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REVIEW ARTICLE

THE EFFECTIVENESS OF CARE BUNDLE APPROACH ON THE PREVENTION OF CATHETER ASSOCIATED URINARY TRACT INFECTION (CAUTI) AMONG THE PATIENT WITH INDWELLING CATHETER IN SELECTED HOSPITALS AT PUDUCHERRY.

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ABSTRACT

Objective: The main purpose of the study is to evaluate the effectiveness of Care Bundle Approach on prevention of CAUTI among experimental group, to compare the effectiveness of Care Bundle Approach on CAUTI among experimental and control group, to associate the selected demographic and clinical variables with CAUTI among the patients on experimental and control group. **Material and methods:** A quasi experimental post test only control group design was adopted for the study. A total number of 60 patients (30 in control group & 30 in experimental group) were selected for this study by using purposive sampling technique. All subjects are evaluated by observational checklist comprising of demographic variables, clinical variable performa and UTI assessment checklist consists of clinical parameter, urine analysis and urine culture. **Results and conclusion:** The results predicts that in post test, in experimental group by following Care Bundle Approach the majority of 18 (60%) and in control group by following the routine care majority 11 (36.7%) had no growth in urine culture. The results shows that in experimental group on post test the clinical variable decreased hemoglobin level has shown statistically significant association with urine culture with chi square value $p<0.01$level. The result shows that on comparison of type of organism E.coli about 11 (36.67%) is found to be a common organism on development of CAUTI**.** The incidence of CAUTI is high among the patient with decreased hemoglobin level and with positive urine sugar. The researcher concluded that the Care Bundle Approach for prevention of CAUTI is clinically significant but not statistically significant.

INTRODUCTION

Human beings develop diseases if these organisms accidentally land at the “wrong place” in the “right time”. Unfortunately during the hospital stay, patients who come for treatment with some diseases may develop some other infections from the hospital. Mainly by the transmission of microorganisms from one person to another through the hospital equipments and also from the health care personnel. This transmission of infection is termed as, nosocomial infection or Hospital Acquired Infection (HAI). Most infections that become clinically evident after 48hrs of hospitalization are considered Hospital-Acquired. There are four types of Hospital Acquired Infection which rates for more than 80%. They are urinary tract infection, surgical site infection, lung infection and blood stream infection. Among these urinary tract infection rates for about 35% of Heath Care Associated Infection.

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CAUTI is defined as any infection in urinary tract where an indwelling catheter was in place for more than two calendar days with day of device placement being one and an indwelling catheter was in place on the date of event. The Care Bundle is a collaborative approach to prevent Device Associated Infection and Hospital Acquired Infections contributing to improve the patient outcome in healthcare settings. It is a set of evidence-based practices that, when performed collectively and reliably to improve the quality care and patient outcomes. The bundle should act as a collaborative unit to ensure that all steps of care are delivered and documented clearly. The failure of performing any one component in the bundle makes the concept zero. According to the global statistics the fourth most common Health Care Associated Infection is Catheter Associated Urinary Tract Infection (CAUTI) which rates for about 93,300 in acute care hospitals. It is estimated that each year there is more than 13,000 deaths are associated with CAUTI. In India the CAUTI remains the second most health care associated infection which accounts for up-to 8.4%. The organisms associated with CAUTI infections are Escherichia coli (21.4%), Candida (21%), Enterococcus (14.9%), Pseudomonas (10%), Klebsella pneumonia (7.7%) and Entero-bacter (4.1%).

MATERIALS AND METHODS

Quantitative research approach and quasi experimental post test only with control group research design was selected for this study. A total number of 60 samples (30 in control group and 30 in experimental group) who full filled the inclusion criteria were selected from inpatient department at selected hospitals, Puducherry by using purposive sampling technique. The study was conducted for the period of 4 weeks. The tool used in this study was observational checklist and was structured in three sections. Section A consists of demographic variables, section B consists of clinical variable Performa to assess the related history and section C comprised of UTI assessment checklist consists of clinical parameter, urine analysis and urine culture.

The inclusion criteria for the study are patients who were,

- above 20 years of age,
- of both gender male or female,
- willing to participate in the study.

The following samples are excluded for the study are the patients who were

- on immunosuppressive drugs,
- with supra-pubic catheter and condom catheter,
- with confirmed diagnosis of UTI before catheterization procedure
- pregnant or antenatal mothers

Ethical consideration

The ethical clearance was obtained from my own institution(MTPG&RIHS) and the hospitals which was selected as my setting. Prior to the data collection, permission was obtained from the concerned authorities of the hospital and formal information was given to the respective ward in-charges and informed consent was obtained from the patients first degree relatives (only for comatose) of the subjects involved in the study. The main study is conducted for 4 weeks. Subjects who required indwelling catheter were selected and for these subjects' demographic variables, clinical variables were assessed. Those who meet the inclusion criteria were enrolled into the study as the study subjects. The sample size was 60, who were randomly assigned to the experimental and control group. The control group received the routine care by the staff nurses and the experimental group received the care bundle given by the investigator for five days. On the 6th day, a clinical symptom of UTI was assessed and urine specimen were obtained and sent for urine analysis by the investigator from the subjects of both groups. The collected data was analyzed by using descriptive and inferential statistics.

RESULTS

The result showed that in experimental group majority 15(50%) and in control group majority 16(53.3%) patients belonged to the age group of 41- 60 years, in experimental group majority 17(56.67%) patients were female and in control group majority18(60%)were male, in experimental and control group majority 20(66.67%) of the subjects were married, in experimental group majority 12 (40%) of the samples completed secondary education and in control group majority 10 (33.33%) of samples had completed university/graduate level education, in relation to occupation, In experimental group majority 13 (43.33%) of samples were not working and in control group majority 13 (43.33%) of samples were hard working. Regarding the area of residence, in experimental group, majority 18 (60%) of samples were residing in urban area and control group, majority 16 (53.3%) were residing in urban area. (Table no. The result showed that in Regarding the clinical variable the diagnosis of patient, in experimental group the majority 19 (63.33%) of samples were diagnosed with medical condition and in control group the majority 23 (76.67%) of samples were diagnosed with neurological disorders; Regarding the indication for catheterization, in experimental group, the majority 15 (50%) and in control group the majority 14 (46.67%) of samples had been catheterized for urinary incontinence;

With respect to previous history of catheterization, in experimental group majority 21 (70%) and in control group majority 22 (73.3%) of the samples had no previous history of catheterization; Regarding the duration of catheter, in experimental group 15 (50%) of the samples were had been catheterized for more than 7 days and 15 (50%) of them had been catheterized for less than 7 days and in control group, majority 16 (53.33%) of the samples had been catheterized for less than 7 days. In relation to the history of co-existing illness, in experimental group majority 14 (46.67%) of the samples had both diabetes mellitus and hypertension and in control group control group 12 (40%) of the samples had both diabetes mellitus and hypertension; 12 (40%) had no history of co-existing illness; Regarding the history of renal disease, in experimental group majority 27 (90%) and in control group majority 22 (73.33%) of the samples had no history of renal disease. With respect to the level of hemoglobin, in experimental group majority of 16 (53.33%) and in control group, majority 17 (56.67%) of the samples had decreased hemoglobin level. (Table no.2).

The result showed that In the comparison of clinical parameters of UTI The redness around urethral meatus was present more in the control group (63.3%) than the experimental group (30%). The pus discharge was present more in control group. In experimental group no one had pus discharge. (Table no.3). The result showed that on the comparison of urine microscopic analysis the urine sugar shows significance which interprets that urine sugar is positive for both experimental and control group which is considered as one of the causative factor for CAUTI. (Table no.4). The table 5 shows that On the analysis of type of organism the E.coli 11 (36.67%) is found to be a common organism present in both Control and Experimental group. The table 6 depicts that the clinical variable, hemoglobin level of the patient had shown statistically significant association with urine culture among patients with indwelling catheter with chi-square value of χ^2= 7.232 at p<0.01 level and the other clinical variables had not shown statistically significant association with urine culture among patients with indwelling catheter in the experimental group. The decreased hemoglobin level is found to be one of the risk factor of CAUTI.

Table 1. Distribution of Demographic Variables of patients with indwelling catheter

Demographic Variables	Experimental Group		Control Group	
	No.	%	No.	%
Age in years				
20 - 40 years	2	6.67	4	13.33
41 - 60 years	15	50.00	16	53.33
Above 60 years	13	43.33	10	33.33
Gender				
Male	13	43.33	18	60.00
Female	17	56.67	12	40.00
Marital status				
Married	20	66.67	20	66.67
Single	2	6.67	3	10.00
widowed/Divorced	8	26.67	7	23.33
Education				
Illiterate	4	13.33	6	20.00
Primary	6	20.00	5	16.67
Secondary	12	40.00	9	30.00
Graduate	8	26.67	10	33.33
Occupation				
Unemployed	13	43.33	13	43.33
Sedentary worker	4	13.33	2	6.67
Moderate worker	10	33.33	11	36.67
Heavy worker	3	10.00	4	13.33
Area of residence				
Rural	12	40.00	14	46.67
Urban	18	60.00	16	53.33

Table 2. Distribution of clinical variables of patients with indwelling catheter

N = 60(30+30)

Clinical Variables	Experimental Group		Control Group	
	No.	%	No.	%
Diagnosis of patient				
Neurological disorders	11	36.67	5	16.67
Medical conditions	19	63.33	23	76.67
Surgery purpose	0	0.00	2	6.67
Indication of catheterization				
Urinary incontinence	15	50.00	14	46.67
Neurological disorders	9	30.00	4	13.33
Surgery purpose	0	0.00	4	13.33
Immobilization	6	20.00	8	26.67
Previous history of catheterization				
Yes	9	30.00	8	26.67
No	21	70.00	22	73.33
Duration of catheter				
Less than 7 days	15	50.00	16	53.33
More than 7 days	15	50.00	14	46.67
History of co-existing illness				
Diabetes mellitus	7	23.33	1	3.33
Hypertension	5	16.67	5	16.67
Both	14	46.67	12	40.00
None	4	13.33	12	40.00
History of renal disease				
Yes	3	10.00	8	26.67
No	27	90.00	22	73.33
Hemoglobin level of the patient				
Normal	14	46.67	13	43.33
Decreased	16	53.33	17	56.67
Increased	0	0.00	0	0.00

Table 3. Comparison of clinical assessment of UTI among patients with indwelling catheter between experimental and control group.

N = 60(30+30)

Clinical Assessment Parameters	Experimental Group		Control Group		Chi-Square Value
	No.	%	No.	%	
Redness around the urethral meatus					χ^2=6.696 P = 0.010
Present	9	30.0	19	63.33	S**
Absent	21	70.0	11	36.67	
Pus discharge					χ^2=4.286 P = 0.038
Present	0	0	4	13.3	S*
Absent	30	100.0	26	86.7	

Table 4. Comparison of urine analysis (Microscopic) among patients with indwelling catheter between experimental and control group

N = 60(30+30

Urine Analysis (Microscopic)	Experimental Group		Control Group		Chi-Square Value
	No.	%	No.	%	
Urine sugar					χ^2=5.455
Positive	21	70.0	12	40.0	P = 0.020
Negative	9	30.0	18	60.0	S*

Table 5. Frequency and percentage distribution of type of organism formed among patients with indwelling catheter in the experimental and control group.

N = 60 (30+30)

Urine Culture	Experimental Group		Control Group	
	No.	%	No.	%
Type of organism				
E.coli	5	16.67	6	20.0
Staphylococcus	0	0	3	10.0
Pseudomonas aeuriginosa	5	16.67	5	16.67
Enteroccoccus	0	0	0	0
Candida albicans	2	6.67	5	16.67
None	18	60.0	11	36.67

Table 6. Association of urine culture among patients with indwelling catheter with their selected clinical variables in the experimental group

N = 30

Clinical Variables	Present		Absent		Chi-Square Value
	No.	%	No.	%	
Hemoglobin level of the patient					χ^2=7.232
Normal	2	6.7	12	40.0	d.f=1
Deceased	10	33.3	6	20.0	p = 0.007
Increased	-	-	-	-	S**

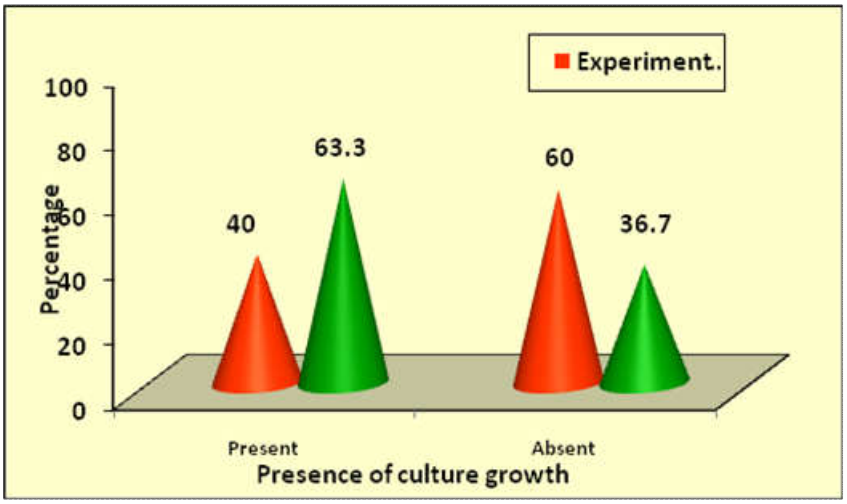

Fig.1. Comparison of urine culture among patients with indwelling catheter between experimental and control group

DISCUSSION

The result highlights that in the post-test, in experimental group by following the Care Bundle Approach the majority of 18 (60%) had no growth in urine culture and 12 patients had growth. The present study was supported by the author Mahesh, et.al (2018) conducted a study on effectiveness of nursing care bundle on CAUTI at MGMC&RI, Puducherry. The result showed that among 30 samples in experimental group around 26 subjects showed no growth and in control group 14 samples showed no growth in urine culture. The p value is 0.0009 and it concluded that the nursing care bundle on CAUTI is effective. The results predicted that in the post-test, in experimental group by following the Care Bundle Approach the majority of 18 (60%) had no growth in urine culture and in control group only 11 (36.7%) had nogrowth in urine culture. Thus the catheter care bundle practice have reduced the incidence of CAUTI. The results revealed that the Care Bundle Approach on prevention of CAUTI is clinically significant but it is not statistically significant. The present study was supported by Alyson W blank et al, (2014), in their quasi experimental study on "prevention bundle for catheter associated urinary tract infection " among the 310 patients with indwelling catheter. The results showed that though the results are not statistically significant, they were clinically significant with a 50% reduction in CAUTI incidence.

The results revealed that in the experimental group, after administration of intervention, that the clinical variable hemoglobin level and urine sugar of the patient 73 had shown statistically significant association with urine culture among patients with indwelling catheter with chi square value at p< 0.01 level majority of the samples. The present study was supported by Hagerty T,et al ., (2015), which was a retrospective study on "risk factors of catheter associated urinary tract infection in critically ill patients with sub-arachanoid hemorrhage" among 242 patients who were selected by convenient sampling technique. The result shows that the variables that are associated with CAUTI infection rate are blood sugar > 200mg/dl and decreased haemoglobin level 95% class interval of (0.977, 14.6).

Conclusion

Hence this study results shows that Care Bundle Approach is effective in preventing the incidence of CAUTI. Care Bundle Approach for prevention of CAUTI is clinically significant but not statistically significant and incidence of CAUTI is high among patients with decreased hemoglobin level and with positive urine sugar. It can be practiced as an evidence based protocol for prevention of CAUTI.

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