PROSPECTIVE STUDY ON CATHETER ASSOCIATED URINARY TARCT INFECTIONS AND ITS PREVENTION

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Abstract

The aim and the objective is to study the catheter associated urinary tract infections and prevention of these infections which includes isolation of pathogenic organisms from the urine sample, performing the antibiotic susceptibility of the isolated pathogen and to check the preventive strategies followed in hospital. The study was conducted in Patel Cancer and Superspeciality Hospital, Jalandhar. Catheter associated urinary tract infections (CAUTI) are those infections that are begun by bacteria or fungi that entered in urinary tract either during the insertion or any during any manipulation of the catheter[1]. These infections are most often associated with the long term use of catheter and infections are more likely to occur in woman[2]. Diagnosis of CAUTI is made by microbiological examination of urine sample. CAUTI's can be reduced by following the prevention strategies and by the use of interventions.

Objective: To study the catheter associated urinary tract infections by antibiotic susceptibility test.

Methods: The urine samples of patients admitted in hospitals were collected and tested for catheter associated urinary tract infection.

Results: The study shows that urinary tract infection is more commonly found in patients who are hospitalized and have catheter intervension.

Conclusion: We conclude that catheter intervention is more likely to cause urinary tract infection.

Keywords: Catheter associated urinary tract infection, Catheter, Antibiotic sensitivity

Introduction

UTI is considered as bladder, ureter, kidneys, or urethra infection which happens when microorganisms go into urinary tract. Because of infection, person's urine will contain bacteria[3]. Urinary catheter is sleek tube sited in bladder for passing urine. It passes along tube into bag which collect urine[1]. Urethral catheterization reasons includes need to drain the bladder in those who are unable to urinate or to control urination (urinary incontinence), need of correct measurements of urinary output in unfavorably ill or if patient requires strict prolonged immobilization[4]. CAUTI are caused by microorganisms that arrived the urinary tract all through the insertion of catheter by means of catheter tube, over external surface of catheter or in other words, we can say that a CAUTI happens in patient who have congenital urinary catheter in place in between 48-hour period before onset of UTI. CAUTI is complex form of UTI in which occurrence of foreign bodies in urinary system not only pre-disposes patient to UTI but likewise modify the body 's

capability for eliminating foreign body from lower urinary tract. CAUTI is utmost severe as well as shared catheter linked problem as it results into urosepsis and septicemia. The chances of CAUTI is more in women due to reduced estrogen hormone in genitalia and due to shorter urethra length along with urethra's closeness to anus providing microorganisms a shorter distance to mobile[5]. UTIs are one of the most common type of infection associated to healthcare. Amongst UTIs cases in hospital, around 75% are due to urinary catheter. Between 15-25% patients in hospitals acquire urinary catheters during their stay in hospital. One of the most vital risk factor of emerging catheter-associated UTI (CAUTI) is persistent use of urinary catheter. CAUTI has linked to amplified morbidity, mortality, hospital cost and duration of visit. Moreover, bacteriuria usually leads into excessive use of antimicrobial, and urinary drainage systems are frequently pools for multidrug–resistant microbes and source of spread to additional patients[6]. The microorganisms causing CAUTI get entree to urinary tract either extra luminally or intra luminally[7]. About 66% CAUTI are accredited to microbes gaining entree through catheter–urethral lumen interface and left over 34% are credited to intraluminal relocation linked with alteration of catheter as well as urinary drainage system[8].

Extraluminal infection too supposed to happen when microbes ascend from perineum sideways the surface of catheter. Feces strains infect perineum and urethral meatus, harbored in labia, and later rise to bladder along external surface, thus causing bacteriuria, creation and encrustation of catheter biofilms[9]. Intraluminal infection happens by rise in bacteria from contaminated catheter, drainage tube, or urine drainage bag[10]. Microorganisms can travel into the bladder in 1 to 3 days[11]. Difficulties linked with CAUTI causes uneasiness to patients, extended hospital stay and increased cost and mortality[4], Secondary bacteremia/sepsis, blockage to flow, choice of multidrug-resistant organisms, urethral strictures, prostatitis[12]. Every year, more than 13,000 deaths happens due to UTIs [13].

Materials and Method

For diagnosing CAUTI, urine sample is taken. The quality of urine sample for culture is significant to determine the infection. The most suitable specimen is first morning void, since it is in general more concentrated, because the urine stay in bladder for longer time. The ideal collection method is midstream, clean-catch specimen. Sample collected from afresh inserted urine catheter is consistent. Only samples collected from precisely designed sampling port or from catheter should be submitted for examination.

After collecting the sample then do the culturing of urine sample for determining the causative organism of CAUTI, and also prepare wet mount. For culturing of urine sample use blood agar and CLED agar media. For identification of the organism we do biochemical tests which include IMVIC, Urease and TSI.

IMVIC reactions contain four useful reactions that usually employed to identify the members of family enterobacteriaceae. In indole test, formation of indole is identified by means of Ehrlich's reagent. Indole reacts with aldehyde in reagent and gives red color[14].

Some bacteria produce acetyl methyl carbinol or reduction product 2, 3 butylene glycol from pyrvic acid in media. In presence of alkali and oxygen, the small amount of acetyl methyl carbinol present in the medium is oxidized into diacetyl which reacts with peptone of broth and produces red color. This is detected by Voges proskauer test[15]. Citrate utilization test identifies the ability of organism to use citrate by way of single source of carbon and energy. Urease broth is differential medium which tests the capability of an organism to yield an exoenzyme. Antibiotic sensitivity test is done to check the susceptibility of bacteria to antibiotics. Antibiotic susceptibility test is done to check which antibiotic will be more effective in treatment of bacterial infection inside the body.

Results and Discussion

The study was carried out in the Patel Hospital Jalandhar on topic of CAUTI. During this period, I observe the patients who have indwelling urinary catheter. ICU and WARDS patients were observed, who have urinary catheters and to check the sign and symptoms of CAUTI. If any patient having catheter develop any sign or symptom of CAUTI, the urine sample culturing was done in the microbiology lab.

When urine samples were cultured on media and observe after 24-48 hours. If the growth occurs, then biochemical tests for identification of the organism was done. Antibiotic sensitivity testing was made after the identification of organism .

Table(1): Distribution of ICU patients included in the study.

Months	**Total no. of patients**	**Sample received**	**Positive samples**	**Total catheter Days**	**CAUTI rate**
January	19	6	1	110	9%
February	62	8	0	136	Nil
March	43	1	1	78	12.8%
April	30	10	1	52	19.2%

This table shows that the total number of ICU patients having inserted catheter during the study period of 3 months and 13 days were 154. Total urine sample received in lab for analysis were 29. Out of 29 samples 3 samples were positive and the organisms identified in these 3 positive samples are ***E.Coli*** and ***Klebsiella*** and ***candida.***

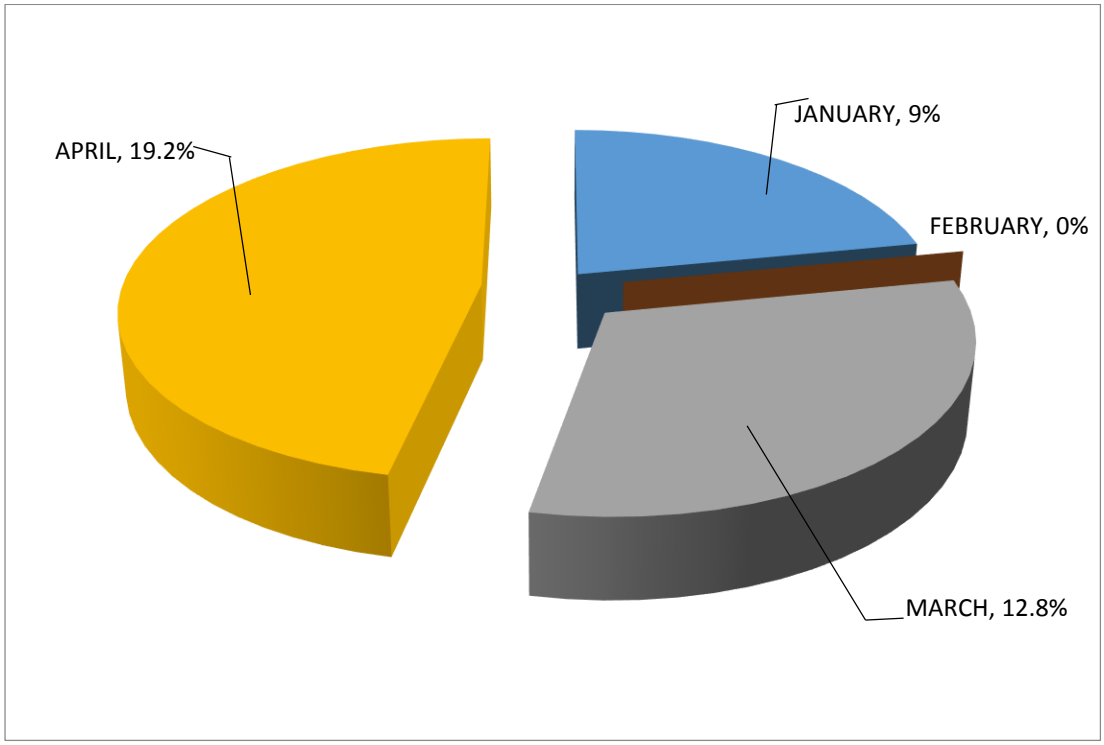

Fig:1: Percentage of CAUTI Rate of ICU

This figure shows the percentage of CAUTI rates of ICU. We can see that CAUTI rates are increasing. The reason behind is that healthcare workers not properly follow the preventive measures.

Table(2): Distribution of IPD patients included in the study.

Months	Total no. of patients	Sample received	Positive samples	Total catheter days	CAUTI rate
January	56	10	1	228	4.3%
February	94	14	1	199	5%
March	91	22	3	159	18.8%
April	61	14	0	153	Nil

Total no. of IPD patients those having urinary catheters were 302 during the study period of 3 months and 13 days. Out of 50 samples 5 samples are positive. Organisms identified in the 5 samples are ***E.Coli, Klebsiella*** and ***Enterobacter.***

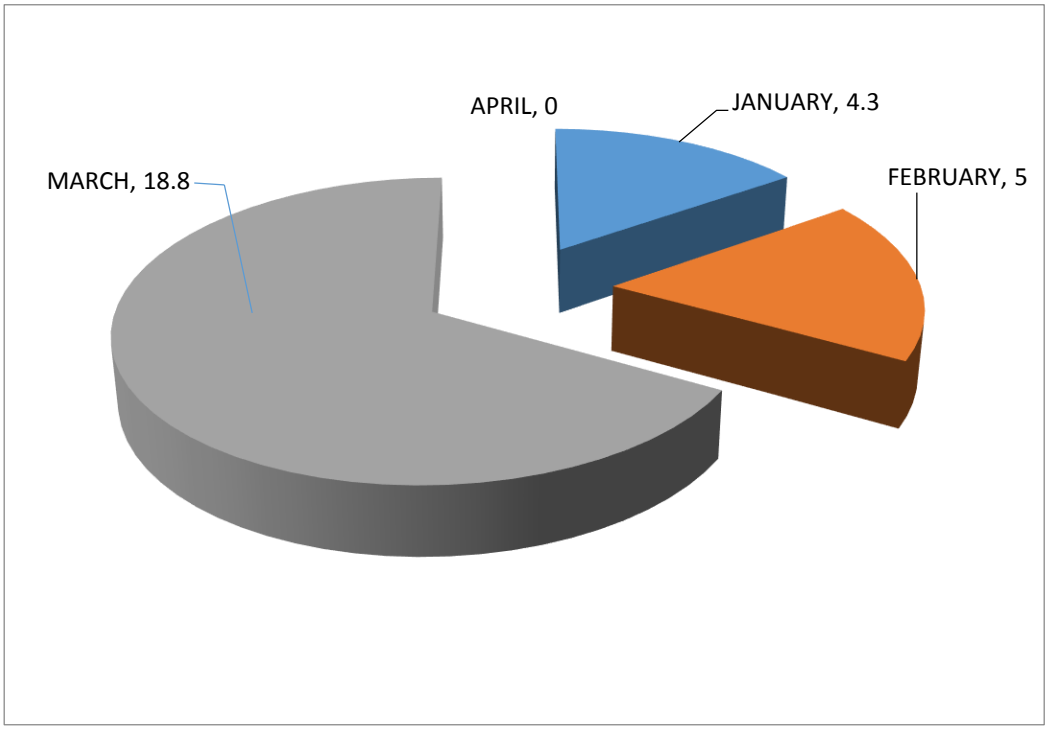

Fig: 2 **Percentage of CAUTI rate of IPD**

This figure shows the CAUTI Rates of IPD. We can see that CAUTI rates are increasing. The reason behind is that healthcare workers not properly follow the preventive measures.

Identification of the bacteria causing CAUTI is made on the basis of biochemical test results.

Table(3): Results Of Antibiotic Sensitivity Testing

Organism	Intermediate Sensitive Antibiotics	Sensitive Antibiotics

Escherichia Coli	Cephalexin Cefoparazone + Sulbactum Gatifloxacin Piparacillin/ Tazobactum	Imipenum Meropenem Gentamicin Cefepime+Tazobactum Netimicin Nitrofuranton Ertapenem Amikacin
Klebsiella	Amikacin	Levofloxacin Polymyxin B
Enterobacter		Imipenem

Conclusion

CAUTI are those infections occur in patient who have urinary catheter in place within the 48-hour period before start of the UTI. CAUTI is one of the most often occurring healthcare-acquired infection and is linked with increased length of stay, morbidity, mortality and excessive use of antibiotics[16]. These complex infections usually persist and outcome in long-term morbidity because of presence of encrustation and blockage of catheter by crystalline biofilms which increase resistance to host immune response as well as to antibiotics[12].

Healthcare providers play an important role in preventing these infections. Studies have shown that if all the preventive measures are taken CAUTI rates can be decreased. For this it is very necessary to educate the health care workers time to time about these preventions. CAUTIs rates can also be decreased by using intervention[17]. Reminder system is the most effective intervention to prevent CAUTI.

In my study period I was noted that by implementing the preventive strategies CAUTI rates can be decreased. Although it does not completely eradicate the problem but it helps to reduce it.

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