

Multidrug resistance organisms causing Hospital acquired infection - A study in the Mission Hospital

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Place of study- Mission Hospital Durgapur

Year- 2021

Introduction

- Healthcare associated infection (HAI) was referred to as infections acquired during the process of patient care in the hospital or healthcare facility and was not present or incubating at the time of admission only those cases with clinical suspicion of HAI that had developed after 48 hours of admission.
- Antibiotic resistance has been referred to as 'the silent tsunami facing modern medicine. Multi drug resistance has become a major problem for the treatment of bacterial infections and is becoming the greatest challenge to public health worldwide.
- MDRO'S- These are the microorganism that are resistant to one or more classes of antimicrobial agents (ESBI,MRSA,VRE etc.)
- As they are associated with increased length of stay, cost and mortality hence it required special attention in Healthcare faculties .

Review of Literature

SR NO	TITLE	AUTHOR NAME/YEAR	PLACE OF STUDY	DESCRIPTION
1.	Detection of extended spectrum beta lactames producing Entrobacteriaceae family from UTI patients.	Devipalanisamy, sivapriya olagnathan, Moorty Marimuthu (2021)	Tamil Nadu, India	It aims to detect extended spectrum beta lactames producing E. coli and K. Peumonia isolates from UTI patients In the present study ESBL, producing E coli, K. Peumoniae are considered to be a multidrug resistant strains and majority of them were resistant to the common antibiotics used in treatment of UTI
2.	The mortality burden of multidrug resistance pathogens in India - A retrospective and observational study	Sumanth Gandra, Katie ktseng et al (2019)	India	This study concluded that while data were observational result provide strong qualification of the association between mortality and MDR pattern in representative LMIC.As MDR bacterial infections pose a significant risk to patients. Future research should aim to elucidate the burden of resistance and the differential transmission mechanisms that drive this public health crisis.

3	Prevalence and antibiotic susceptibility pattern among Klebsiella isolated from patient attending a tertiary care hospital	Saharanya K, Sindhu Cugati, Chitrlekha saikimar (2018)	Chennai, India	Aims to assess the diversity and state of resistance of K. Pneumonia to antibiotics in a tertiary care hospital. This study shows that the prevalence of Klebsiella was 13.6% and was found to be resistant to many antibiotics hence, detection of drug resistance mechanism formulation of a good antibiotics policy and a proper antibiotics stewardship programme should be incorporated to combat emerging MDR cases
4	Nosocomial infection and their control strategies	Hassan Ahmed Khan, Aftab Ahmad, Riffat Mehboob (2015)	North America, Europe, Latin America, Sub Saharan Africa, and Asia	This study finds out that North America and Europe has 5-10% of Nosocomial infection while, Latin America, ,Sub Saharan Africa and Asia had more than 40% of Nosocomial Infection. This study concluded that the transmission of infection in the hospital setting through healthcare worker can be avoided by the use of infection control practices , improper and frequent use of antibiotics is the important cause of drug resistance organism that are difficult to treat . A well-managed surveillance methodology is required

5	Prevalence of multidrug resistance and extended spectrum beta-lactamases among uropathogenic Escherichia coli isolates in a tertiary care hospital in South India: An alarming trend	Chittur Yerat Ranjini, Leela Rani Kasukurthi et al	Karnataka , India	The aim of this study was to define the current prevalence of MDR and extended spectrum beta-lactamases (ESBL) production among E. Coli isolates from urine samples in hospital. Multidrug resistant strains of E. Coli are widely prevalent in the community. Antibiotics like imipenem require hospitalization, parenteral administration, drug monitoring for toxicity, all of which incur high cost to the patient and have to be used judiciously.
6	Multidrug resistance of pseudomonas Aeruginosa as known from surveillance of nosocomial and community infection in Indian teaching hospital	Mahesh. C.Sahu, Debasmita Dubey et al (2012)	India	Aim of the present study was to record nosocomial and community-acquired accounts of antibiotic resistance in Pseudomonas aeruginosa strains, isolated from clinical samples of a hospital by surveillance, over a period of 18 months (November 2009-April 2011). This study concluded that basic Infection control practices such as proper hand washing, prevention of NSI, proper disposal of hospital waste and sewage. Rational antibiotic policy and regular surveillance are the areas in which we should take proper and pragmatic care of a hospital.

Data and Methods

- RESEARCH DESIGN- Retrospective observational study.
- DATA COLLECTION TECHNIQUE- This research based on secondary data and all information has been taken from ICN surveillance system and LIS system of lab.
- DATA COLLECTION TOOLS- As this is retrospective study all data has been retrieved from diverse recorded sources.
- SAMPLE SIZE- Sample size is 206
- Study Duration -April- June 2021

- **SAMPLING TECHNIQUE-** This study covered whole included population hence no sampling is done.
- **RESEARCH QUESTION-** What is the trend of the Multidrug resistance organism causing Hospital acquired infection at The Mission Hospital, Durgapur?
- **OBEJECTIVES-**
 1. To understand the trend of multidrug resistance organism causing hospital acquired infection in The Mission hospital, Durgapur
 2. To identify and scrutinize the significant focus area for the improvement in the hospital.
 3. To suggest the recommendations for improvement

Data and Methods

- All the relevant data included in the study were tabulated in Microsoft Excel 2010. Prevalence rate of Hospital acquired infection and Antibiotic drug sensitivity were computed
- Further Pareto analysis was conducted which aims to identify and scrutinize the focus area of improvement in the hospital

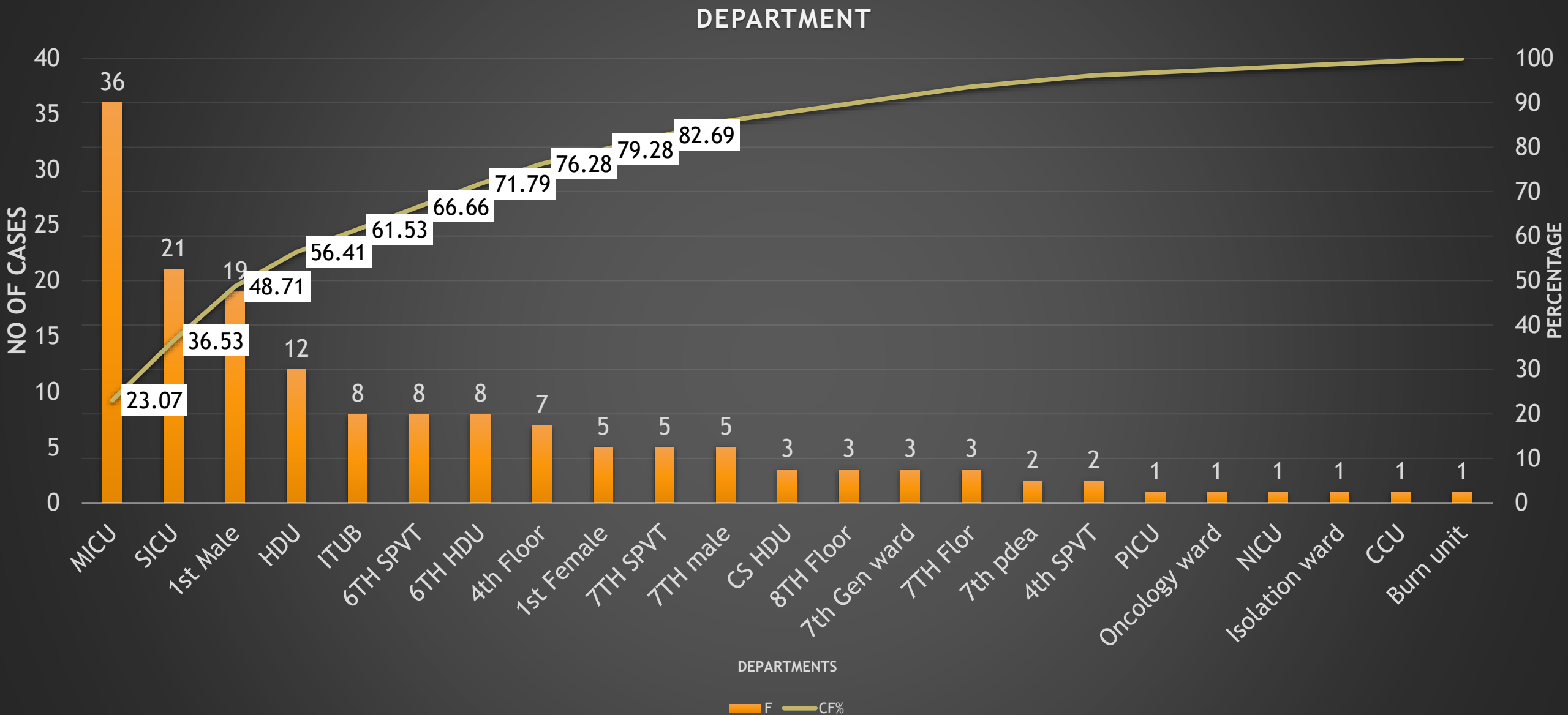


FIGURE 1.1 MDRO'S cases in respective department, Picture Courtesy Infection control surveillance data Mission hospital, Durgapur.

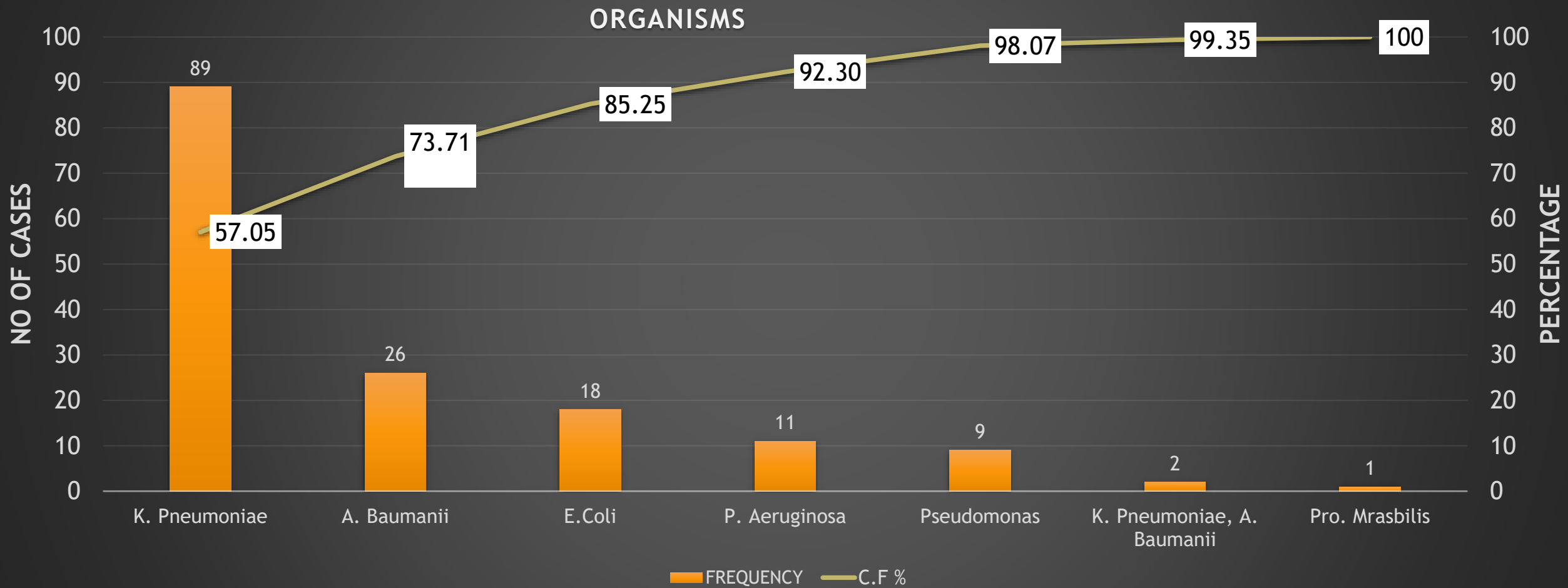


FIGURE 1. 2 this graph depicts 80% of MDRO'S is possibly due to K. pneumoniae and A. Baumanii. Pic courtesy Mission hospital, Durgapur

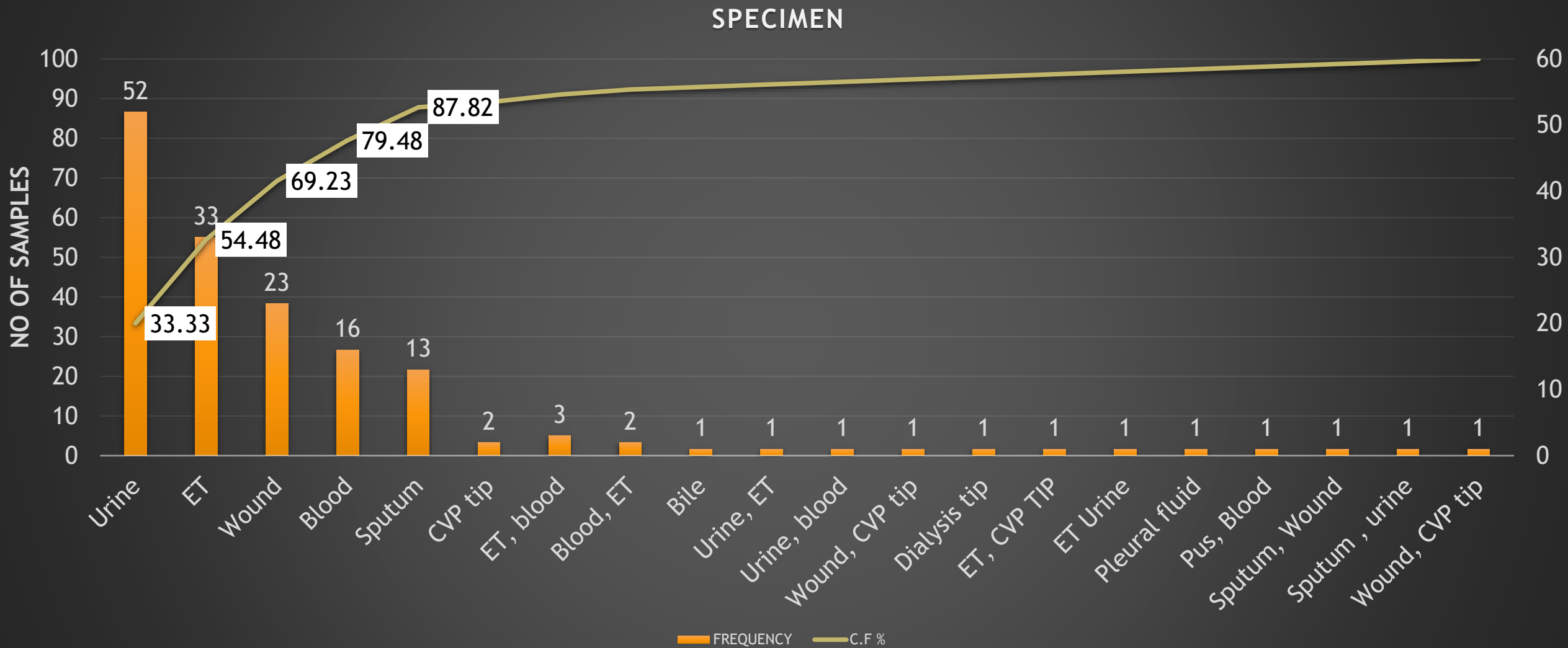


FIGURE 1.3 this graph depicts 50% of culture positive sample is taken from Urine, ET, and wound respectively. Picture courtesy Mission Hospital, Durgapur

Drug Sensitivity



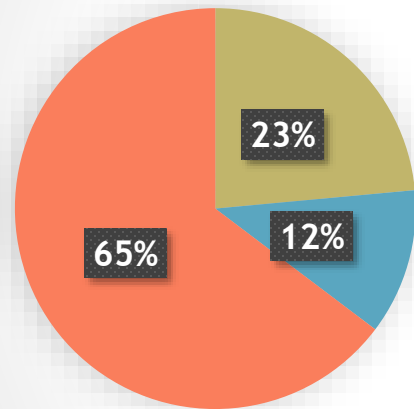
For K. Pneumonia, Colistin has 81% sensitivity; tigecycline has 19% sensitivity respectively. Which shows decreased sensitivity towards Tigecycline

A. Baumannii



Similarly for *A. Baumannii* shows 83% sensitivity towards colistin, 17% towards tigecycline

E. Coli



- COLISTIN, TIGECYCLINE
- FOSFOMYCIN
- COLISTIN, FOSFOMYCINE

Likewise for E. coli 65% are sensitive to colistin and tigecycline, 23% are sensitive to colistin and fosfomycin, and 12% are sensitive to only fosfomycin

Conclusion

- In conclusion our study finds MDRO's showed up going trends.
- The stated benchmark for MDRO'S causing Hospital acquired infection was less than 1% but for the year 2020 it is escalated up to 1.7%, hence it shows 0.7% increase in the cases.
- K. Pneumonia and A. Bumannii were leading isolates in the ICU'S
- In addition, tigecycline's sensitivity to several microorganisms that were previously proven to be sensitive has decreased. Hence antibiotics which were effective against most of the isolates bacteria were colistin, Polymyxin B, Tigecycline, ticoplanin, and linezolid. These antibiotics should never be used empirically and must be reserved for special conditions, like drug failure and life saving measures etc.

Recommendations-

- The following are some of the methods that can be taken to prevent the spread of antibiotic resistance in healthcare facilities:
- Administrative support
- At all levels, strict hand hygiene procedures must be implemented.
- Using antibiotics as a daily specified dose per 100 bed days is a smart way to figure out how much of a certain antibiotic is being used.
- In the hospitals, all cadres of staff are educated on infection control practices.
- Patient cohorting in hospitals, cases with the MDRO'S should be isolated from the normal population.
- Implementation of Antibiotic justification forms.
- Provide clinicians with antimicrobial susceptibility reports and analysis of current trends, updated at least annually, to guide antimicrobial prescribing practices.

- Judicious use of antimicrobials and formulary restriction
- Antimicrobial treatment regimens should be based on pharmacodynamics/pharmacokinetic data.
- Should opt for de-escalation of antibiotic treatment for infections like which required invasive procedures like VAE,UTI etc
- Treatment regimens with high doses and a short duration could be followed in severe cases.
- Adherence to stringent antibacterial prophylactic measures during surgery
- Involvement of the clinical microbiology laboratory, and also effective communication across departments.
- Good Sterilization and disinfection procedures must be followed.
- Implementation of strict perioperative antibiotic prophylaxis guidelines

Limitation of the study-

- There are some limitations in our study as this study only able to recognize the key focus areas, procedures and organisms and drug sensitivity of key organisms.
- This study could not able to evaluate the patient record for extensive research and analysis of any past Multidrug resistance history due to limitation of the time.
- Also, the antibiogram of microorganism and drug resistance mechanism was not included in this study

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