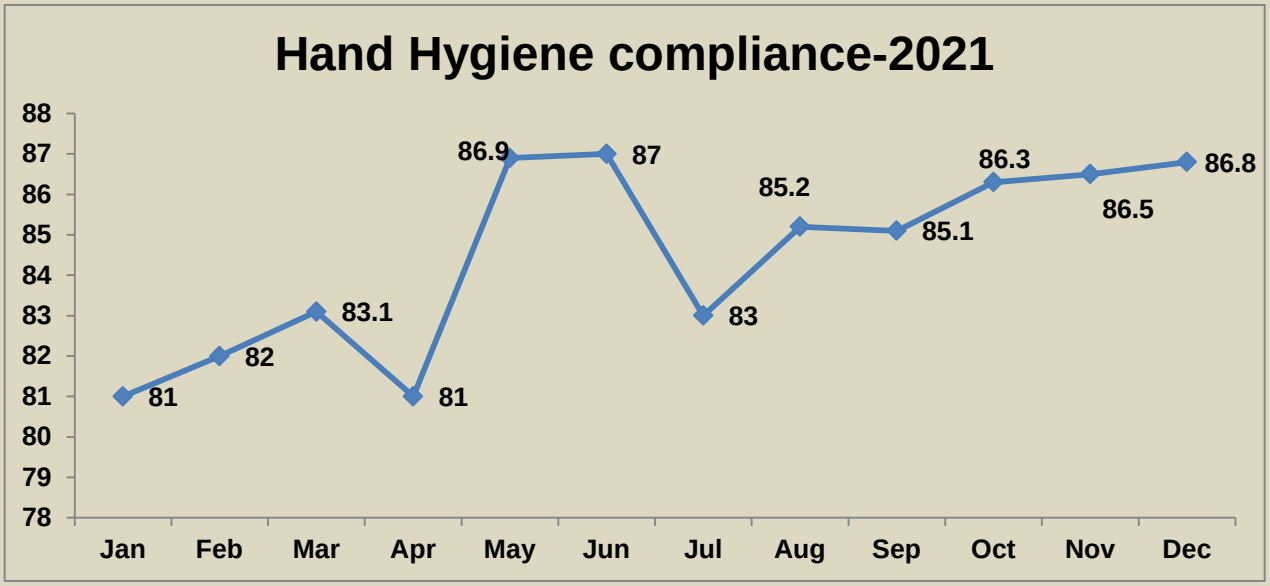


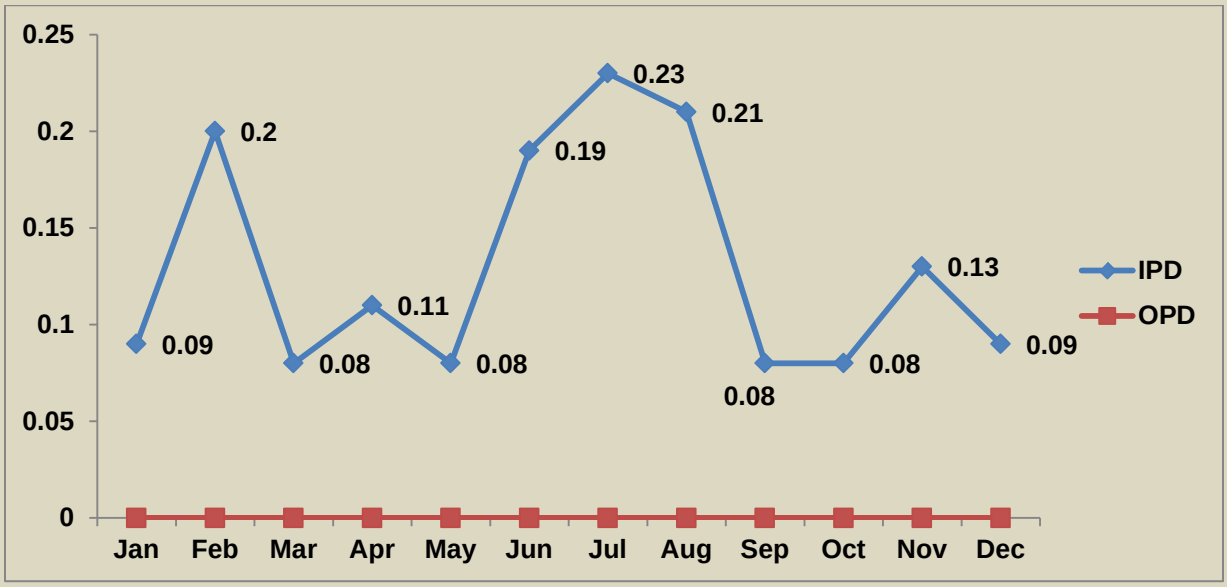
v) STANDARDIZED INFECTION RATIO(SIR) from Jan to Dec-2021



vi) Hand hygiene overall compliance rate from Jan to Dec 2021



vii) **Needle stick injury incidences (NSI) from Jan to Dec 2021**



SRI VENKATESWARA INSTITUTE OF MEDICAL SCIENCES, TTD, TIRUPATI

ANTIMICROBIAL STEWARDSHIP POCKET GUIDE

JUL-DEC 2021 (12TH EDITION)

12th Edition

Editors

Dr B.Vengamma, Director-cum-VC

Dr. Ram, Medical Superintendent

Dr B. Venkataramana (HOD I/C)

Dr R.Jayaprada, HICO, AMSP Lead

Dr N.Ramakrishna, HICO, AMSP Lead

Preface

Healthcare Associated Infections (HAI)

Dr. B. Vengamma, 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. B.Vengamma
Director cum Vice Chancellor

From the desk of editors…….

Greetings from Anti-Microbial Stewardship Program committee team,

- Antimicrobial resistance (AMR) results in increased morbidity, mortality and costs of health care.
- Prevention of the emergence of antimicrobial resistance and the dissemination of resistant organisms will reduce the adverse effects and their costs.
- In SVIMS, 56% of Multidrug Resistance (MDR) was contributed by *Escherichia coli* followed by *Klebsiella spp.(17.1%), Acinetobacter spp.(11%)*and *Pseudomonas spp. (6.7%)* among Gram negative bacteria.
- As per our local antibiogram, empirical choice of antibiotic in **ICUs** in our institute is **Cefoperazone+sulbactam.** In case of suspicion of *Pseudomonas spp.*infections, empirical choice of antibiotic is Piperacillin+ Tazobactam.
- Based on Gram staining report, empirical choice for Gram negative bacilli is **Cefoperazone+ sulbactam,** and for Gram positive bacteria is **Vancomycin**in all ICUs depending on the individual department.
- In our hospital, Percentage of Methicillin resistance *Staphylococcus aureus* (MRSA) was 58.1%, Methicillin resistance *Coagulase negative Staphylococcus* (MRCoNS) was 56.7%,Vancomycin resistance *Staphylococcus aureus* (VRSA) was 0.8%, Vancomycin resistance *Coagulase negative Staphylococcus* (VRCoNS) was nil and Vancomycin resistant *Enterococci* (VRE) being 9.1% among multidrug resistant 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.* (70.2%) followed by *Klebsiellae spp.*(48.4%), *Pseudomonas spp.*(27.2%).
- Among isolated MDR Enterobacteriaceae, 13.4% were Carbapenem resistant Enterobacteriaceae (CRE)

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 of infection and the clinical status of the patient.***

Foot notes: ***All cephalosporins and piperacillintazobactum must be given as 3 hour infusion to maintain the therapeutic levels as per Clinical laboratory Standard Institute (CLSI) 2022.***

R.Jayaprada, N.Ramakrishna, S.Yamini — Infection Prevention & Control Officers, AMSP Lead

Ram — Medical Superintendent

B.Vengamma — Director-cum-Vice Chancellor

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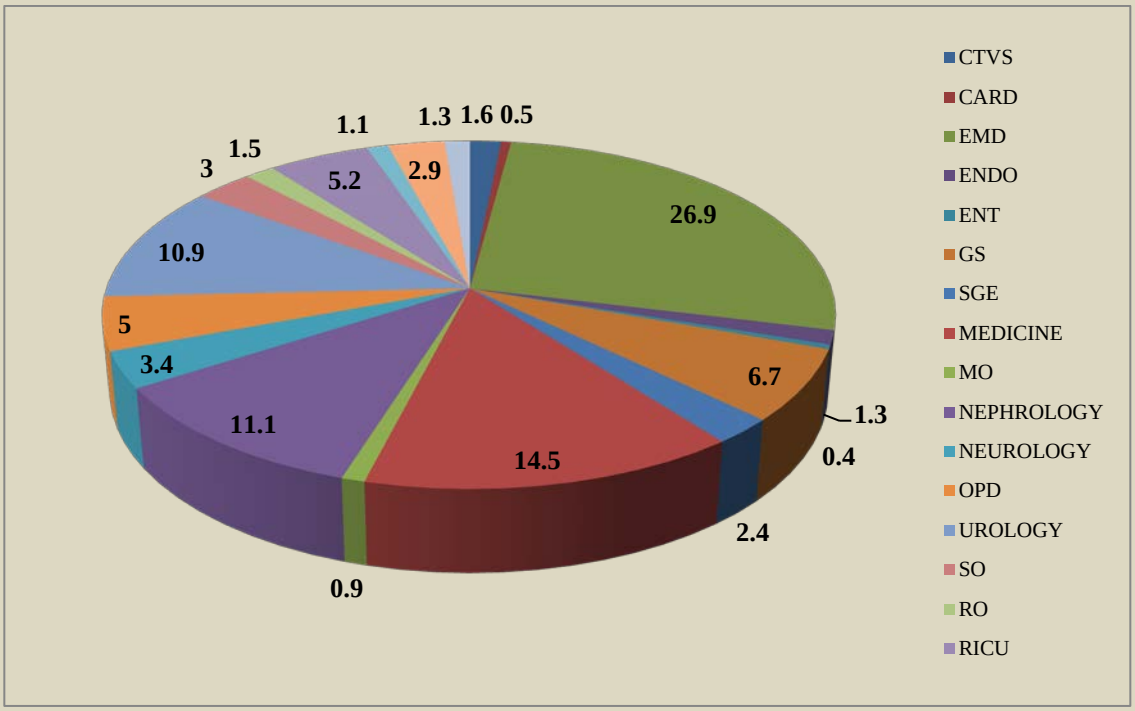
1. Trends of Multidrug Resistance from July 2021 – December 2021

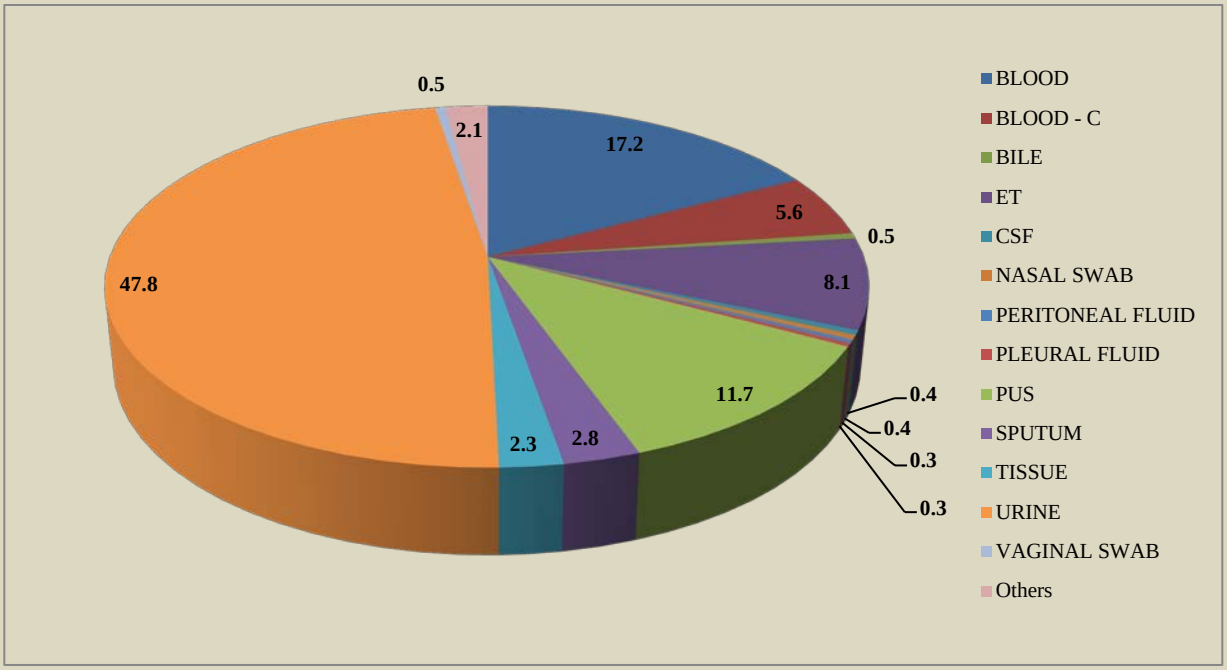
Fig 1: Department wise distribution of MDR isolates(%)



CTVS- Cardiothoracic vascular surgery, **CARD**-Cardiology, **EMD**-Emergency medicine department, **ENDO**-Endocrinology, **ENT**- Ear, Nose & Throat, **GS**-General surgery, **SGE**- Surgical Gastroenterology, **MO**- Medical oncology, **OPD**-Outpatient department, **SO**- Surgical oncology, **RO**- Radiation oncology, **RICU**- Respiratory Intensive care unit, **OBG**- Obstetrics &Gynecology, **NS**- Neurosurgery.

High percentage of multidrug resistance was noted from emergency department followed by General surgery and Nephrology.

Fig 2: Sample wise distribution of MDR isolates(%)



Blood-A- Automated blood culture, Blood-C- Conventional blood culture, ET- endotracheal aspirate, CSF- Cerebrospinal fluid.

Percentage of multidrug resistance is high in urine samples followed by automated blood cultures & bile fluid.

Fig 3: Age wise distribution of Samples(%)

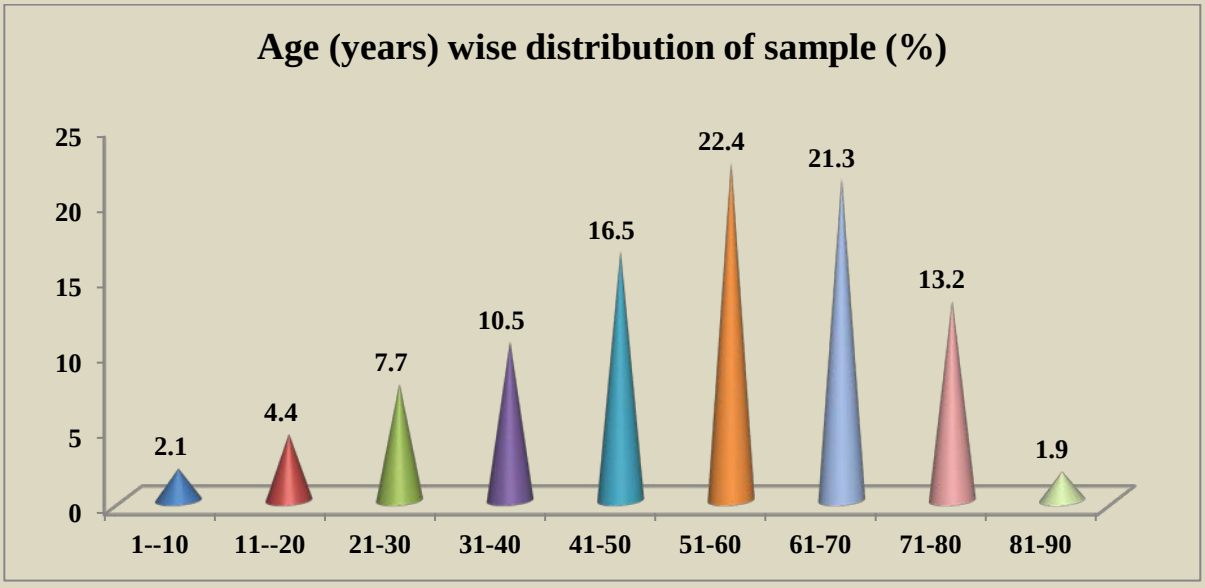


Table 1

Antimicrobial sensitivity pattern of MDR GNB from Medical units (%)

Antimicrobial agent	*E.coli*	*Acinetobacter spp.*	*Enterobacter spp.*	*Klebsiella spp.*	*Pseudomonas spp.*
AK	78.4	25	66.7	62.6	14.7
CFS	77.2	75	75	38.1	31.8
CTX	10.2	9.1	33.4	4.8	19.6
CF	12.8	25	50	15.9	12.2
COT	29.2	13.6	25	11.2	
G	64.5	32	66.7	31	25
M	95.3	25	100	49.3	56.1
PTZ	76	25	83.4	39.7	70.8
Pb	100	97.8	100	99.3	100
CZ	6.4	4.6	25	2.4	

AK-Amikacin, CFS-Cefoperazone-sulbactam, CTX-Ceftriaxone, CF-Ciprofloxacin, CoT-Cotrimoxazole, G-Gentamicin, M-Meropenem, PTZ-piperacillin-tazobactam, Pb-polymyxin-B, and CZ-Cefazolin

MDR gram negative isolates from medical units were highly resistant to Cephalosporins, ciprofloxacin and cotrimoxazole.

Table 2

Antimicrobial sensitivity pattern of MDR GNB from Surgical units (%)

Antimicrobial agent	*E.coli*	*Acinetobacter spp.*	*Enterobacter spp.*	*Klebsiella spp.*	*Pseudomonas spp.*
AK	79.4	17.6	57.7	36.8	31.2
CFS	83.9	65	73.1	43.6	57.8
CTX	11.7	8.8	3.9	7.7	22.3
CF	8.4	19.3	11.6	12	8.9
COT	29	19.3	15.4	12.9	
G	68.4	19.3	57.7	34.2	15.6
M	98.3	33.4	92.4	58.2	86.7
PTZ	85.2	15.8	46.2	42.8	77.8
Pb	100	96.5	100	99.2	100
CZ	7.9	10.6	0	0.9	

AK-Amikacin, CFS-Cefoperazone-sulbactam, CTX-Ceftriaxone, CF-Ciprofloxacin, CoT-Cotrimoxazole, G-Gentamicin, M-Meropenem, PTZ-piperacillin-tazobactam, Pb-polymyxin-B, and CZ-Cefazolin

MDR gram negative isolates from surgical units were highly resistant to Cephalosporins, ciprofloxacin and cotrimoxazole.

Table 3

Antimicrobial sensitivity pattern of MDR GNB from ICUs units (%)

Antimicrobial agent	*E.coli*	*Acinetobacter spp.*	*Enterobacter spp.*	*Klebsiella spp.*	*Pseudomonas spp.*
AK	78.9	25.8	30.8	34.3	28
CFS	78.9	77.3	61.6	35.1	46
CTX	9.8	1.6	15.4	7.1	32
CF	10.1	41.7	23.1	16.7	4
COT	29.4	16	23.1	12.3	
G	64.7	24.3	15.4	29	6
M	95.9	28.8	69.3	43.9	76
PTZ	75.4	16.7	46.2	34.3	68
Pb	100	97.8	100	98.3	100
CZ	5.1	1.6	0	3.6	

AK-Amikacin, CFS-Cefoperazone-sulbactam, CTX-Ceftriaxone, CF-Ciprofloxacin, CoT-Cotrimoxazole, G-Gentamicin, M-Meropenem, PTZ-piperacillin-tazobactam, Pb-polymyxin-B, and CZ-Cefazolin

MDR gram negative isolates from ICUs were highly resistant to Cephalosporins, ciprofloxacin, aminoglycosides and cotrimoxazole.

Table 4: Antimicrobial sensitivity pattern of MDR GNB from OI units (%)

Antimicrobial agent	*E.coli*	*Acinetobacter spp.*	*Enterobacter spp.*	*Klebsiella spp.*	*Pseudomonas spp.*
AK	79.6	33.4	34	42.9	63.7
CFS	81.7	66.7	100	62	81.9
CTX	10.3	11.2	0	14.3	27.3
CF	6.2	0	66.7	14.3	0
COT	24.5	11.2	0	14.3	
G	65.4	22.3	33.4	33.4	9.1
M	91.9	44.5	100	71.5	63.7
PTZ	87.8	22.3	100	57.2	91
Pb	100	100	100	100	100
CZ	4.1	0	0	0	

AK-Amikacin, CFS-Cefoperazone-sulbactam, CTX-Ceftriaxone, CF-Ciprofloxacin, CoT-Cotrimoxazole, G-Gentamicin, M-Meropenem, PTZ-piperacillin-tazobactam, Pb-polymyxin-B, and CZ-Cefazolin

MDR gram negative isolates from outside samples were also highly resistant to Cephalosporins, ciprofloxacin, and cotrimoxazole.

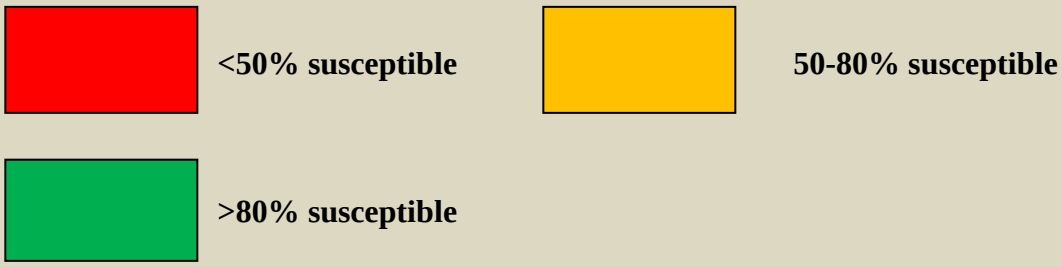
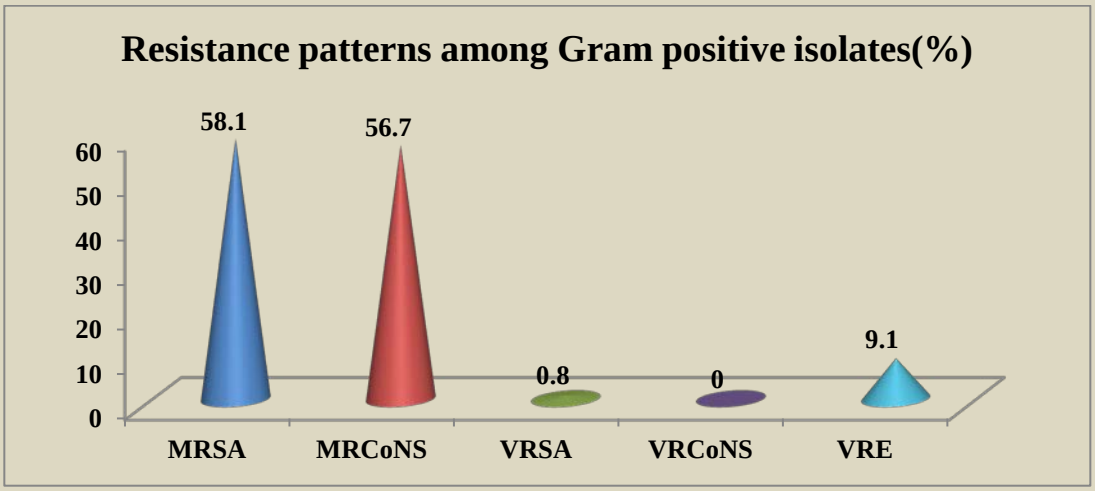


Fig 4

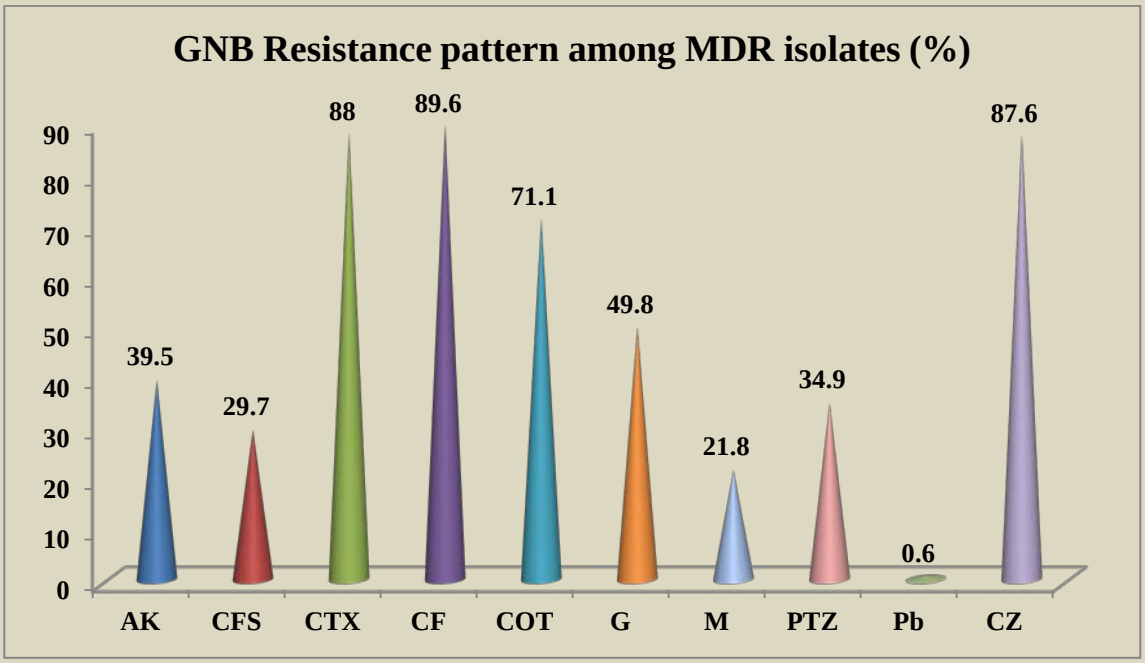
Percentage of Gram positive isolates resistance pattern among MDR isolates(%)



MDR- Multidrug resistant, MRSA-Methicillin resistance *Staphylococcus aureus,* **MRCoNS-** Methicillin resistance *Coagulase negative Staphylococcus,***VRSA**- Vancomycin resistance *Staphylococcus aureus,* **VRE**- Vancomycin resistant *Enterococci*

Percentage of MRSA was 58.1;MRCoNSwas 56.7%,VRSA& VRE being 0.8 and 9.1 respectively. Vancomycin resistance *Coagulase negative Staphylococcus* (VRCoNS) was nil.

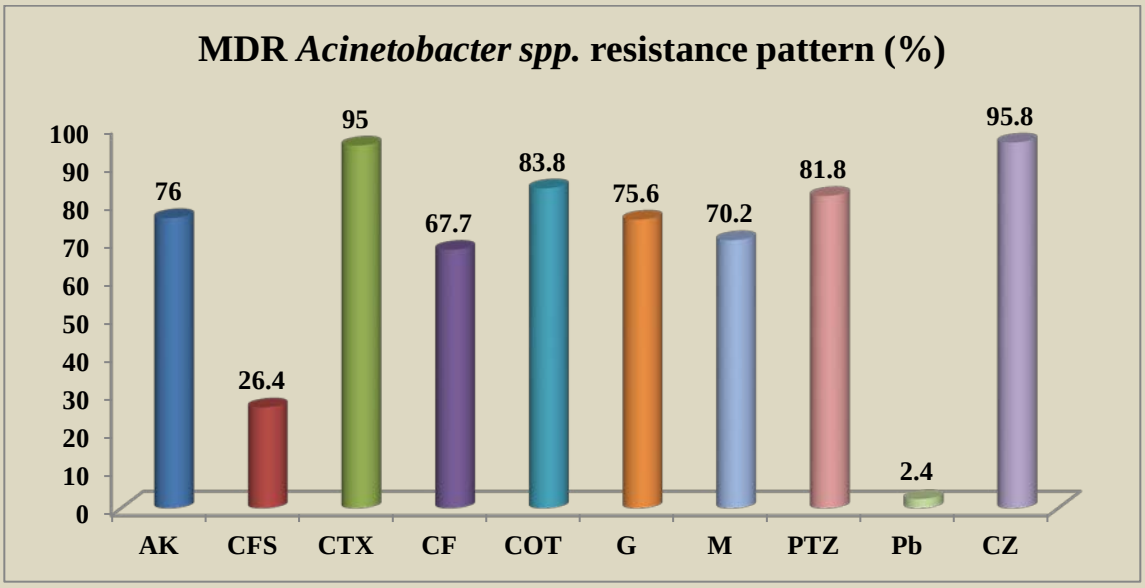
Fig 5:Percentage of Gram negative bacterial resistance pattern among MDR isolates(%)



AK-Amikacin, CFS-Cefoperazone-sulbactam, CTX-Ceftriaxone, CF-Ciprofloxacin, CoT-Cotrimoxazole, G-Gentamicin, M-Meropenem, PTZ-piperacillin-tazobactam, Pb-polymyxin-B, and CZ-Cefazolin.

Eighty to Ninety percent of all Gram negative isolates were resistant to Cefotaxime, Cefazolin,Ceftriaxone. Carbapenem resistance was 21.8% among all Gram negative isolates.

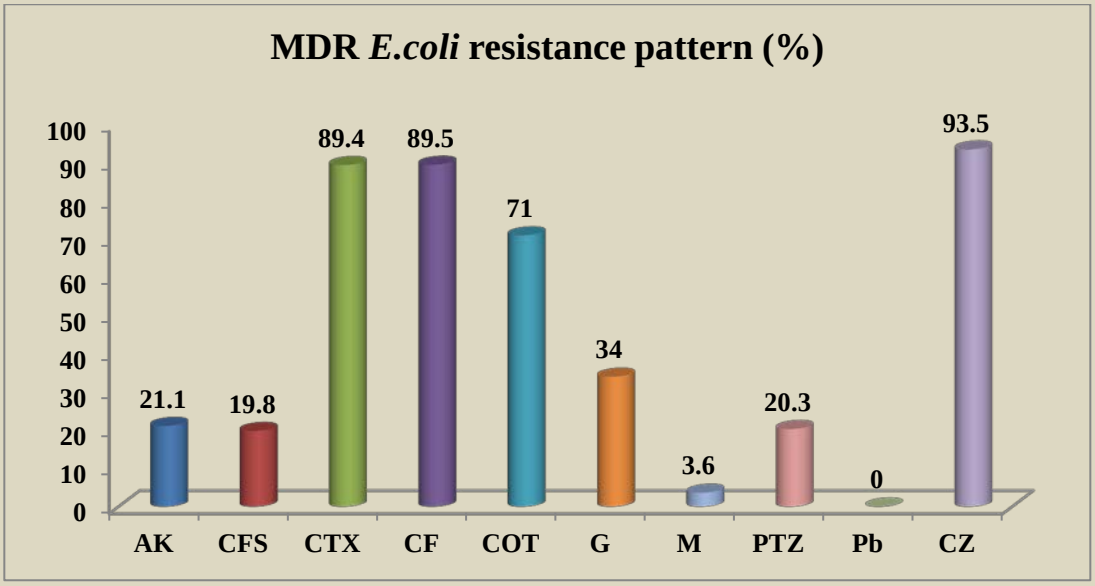
Fig 6: Multidrug resistant *Acinetobacterspp.*resistancepatternto various antimicrobials(%)



AK-Amikacin, CFS-Cefoperazone-sulbactam, CTX-Ceftriaxone, CF-Ciprofloxacin, CoT-Cotrimoxazole, G-Gentamicin, M-Meropenem, PTZ-piperacillin-tazobactam, Pb-polymyxin-B, and CZ-Cefazolin

Majority of *Acinetobacterspp* were resistant to cephalosporins except Cefoperazone-sulbactam.Carbapenem resistance noted was 70.2%.

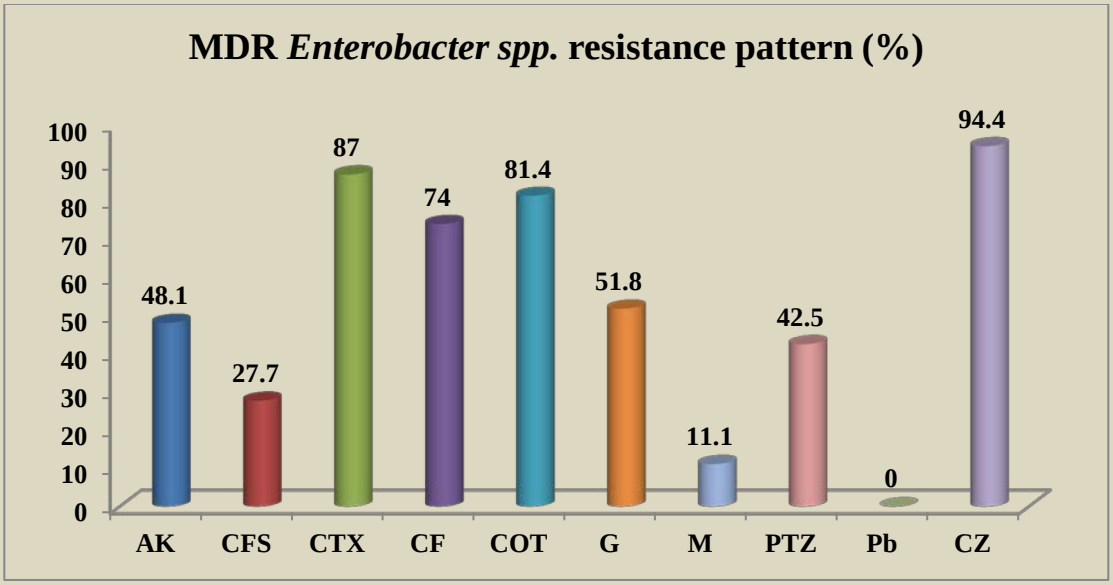
Fig 7: Multidrug resistant *Escherichia coli.*resistancepatternto various antimicrobials(%)



AK-Amikacin, CFS-Cefoperazone-sulbactam, CTX-Ceftriaxone, CF-Ciprofloxacin, CoT-Cotrimoxazole, G-Gentamicin, M-Meropenem, PTZ-piperacillin-tazobactam, Pb-polymyxin-B, and CZ-Cefazolin.

More than 90% of *Escherichia.coli* was resistant to cephalosporins except Cefoperazone-sulbactam. Ninety six percent of *Escherichia.coli* was sensitive to carbapenems.

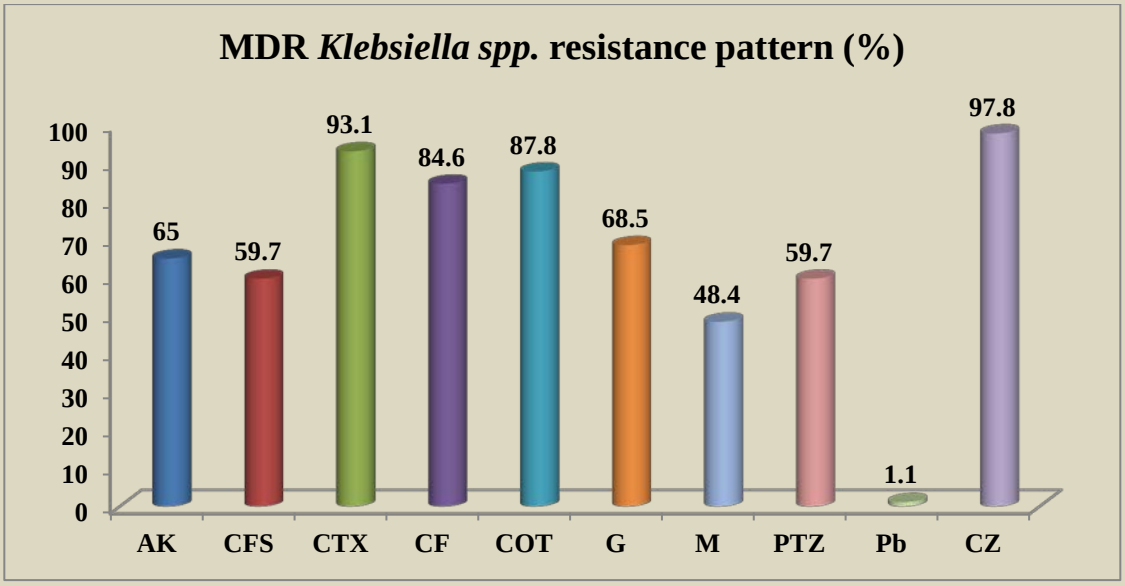
Fig 8: Multidrug resistant *Enterobacter spp.* resistance patternto various antimicrobials(%)



AK-Amikacin, CFS-Cefoperazone-sulbactam, CTX-Ceftriaxone, CF-Ciprofloxacin, CoT-Cotrimoxazole, G-Gentamicin, M-Meropenem, PTZ-piperacillin-tazobactam, Pb-polymyxin-B, and CZ-Cefazolin.

Majority (85-95%) of *Enterobacterspp* were resistant to cephalosporins except Cefoperazone-sulbactam.Carbapenem resistance observed was 11.1%.

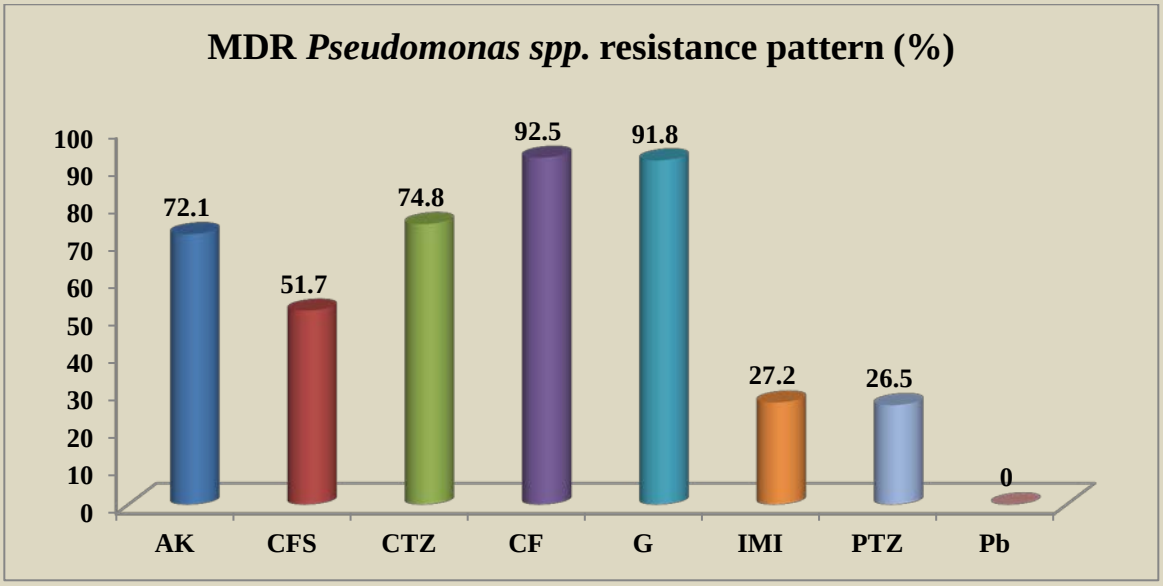
Fig 9: Multidrug resistant *Klebsiella spp.* resistance patternto various antimicrobials(%)



AK-Amikacin, CFS-Cefoperazone-sulbactam, CTX-Ceftriaxone, CF-Ciprofloxacin, CoT-Cotrimoxazole, G-Gentamicin, M-Meropenem, PTZ-piperacillin-tazobactam, Pb-polymyxin-B, and CZ-Cefazolin.

Majority (60-98%) of *Klebsiellaspp* were resistant to allcephalosporins.KlebsiellaCarbapenem(KPC) resistance observed was 48.4% which is relatively high.

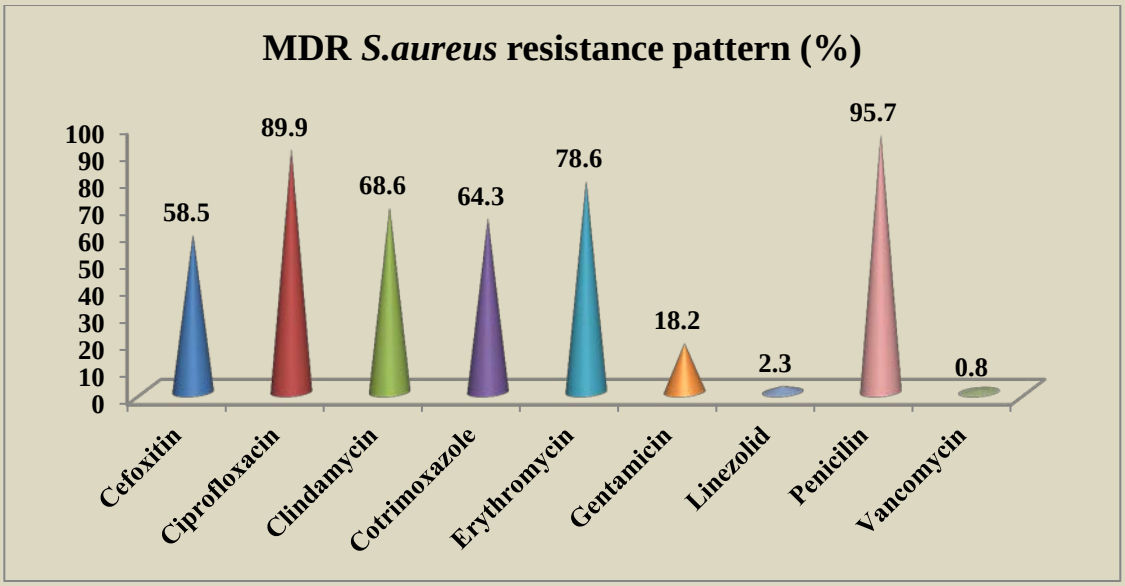
Fig 10: Multidrug resistant *Pseudomonas spp.* resistance patternto various antimicrobials(%)



AK-Amikacin, CFS-Cefoperazone-sulbactam, CTX-Ceftriaxone, CF-Ciprofloxacin, CoT-Cotrimoxazole, G-Gentamicin, M-Meropenem, PTZ-piperacillin-tazobactam, Pb-polymyxin-B, and CZ-Cefazolin

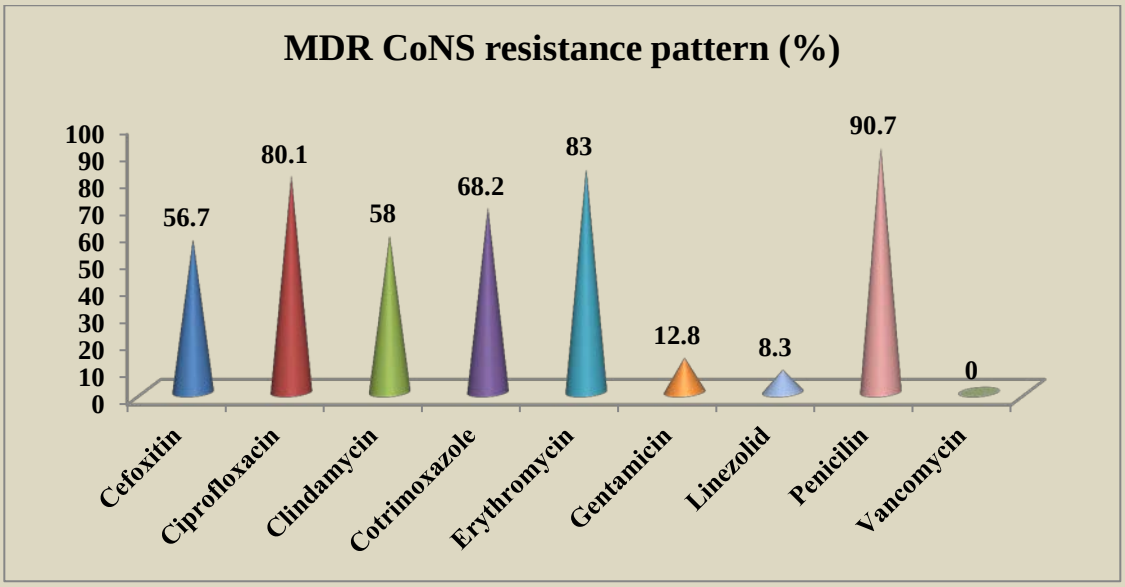
Almost all *Pseudomonas spp.*isolates were resistant to all cephalosporins. Aminoglycoside resistance was also high in *Pseudomonas spp* isolates. Percentage of carbapenem resistance being 27.2%.

Fig 11: Multidrug resistant *Staphylococcus aureus* resistance patternto various (%)antimicrobials



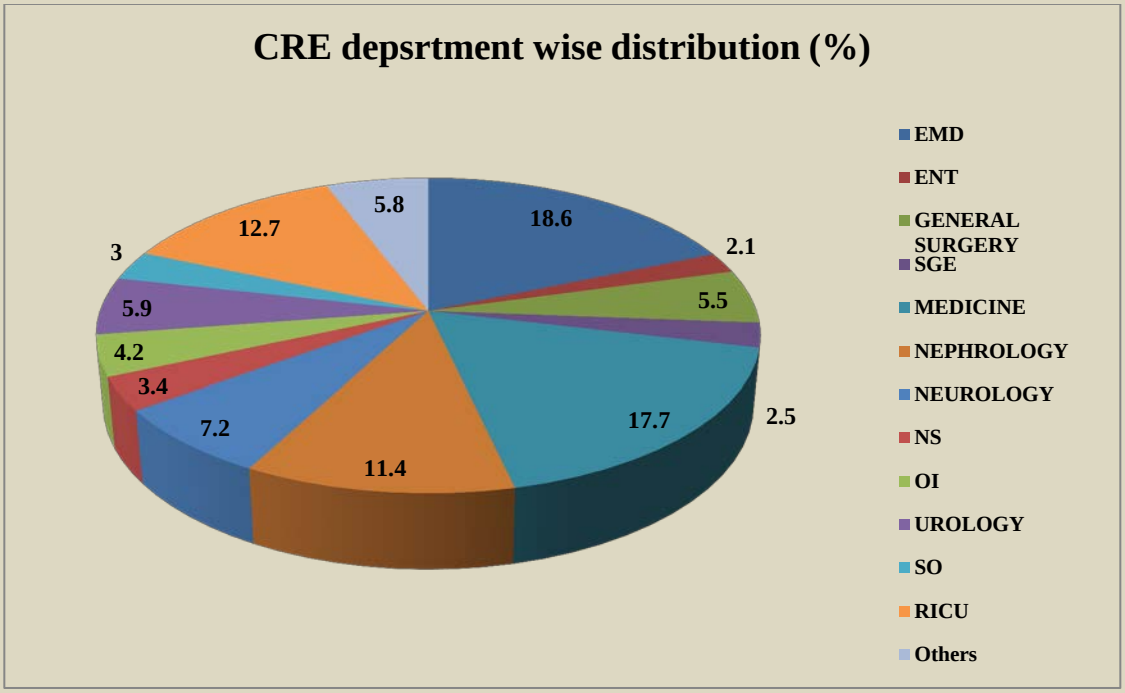
Percentage of penicillin resistance in *S.aureus* isolates was 95.7%. Methicillin resistance was 58.5%. Macrolide LincosamideStreptogramin resistance in *S.aureus* was 68.6 %.Ninety percent of *S.aureus* isolates were resistant to ciprofloxacin. Vancomycin resistance *Staphylococcus aureus* (VRSA) was 0.8%which is very low.

Fig 12: Multidrug resistant *Coagulase negative staphylococcus spp.* resistance patternto various antimicrobials(%)



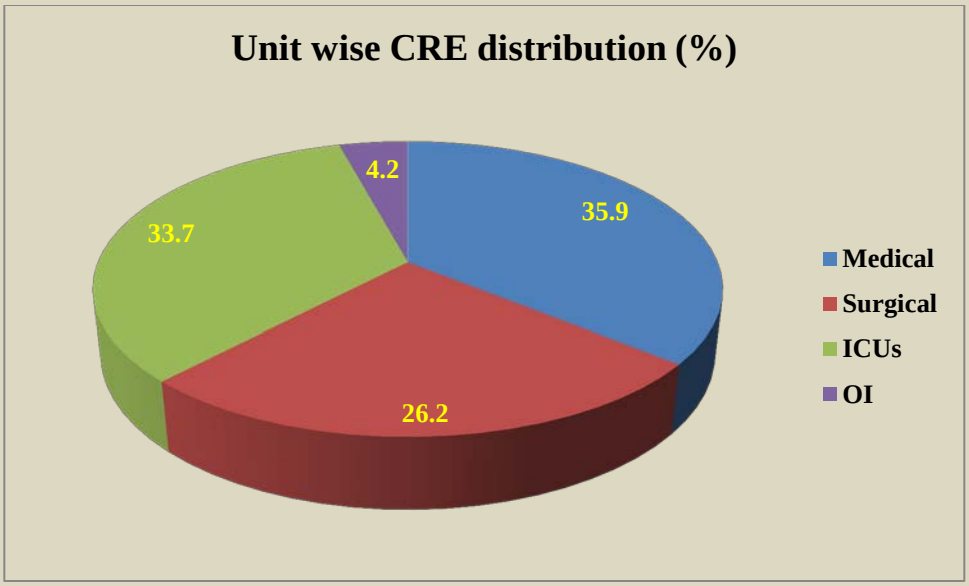
Ninety percent of penicillin resistance in *Coagulase negative staphylococcus spp.*(CoNS)isolates was 90.7%. Methicillin resistance in CoNS was 56.7%. Macrolide LincosamideStreptogramin resistance inCoNSwas 58%.Eighty percent of *S.aureus* isolates were resistant to ciprofloxacin. Vancomycin resistance *Coagulase negative Staphylococcus* (VRCoNS) was nil.

Fig 13: Department wise distribution of Carbapenem resistant Enterobacteriaceae(%)



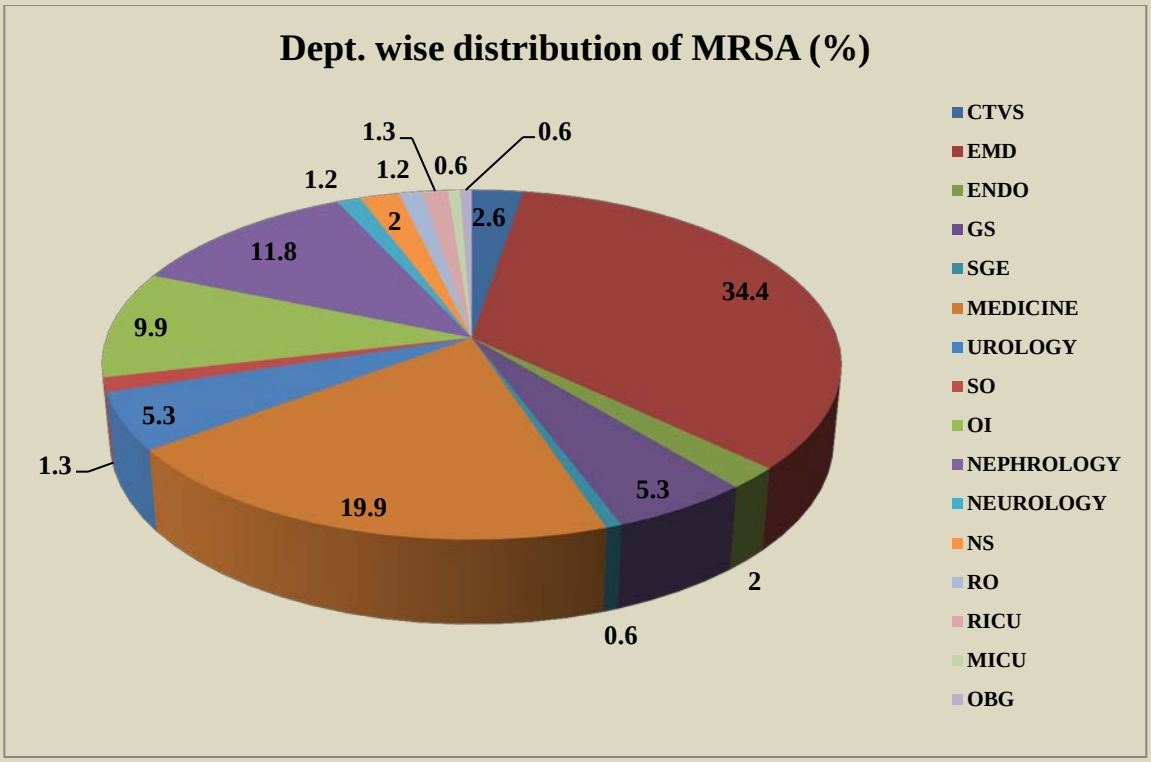
EMD-Emergency medicine department, **ENT**- Ear, Nose & Throat, **GS**-General surgery, **SGE**- Surgical Gastroenterology, **NS**- Neurosurgery,**OI**-Outside Investigation,**SO**- Surgical oncology,**RICU**- Respiratory Intensive care unit.

Fig 14: Unit wise distribution of Carbapenem resistant Enterobacteriaceae (CRE)(%)



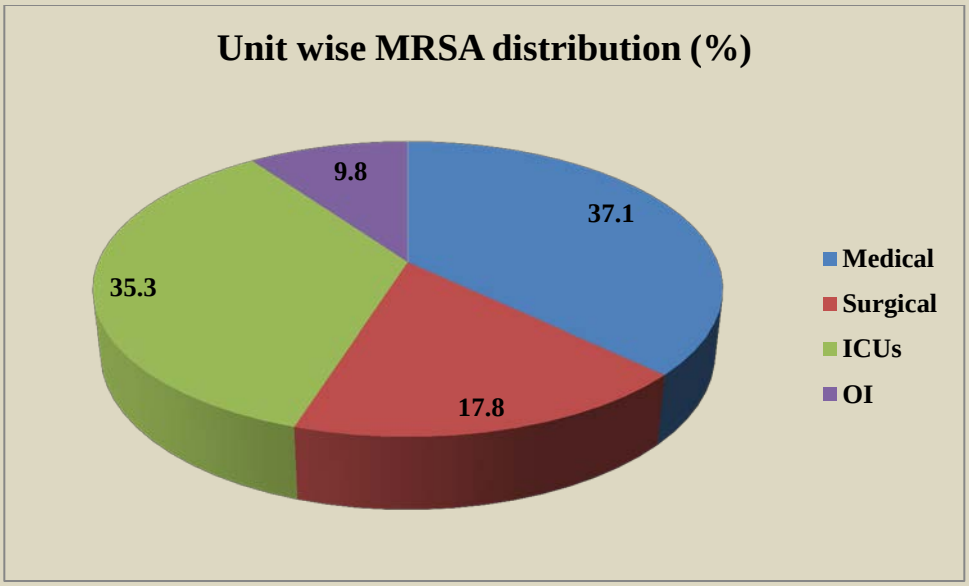
ICUs- Intensive care units, **OI**-Outside Investigation.

Fig 15: Department wise distribution of Methicillin resistant *Staphylococcus aureus* (MRSA)(%)



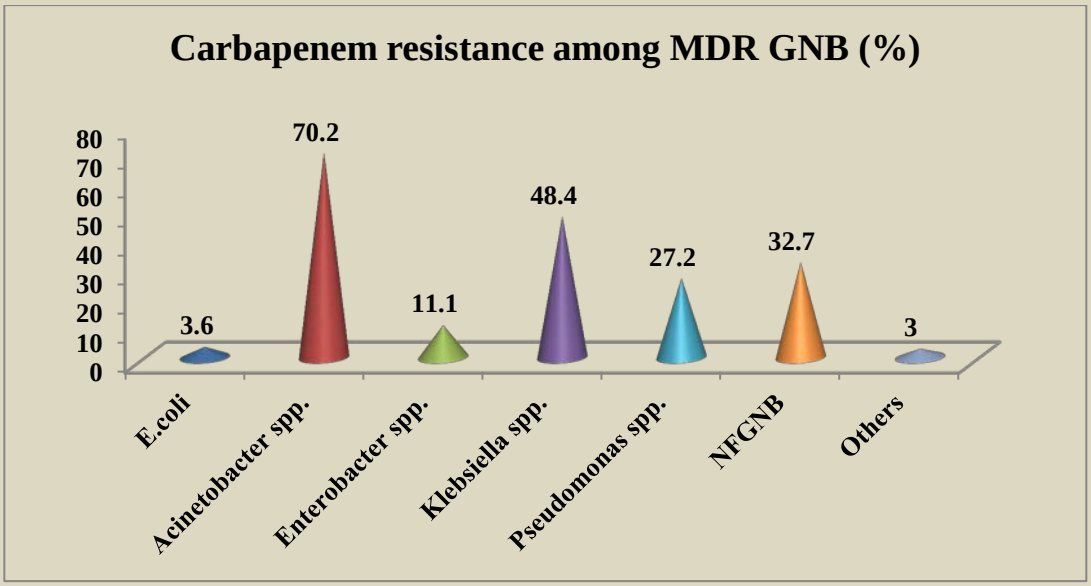
CTVS- Cardiothoracic vascular surgery,**EMD**-Emergency medicine department, **ENDO**- Endocrinology, **GS**-General surgery, **SGE**- Surgical Gastroenterology, **SO**- Surgical oncology,**OI**-Outside Investigation,**NS**- Neurosurgery, **RO**- Radiation oncology, **RICU**- Respiratory Intensive care unit,**MICU**- Medical Intensive care unit, **OBG**- Obstetrics &Gynecology .

Fig 16: Unit wise distribution of Methicillin resistant *Staphylococcus aureus* (MRSA)(%)



ICUs- Intensive care units, **OI**-Outside Investigation.

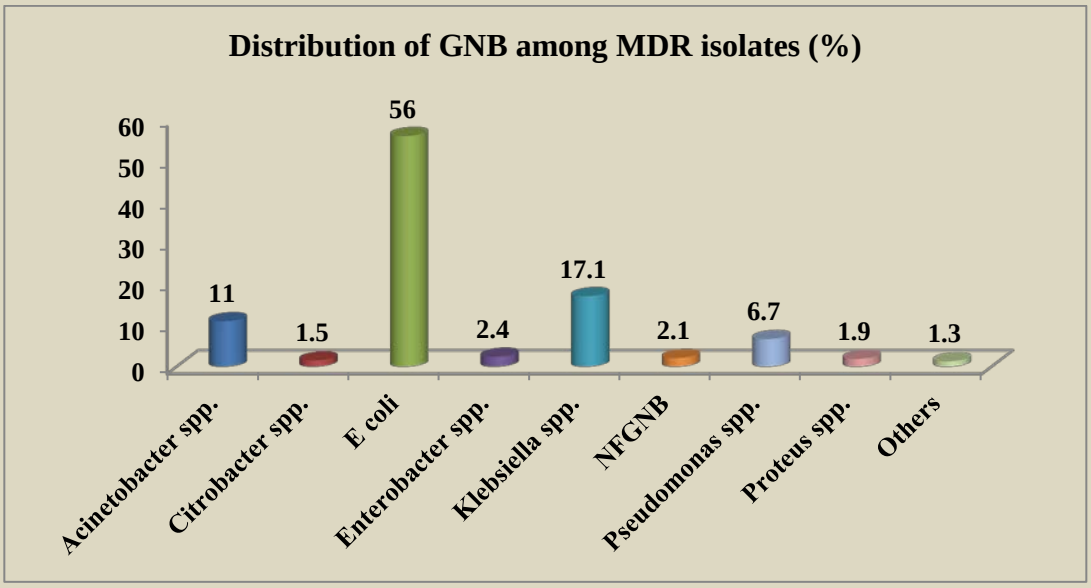
Fig 17:Carbapenem resistance among multidrug resistance Gram negative bacilli (%)



Non Fermenting Gram Negative bacilli- (NFGNB)

Percentage of carbapenemresistancein*Acinetobacter spp.* was very high (70.2) followed by *Klebsiella spp.* (48.4%), Non Fermenting Gram Negative bacilli (NFGNB) (32.7%).

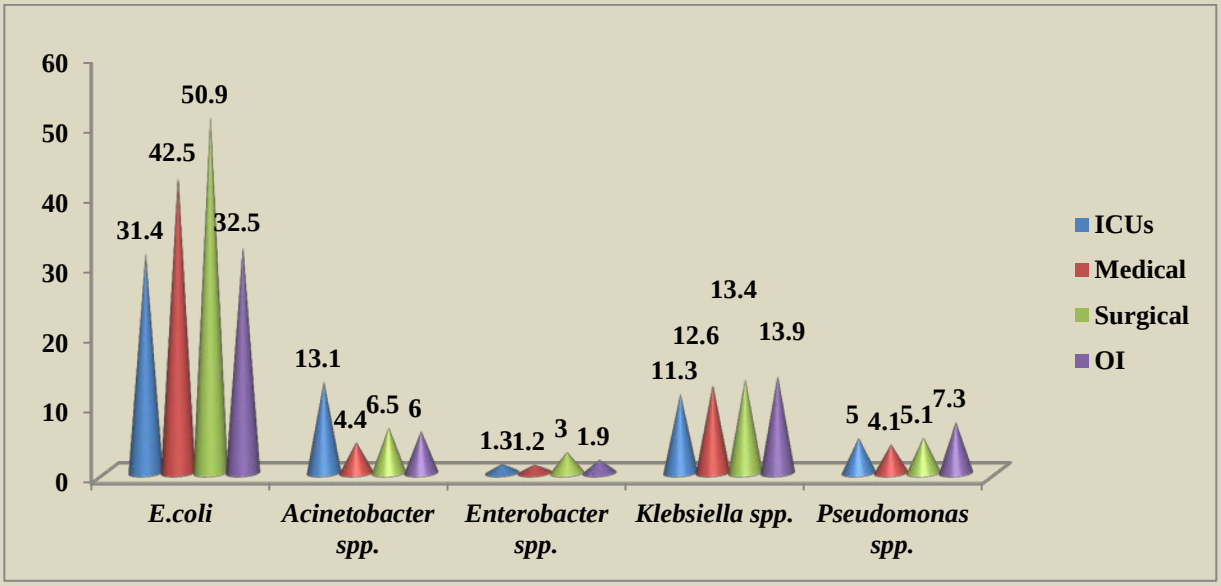
Fig 18: Distribution of Gram negative bacilli among MDR (%)



Non Fermenting Gram Negative bacilli- (NFGNB).

Multidrug resistance observed in *E.coli* was 56% followed by *Klebsiella spp.* (17.1%) and *Acinetobacter spp.*

Fig 19:Gram negative bacillidistribution among various departments (%)



Predominant isolate from all units i.e medical, surgical and ICUs was *Escherichia coli* followed by *Klebsiella spp*., but from ICUs *Acinetobacter spp*. was the second most common followed by Escherichia coli.

2. 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

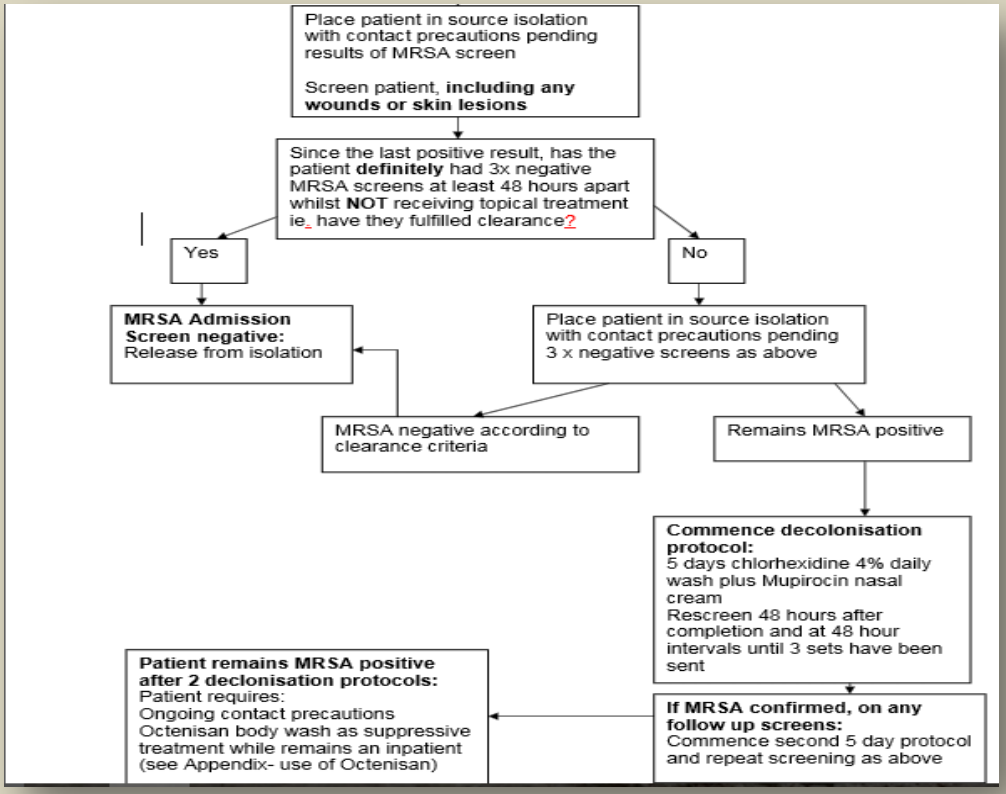
- Based on the spectrum of the antibiotic taking into account possible resistant patterns.
- Use the correct dose, route and duration.
- Ensure chosen antibiotic has adequate tissue penetration at the site of infection.
- Optimize PK-PD parameters according to co-morbidities

De-escalation/modification

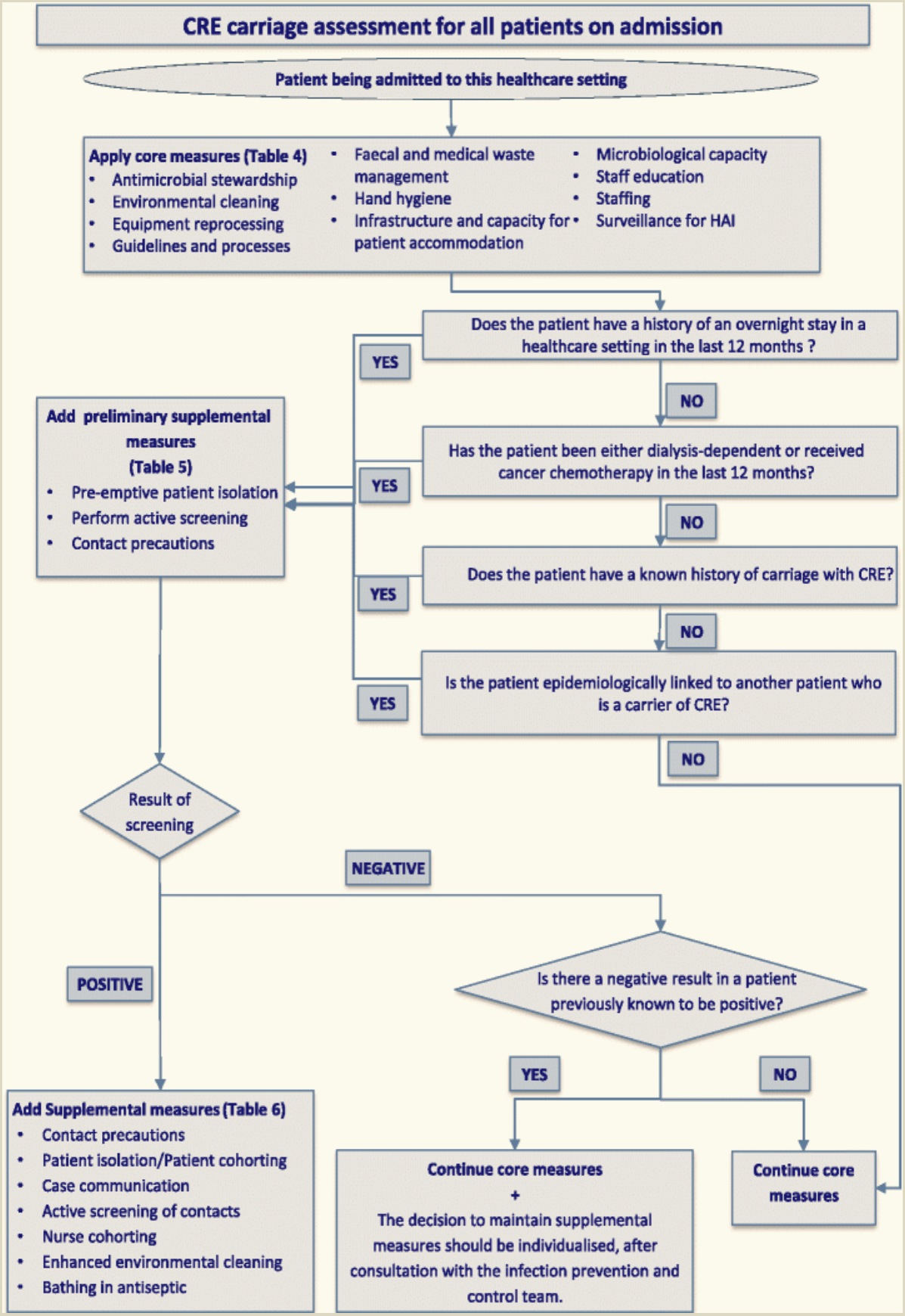
a. Modify empiric broad spectrum antibiotics depending on culture and antimicrobial susceptibility reports and patient status
b. Stop polymyxins and glycopeptides if no carbapenem resistant organisms (CRO) or methicillin resistant *Staphylococcus aureus*(MRSA) identified on cultures
c. Avoid double or 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)ofCarbapenemase-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 infectioussyndromes;
- **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 'lastresort'treatmentoptions

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 cephalosporinse.g.Ceftaroline	Tigecycline
Polymyxins e.g. Polymyxin B, Colistin	Daptomycin

3. 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/ Disposaloptions
Yellow	Human anatomical waste	Yellowcoloured	Incineration/ Plasma pyrolysis/ deepburial
	Animal anatomical waste		
	Soiledwaste	non chlorinated plasticbags	Incineration/ Plasma Pyrolysis/ deepburial/ autoclaving or hydroclaving+ shredding/mutilation
	Expired/ discarded medicines-pharmaceutical waste,cytotoxic drugs	Yellowcoloured containers/ non chlorinated plastic bags	Incineration (cytotoxic drugs at temperature > 1200□C)
	Chemicalwaste	Yellowcoloured containers/ non chlorinated plastic bags	Incineration or Plasma pyrolysis orEncapsulation
	Discarded linen contaminated with blood/ bodyfluids	Non- chlorinated yellow plastic bags / suitable packing material	Non- chlorinated chemical disinfection followedby incineration/ plasmapyrolysis
	Microbiology, other clinical lab waste, blood bags, live/attenuated vaccines	Autoclave safe plastic bag/container	Pre-treattosterilizewith non-chlorinated chemicals on-site asper NACO/ WHOguidelines+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 sharppit
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 forincineration
- Routine mask and gown –yellow
- Cardboard boxes with blue colored marking - Puncture proof and leak proof boxes orcontainers with blue coloredmarking
- 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 monthlyinterval
- Daily - Chemical indicatorstrip

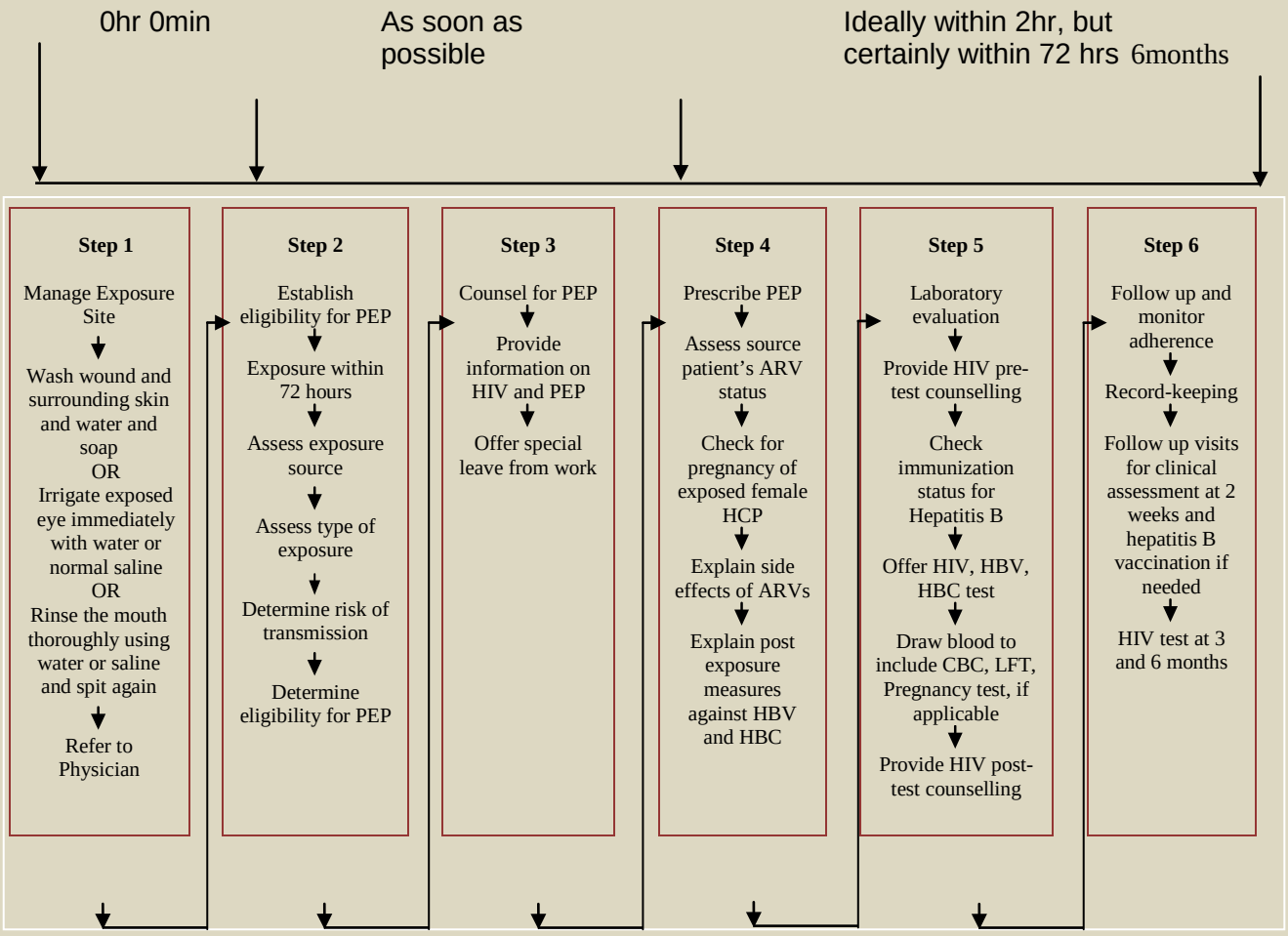
BMW 2019 Amendment

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 andcolour 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 madeavailable.
3. Health Care Facilities having less than ten beds shall have to comply with the outputdischarge 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:

1. https://www.who.int/gpsc/5may/Hand_Hygiene_Why_How_and_When_Brochure.pdf
2. https://www.ijmm.org/documents/Treatment_Guidelines_2019_Final.pdf
3. https://www.who.int/medicines/news/2019/WHO_releases2019AWaRe_classification_antibiotics/en/
4. https://dhr.gov.in/sites/default/files/Bio-medical_Waste_Management_Rules_2016.pdf
5. https://www.cdc.gov/hai/organisms/cre/cre-facilities 2018.pdf