Prevalence of Organisms in Hospital Acquired Infection with Special Reference to Cauti in A Tertiary Care Hospital In Bhubaneswar, Odisha, India.

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I. Introduction

Hospital Acquired Infection (HAI) is a frequent complication of hospitalization. HAI is defined as an infection whose development is favoured by a hospital environment, such as one acquired by a patient during a hospital visit[1]. Hospital-acquired infections, also known as healthcare-associated infections, are nosocomial acquired infections that are typically not present. These infections are usually acquired after hospitalization and manifest 48 hours after admission to the hospital[2].

This issue been recognized for more than a century as a critical problem affecting the quality of health care and principal source of adverse outcomes. The pattern of organism causing infections varies widely from one country to another as well as from one hospital to another and even wards as well as ICUs within a hospital. HAI surveillance data should play an integral role in developing effective infection control practices[3].

According to the American Association of critical care Nurse, CAUTI (Catheter Associated Urinary Tract Infection) is the most common infections acquired by patient during hospitalization[4]. Catheter-associated UTI (CAUTI): A UTI where an indwelling urinary catheter was in place for more than two consecutive days in an inpatient location on the date of event, with day of device placement being Day 1[5]. However, CAUTI is the most common HAI in our set up also. Therefore, the present study is aimed to know the prevalence of commonly isolated organism with special reference to CAUTI [3].

II. Objectives

To Analyse the emerging trend of organism causing CAUTI, in tertiary hospital setting which is an important aspect for clinical decision making and infection control practices.

III. Material And Methods

The retrospective study was conducted in all ICUs and wards of Apollo Hospitals-a tertiary Care Hospitals in Bhubaneswar, Odisha(India)from 2019-2021. Based on clinical criteria of CAUTI, the urine samples sent to microbiology department were analysed. The urine samples were inoculated into Mac Conkey agar and blood agar plates and intubated overnight at 37°c. Bacterial pathogens were identified by conventional biochemical methods and Vitek -2 system according to standard microbiological techniques.

IV. Design of The Study

Study Design: - Retrospective study was conducted in Apollo Hospitals, Bhubaneswar, Odisha, India.
Study Periods: - Jan 2019-Jan 2021
Study Location: - ICU, HDU and ward.
Inclusion Criteria
All adult age group of patient admitted to our hospitals during study period, who were catheterized with indwelling catheter for >2 calendar days in hospital stay.

Exclusion Criteria
1. CAUTI after the patient is discharged from the hospital. (If discovered, any CAUTI with a date of event (DOE) on the day of discharge or the next day is attributed)[6]
2.UTI due to nearby anatomical site infection like CA penis, Chronic vaginitis, Chronic urethritis, uterine prolapse, retention of urine because of surgical cause, cystitis and BPH[6]
3.Patient diagnosed with UTI on day of admission till 14 days' these period starting from date of event as (Day-1), during which site specific culture become positive again. If culture is positive beyond 14 days, then it is considered another episode of CAUTI[6].
4. Patients on suprapubic catheter, nephrostomy tube and condom catheter[5].

V.   Results
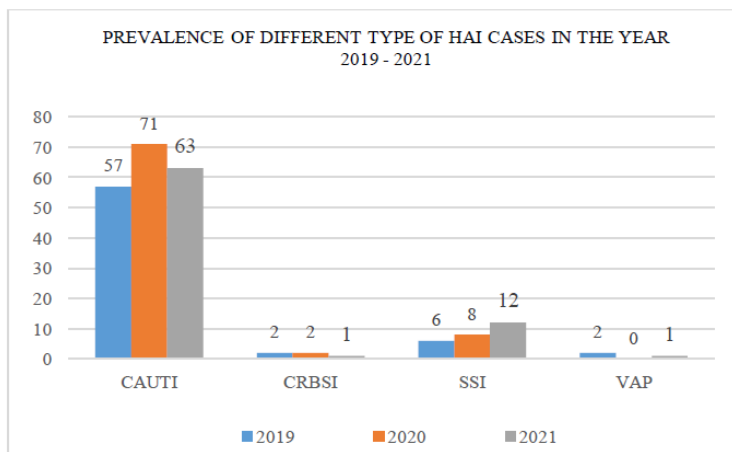## Fig 1: PREVALENCE OF DIFFERENT TYPE OF HAI CASES IN THE YEAR (2019 – 2021)

Fig 1:

 We saw CAUTI is the commonest HAI in our hospital during the study period i.e. 2019-2021 followed by SSI, No VAP cases had been encountered, only 2 CRBSI cases reported during 2019-2021.

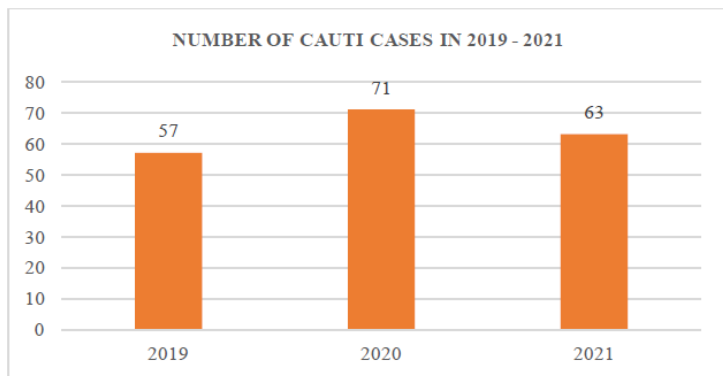## Fig 2: - NUMBER OF CAUTI CASES (2019 – 2021)

Fig 2:

In 2020, the Covid -19 pandemic had placed a large burden on hospitals and health care providers worldwide which increases the number of HAI especially CAUTI.

Fig 3: -PREVALENCE OF ORGANISM'S ISOLATED FROM CAUTI (2019 -2021)

2019

- KLEBSIELLA PNEUMONIAE
- E.COLI
- PSEUDOMONAS SPECIES
- ENTEROCOCCUS SPECIES
- ACINETOBACTER
- MYROIDES
- PROTEUS MIRABILIS
- SERRATIA MARCESCENS
- CITROBACTER SEDLAKII
- PROVIDENCIA RETTGERI
- VRE

Fig :3(a)

2020

- KLEBSIELLA PNEUMONIAE
- E.COLI
- PSEUDOMONAS SPECIES
- ENTEROCOCCUS SPECIES
- PROVIDENCIA RETTGERI
- PROTEUS MIRABILIS
- VRE
- MRSA
- ACINETOBACTER

Fig :3(b)

2021

- KLEBSIELLA PNEUMONIAE
- E.COLI
- PSEUDOMONAS SPECIES
- ENTEROCOCCUS
- PROVIDENCIA RETTGERI
- PROTEUS MIRABILIS
- VRE
- MORGNAELLA MORGANII
- STAPHYLOCOCCUS
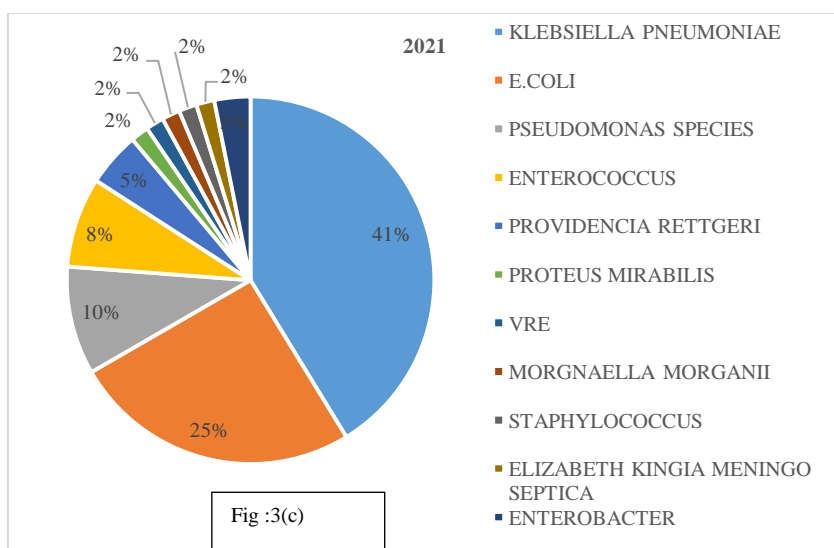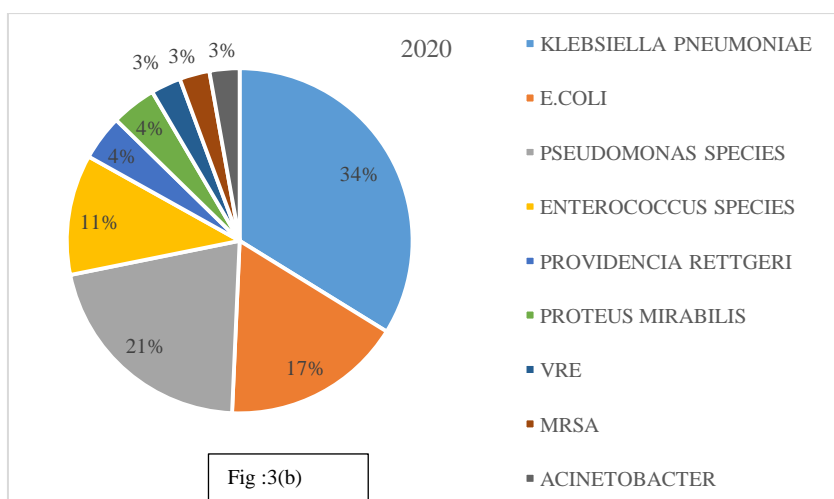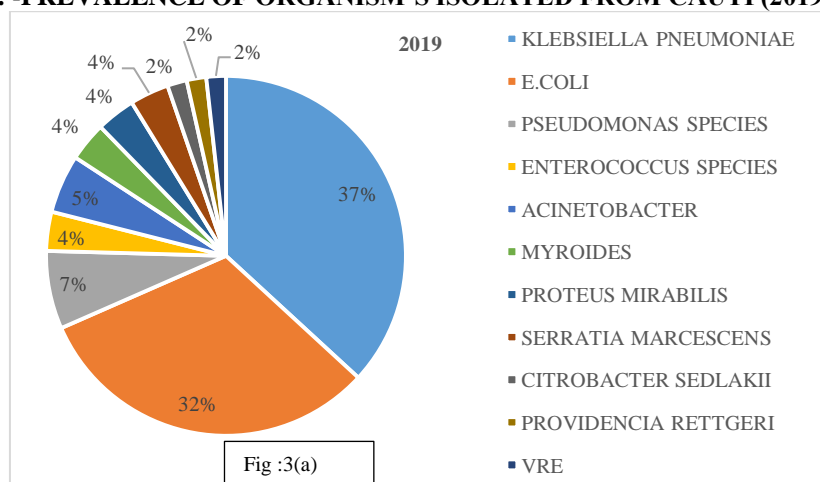- ELIZABETH KINGIA MENINGO SEPTICA
- ENTEROBACTER

Fig :3(c)

Fig:3

Fig :3(a) shows that the common organism isolated from CAUTI in 2019 were Klebsiella Pneumoniae (37%) followed by E.coli (32%), Pseudomonas species (7%), Enterococcus species (4%),VRE(2%) and Other GNB and GPC.

Fig :3(b) shows that the common organism isolated from CAUTI in 2020 were Klebsiella pneumonia (34%), E. coli (17%), Pseudomonas species (21%), Enterococcus species ((11%) However VRE (3%) and MRSA (3%) also detected.

Fig :3(c) shows that common organism isolated from CAUTI in 2021 were Klebsiella pneumonia (41%), E. coli (25%), Pseudomonas species (10%), Enterococcus species (8%). However, VRE (5%) and Elizabethkingia Meningoseptica also detected

Fig 4: - PREVALENCE OF GRAM NEGATIVE ORGANISM'S ISOLATED FROM CAUTI (2019 - 2021)
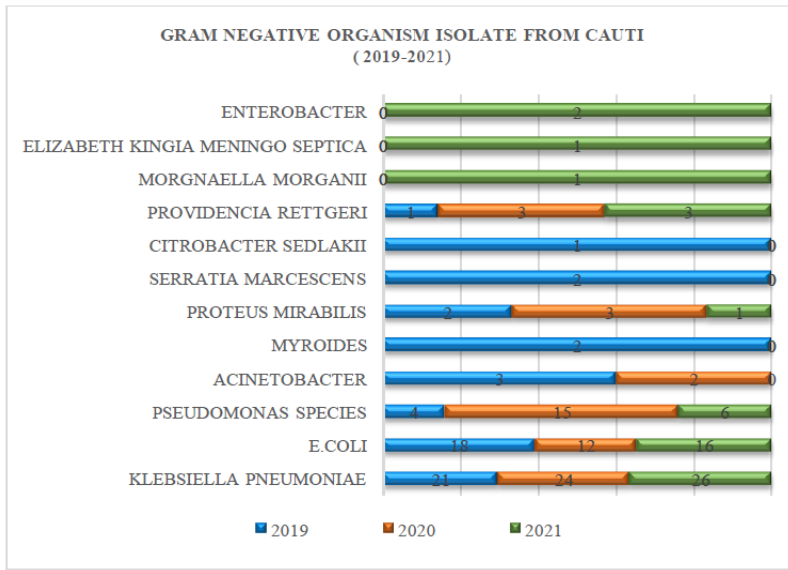

GRAM NEGATIVE ORGANISM ISOLATE FROM CAUTI (2019-2021)

Fig :4

Gram negatives organisms that were isolated during study period in CAUTI cases were Klebsiella Pneumoniae,Pseudomonas species ,Providencia Rettgeri,Elizabethkingia meningo septica,Serratia marcescens and Myroides

Fig 5: - PREVALENCE OF GRAM POSITIVE ORGANISMS ISOLATED FROM CAUTI (2019 - 2021)
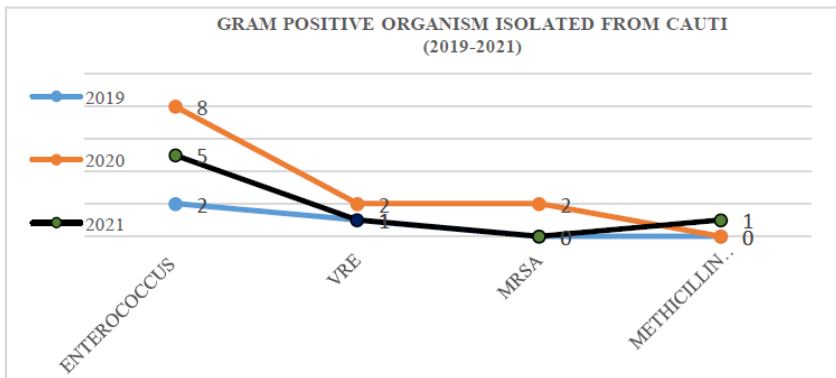

GRAM POSITIVE ORGANISM ISOLATED FROM CAUTI (2019-2021)

Fig: 5

Among Gram Positive Organism Enterococcus species, VRE, MRSA and Methicillin sensitive staphylococcus haemolyticus were detected in CAUTI.

Fig 6: - PREVALENCE OF ORGANISMS ISOLATED FROM CAUTI (2019 - 2021)

PREVALENCE OF ORGANISMS ISOLATED FROM CAUTI (2019 - 2021)

- KLEBSIELLA PNEUMONIAE
- E.COLI
- PSEUDOMONAS SPECIES
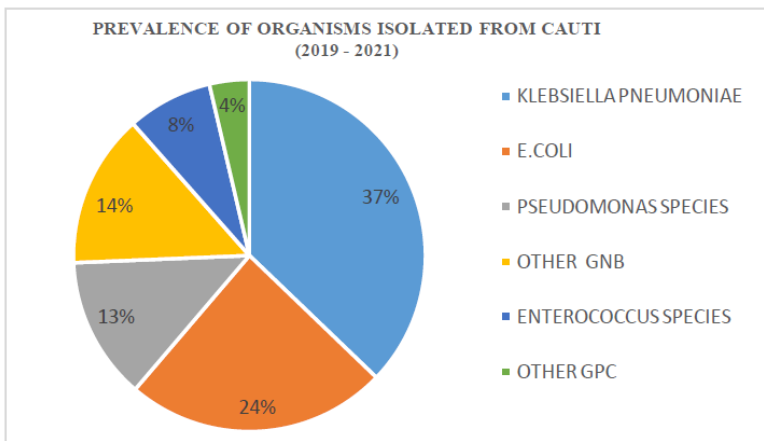- OTHER GNB
- ENTEROCOCCUS SPECIES
- OTHER GPC

Fig:6

Over a period of 3 year (2019-2021),Out of 191 total isolates 169(88%) were Gram negative bacteria and 22 (12%) were Gram positive cocci.

Gram negative organisms included Klebsiella pneumonia 71(37 %) E. coli 46(24%), Pseudomonas species 25(13%) and other GNB 27(14%). Gram positive isolates are Enterococcus species 15(8%) and other GPC 7(4%).

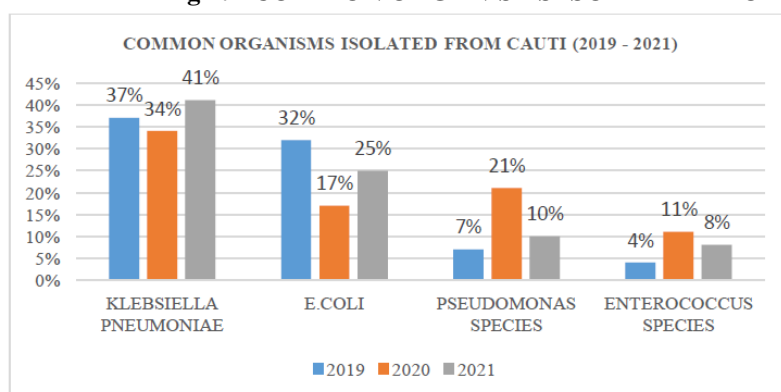**Fig 7: - COMMON ORGANISMS ISOLATED FROM CAUTI (2019 - 2021)**

Fig:7

The most common organism isolated from CAUTI are Gram negative organisms. Among them majority of isolates are Klebsiella pneumoniae. E. coli, Pseudomonas species Comparatively, gram positive isolates are less among them majority of isolates Enterococcus species .

VI.   Discussion

CAUTI was the commonest hospital acquired infection (HAI) among hospitalized patients in our hospital (84. 9%).Risk factors associated with the development of CAUTI include prolonged duration of urinary catheterization, long hospital stay, prior systemic antimicrobial therapy and co-morbid conditions in critical care patients[5].

This study determined the prevalence of organism isolated from CAUTI i.e. Klebsiella as the most prevalent bacterial uropathogen with (37%) prevalence followed by E. *coli (24%).* Pseudomonas was the third most isolated bacterial uropathogen with (13%) prevalence. Among the gram positive organisms i.e. Enterococcus was isolated in (8%) cases.

In our study VRE (3%) and MRSA (3%) was higher in number in 2020 as compare to   2019, this could be possibly because of COVID 19 pandemic.

Our study is concordant with the study of Ramesh Venkataraman et.al[2] and also our study shows slight deviation from another study i. e, Kumudini Panigrahi et.al (2020)[6] where CAUTI rate is (21.7%) They isolated Escherichia coli as the common CAUTI organisms 25%, followed by 22% Enterococcus species and (19%) Klebsiella, (11%) Proteus, (8%) Pseudomonas[6].This could possible due to patient type-2 category patients received in our hospital. According to CDC CAUTI rate reported (19%) overall increase was observed in (2020Q4) with ICUs experiencing a 30% increase[7]. Overall, there was no significant change in CAUTI between 2019 and 2020, about 10% increase observed in ICU[7].

VII.   Conclusion

The most common organisms responsible for CAUTI is Klebsiella followed by E. Coli, Pseudomonas species, Enterococcus species. Strictly follow up of insertion and maintenance CAUTI bundle care reduces the impending CAUTI cases[6]. The old age, prolonged catheterization, Diabetes, immunocompromised condition and prolonged antibiotic therapy are the significant risk factors for CAUTI[5]. Indwelling urethral catheters should be avoided whenever possible and should only catheterized in absolute indication. Insertion of catheter should be done in strict asepsis by trained personnel. Closed catheter drainage system should be employed in all cases. Routine hygiene (e.g., cleansing of the meatal surface during daily bathing and after passing stool etc.) should be followed. The catheter should be inspected regularly to ensure, Proper positioning & fixing. Prevention of infections attributable to these devices should be an important goal of healthcare associated control programme[5].

Keywords: - CAUTI (Catheter Associated Urinary Tract Infection.
          HAI (Hospital Acquired Infection)

References

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