

## Effectiveness of Nursing Care Bundle on Catheter Associated Urinary Tract Infection (CAUTI) among Patients with Indwelling Catheter in Selected Wards of Mgmcri, Kasturba Gandhi Nursing College, Puducherry India - An Experimental Study

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### Abstract

**Background:** Infection is a health hazard of great expense and significance affecting the final outcome of treatment. Infection control (IC) is a quality standard and is essential for the well-being and safety of patients, staff, and visitors. A hospitalized patient can be expected to be more susceptible to infection due to their underlying disease, or by injuries acquired outside or inflicted upon them by surgical procedures and instrumentations in the hospital. UTIs are the most common type of healthcare-associated infection reported to the National Healthcare Safety Network (NHSN) (2015) Among UTIs acquired in the hospital, approximately 75% are associated with a urinary catheter, which is a tube inserted into the bladder through the urethra to drain urine. Therefore, catheters should only be used for appropriate indications and should be removed as soon as they are no longer needed.

**Aim:** The main aim of the current study was to know the effectiveness of Nursing Care Bundle on Catheter Associated Urinary Tract Infection among patients with indwelling catheter in critical care units of MGMCRI, Puducherry.

**Materials and Methods:** Quantitative research approach was used for this study. The two group pre-test post-test design was used for this study. Total 60 samples were selected using simple random sampling technique. The data pertaining to level of bacterial colonization was collected by using urine culture and sensitivity and NHSN CAUTI assessment tool.

**Result:** The results in the experimental group urine culture during post-test were positive for only 4 samples, whereas the other 26 samples were negative. In control group during post-test, urine culture was positive for 16 samples and 14 samples were negative. The calculated P-value ( $P= < 0.0009^*$ ) was less than 0.05 level & statistically significant at  $p < 0.05$  level. The demographic variables namely age, gender, financial status, marital status, diet pattern, educational status, religion, and occupation did not have any significant association with level of CAUTI.

**Conclusion:** The risk of CAUTI increases with longer duration of catheterization. All patients those who had catheter for more than 6 days should be checked for UTI symptoms. And their urine should be cultured regularly in order to diagnose and prevent CAUTI and its complications which are very dangerous and difficult to treat. Regular practice of this Nursing Care Bundle will prevent the CAUTI rates in hospitals and tertiary care areas.

**Keywords:** Colonization, CAUTI, UTI, Asymptomatic.

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## INTRODUCTION

Infection is a health hazard of great expense and significance affecting the final outcome of treatment. Infection control (IC) is a quality standard and is essential for the well-being and safety of patients, staff, and visitors. It affects many departments of the hospital and involves issues of quality, risk management, clinical governance and health and safety. A hospitalized patient can be expected to be more susceptible to infection due to their underlying disease, or by injuries acquired outside or inflicted upon them by surgical procedures and instrumentations in the hospital. There is an increasing trend of bacterial resistance to drugs and the emergence of new strains, with harmless bacteria becoming pathogenic under certain circumstances<sup>1</sup>

UTIs are the most common type of healthcare-associated infection reported to the National Healthcare Safety Network (NHSN) (2015) Among UTIs acquired in the hospital, approximately 75% are associated with a urinary catheter, which is a tube inserted into the bladder through the urethra to drain urine. Between 15-25% of hospitalized patients receive urinary catheters during their hospital stay. The most important risk factors for developing a catheter-associated UTI (CAUTI) is a prolonged use of the urinary catheter. A urinary tract infection (UTI) is an infection involving any part of the urinary system, including the urethra, bladder, ureters, and kidney<sup>2</sup>

Urinary tract infections (UTIs) are the fourth most common type of healthcare-associated infection, with an estimated 93,300 UTIs in acute care hospitals in 2011. UTIs additionally account for more than 12% of infections reported by acute care hospitals. Virtually all healthcare-associated UTIs are caused by instrumentation of the urinary tract. Approximately 12-16% of adult hospital inpatients will have an indwelling urinary catheter at some time during their hospitalization, and each day the indwelling urinary catheter remains, a patient has a 3-7% increased risk of acquiring a catheter-associated urinary tract infection<sup>3</sup>

In India, CAUTI is the second, most commonly occurring infection, accounting up to 8.4% in every adolescent population. The prevalence of CAUTI in the acute care setting is directly linked to the widespread use of indwelling catheterization in that setting. The National Health care Safety Network reported CAUTI

rates to be from 3.1 to 7.5 per 1,000 catheter days in acute care hospitals in 2006. The highest rates were found to be in burn ICUs and the lowest rates in medical-surgical ICUs. The most common organisms associated with CAUTI are Escherichia coli (21.4%), Candida (21%), Enterococcus (14.9%), Pseudomonas aeruginosa (10%), Klebsiella pneumonia (7.7%), and Enterobacter (4.1%). Reported hospital-wide prevalence rates for indwelling catheterization vary from 25% to 35%. Prevalence rates in the critical care unit are substantially higher at 67% to 76%.<sup>22, 23</sup> Cumulatively, CAUTI adds an additional 90,000 hospital days per year<sup>4</sup>

## OBJECTIVES OF THE STUDY

1. To evaluate the effectiveness of Nursing Care Bundle on level of Catheter Associated Urinary Tract Infection among patients with indwelling catheter.
2. To find out the association between CAUTI among patients with indwelling catheter with selected demographic variables.

## METHODOLOGY

### Research Approach

True-experimental research approach was adopted for the study as it was intended to know the effectiveness of Nursing Care Bundle on Catheter Associated Urinary Tract Infection among patients with indwelling catheter.

### Research Design

The design used was two group pre-test post-test design was adopted

### Study Settings

The study was conducted in Mahatma Gandhi Medical College and Research Institute Puducherry. It is as Multi specialty hospital situated 15 Km away from Puducherry. It is 1350 bedded with specialty wards.

### Study Population

The population of the study included patients in critical care units of MGMCRI, who met the inclusion criteria.

### Sample and Sample Size

Patient admitted in critical care units who fulfill the criteria, where selected as sample. The sample size was 60 (experimental-30, control-30)

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## Criteria for Sample Selection

### Inclusion Criteria

- Patients more than 18 years with indwelling catheter
- Patients with indwelling catheter on 3rd day
- Both the sexes

### Exclusion Criteria

- Patients who were on antibiotics
- Patients with the condom catheter
- Patients with immunocompromised status and other debilitating illness such Carcinoma bladder.
- Known patient already diagnosed as urinary tract infection

## Sampling Technique

The sample who met the inclusion criteria during the data collection were selected using simple random sampling technique.

## PROCEDURE FOR DATA COLLECTION

Before starting data collection researcher obtained permission from the HOD of critical care medicine. The sample was selected on the basis of inclusion criteria. Written consent was obtained. Samples were selected on 3<sup>rd</sup> day of catheterization. Initially urine culture was done on the 3<sup>rd</sup> to know the bacterial colonization level. For experimental group, Nursing care Bundle was given twice a day for one week where normal routine nursing care was given for control group. Post-test urine culture was done on 7<sup>th</sup> day again to know the bacterial colonization level and to know the symptoms of UTI.

## NURSING CARE BUNDLE

Nursing Care bundle is a bundle of care which includes following steps acts as standard of care prepared by the investigator after the intensive review of literatures. Which includes,

- Hand hygiene
- 2% Chlorhexidine based catheter care
- Use of 3% hydrogen peroxide in urinary drainage bags (5ml)

- Securing catheter: BOYS: lateral abdomen, GIRLS: Inner aspect of thigh
- Maintain unobstructed and prevent dependent loops
- Keep the collecting bag below the level of the bladder at all times, do not touch the bag on the floor.
- Empty the urine collecting bag regularly with the level of 400 ml or at least every 4 to 6 hours.

## RESULTS

- In the experimental group urine culture during post-test were positive for only 4 samples, whereas the other 26 samples were negative. In control group during post-test, urine culture was positive for 16 samples and 14 samples were negative. The calculated P-value ( $P < 0.009^*$ ) was less than 0.05 level & statistically significant at  $p < 0.05$  level. Which reveals that the Nursing Care Bundle was highly effective in experimental group as when compared to the control group received routine nursing care.
- Pre and post level of colony growth in experimental group and control group, it shows that in experimental group Pretest, 20(66.66%) samples have less than 103 CFU/ml, 4(13.3%) were in the range of 103 CFU/ml- 104 CFU/ml, 6(20%) were in the range of 104 CFU/ml- 105 CFU/ml. Where in posttest, 26(86.6%) have less than 103 CFU/ml, 2(6.6%) were in the range of 104 CFU/ml- 105 CFU/ml. (6.6%) were in the range of >105 CFU/ml.
- In control group Pretest shows that 24(80%) samples have less than 103 CFU/ml, 4(13.3%) were in the range of 103 CFU/ml- 104 CFU/ml, 2(6.6%) were in the range of 104 CFU/ml- 105 CFU/ml. Where in posttest, 13(43.3%) have less than 103 CFU/ml, 1(3.3%) were in the range of 103 CFU/ml- 104 CFU/ml, 2(6.6%) were in the range of 104 CFU/ml- 105 CFU/ml. 14(46.6%) were in the range of >105 CFU/ml.
- There was an association with the gender with Catheter Associated Urinary Tract Infection

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**Table 1.** Frequency and percentage distribution samples with demographic variables among patients with indwelling catheter

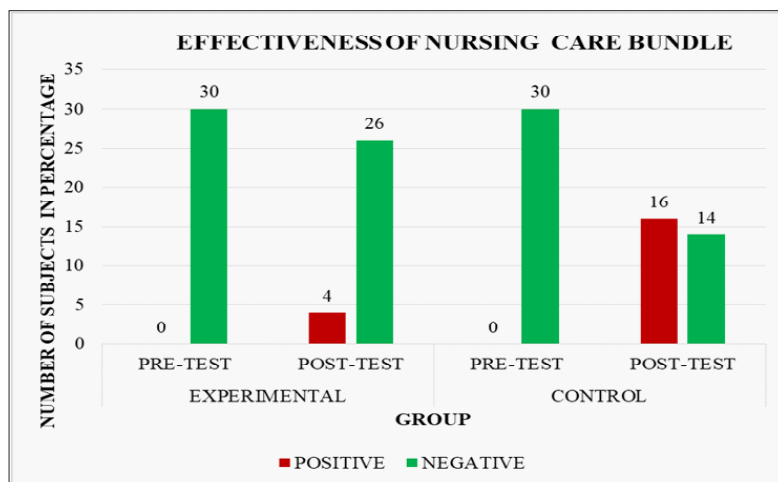
| Si No | Demographic Variables          | Experimental N=30 |       | Control N-30 |       | Total N=60 | %     |
|-------|--------------------------------|-------------------|-------|--------------|-------|------------|-------|
|       |                                | n                 | %     | n            | %     |            |       |
| 1     | <b>Age In Years</b>            |                   |       |              |       |            |       |
|       | Young adult(18-40 years)       | 11                | 36.6  | 9            | 30    | 20         | 33.33 |
|       | Adult (41-65 years)            | 10                | 33.3  | 10           | 33.3  | 20         | 33.33 |
|       | Elderly> 60 years              | 9                 | 30    | 11           | 36.6  | 20         | 33.33 |
| 2     | <b>Gender</b>                  |                   |       |              |       |            |       |
|       | Male                           | 16                | 53.3  | 18           | 60    | 34         | 56.66 |
|       | Female                         | 14                | 46.6  | 12           | 40    | 26         | 43.33 |
|       | Transgender                    | -                 | -     | -            | -     | -          | -     |
| 3     | <b>Marital Status</b>          |                   |       |              |       |            |       |
|       | Unmarried                      | 4                 | 13.3  | 2            | 6.6   | 6          | 10    |
|       | Married                        | 25                | 83.3  | 27           | 90    | 52         | 86.66 |
|       | Divorced / Separated           | -                 | -     | -            | -     | -          | -     |
|       | Widow / Widower                | 1                 | 3.3   | 1            | 3.3   | 2          | 3.33  |
| 4     | <b>Family Income Per Month</b> |                   |       |              |       |            |       |
|       | <Rs 5,000                      | 6                 | 20    | 11           | 36.6  | 17         | 28.33 |
|       | Rs 5,001 to 10,000             | 11                | 36.6  | 9            | 30    | 20         | 33.33 |
|       | Rs10,001 to 15,000             | 6                 | 20    | 5            | 16.6  | 11         | 18.33 |
|       | > Rs15000                      | 7                 | 23.3  | 5            | 16.6  | 12         | 20    |
| 5     | <b>Religion</b>                |                   |       |              |       |            |       |
|       | Hindu                          | 21                | 70    | 22           | 73.3  | 43         | 71.66 |
|       | Christian                      | 5                 | 16.6  | 4            | 13.3  | 9          | 15    |
|       | Muslim                         | 4                 | 13.3  | 4            | 13.3  | 8          | 13.33 |
|       | Others                         | -                 | -     | -            | -     | -          | -     |
| 6     | <b>Diet Pattern</b>            |                   |       |              |       |            |       |
|       | Vegetarian                     | 4                 | 13.3  | 1            | 3.3   | 5          | 8.33  |
|       | Non-Vegetarian                 | 26                | 86.6  | 29           | 96.6  | 55         | 91.66 |
| 7     | <b>Educational Status</b>      |                   |       |              |       |            |       |
|       | Graduate                       | 16                | 53.3  | 14           | 47    | 30         | 50    |
|       | Higher Secondary School        | 1                 | 3.3   | 1            | 3.3   | 2          | 3.33  |
|       | Primary School                 | 4                 | 13.3  | 3            | 10    | 7          | 11.66 |
|       | Non- literate                  | 9                 | 30    | 11           | 37    | 21         | 33.33 |
| 8     | <b>Occupation</b>              |                   |       |              |       |            |       |
|       | Unemployed                     | 6                 | 20    | 5            | 16.66 | 11         | 18.33 |
|       | Daily labour                   | 10                | 33.33 | 10           | 33.33 | 20         | 33.33 |
|       | Self-employed                  | 2                 | 6.66  | 5            | 16.66 | 7          | 11.66 |
|       | Government employee            | 1                 | 3.33  | -            | 0     | 1          | 1.66  |
|       | Private employee               | 11                | 36.66 | 10           | 33.33 | 21         | 35    |

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**Table 2.** Comparison of Pre and Post-test level of CAUTI rates in both experimental group and control group among patients with indwelling catheter N=60

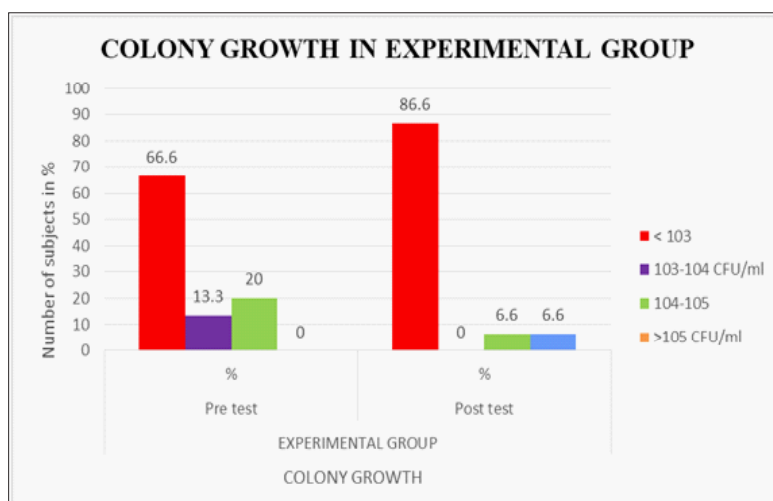
| Group / Urine Culture | Experimental Group |           | Control Group |           | Total | χ <sub>2p</sub> Value                         |
|-----------------------|--------------------|-----------|---------------|-----------|-------|---|
|                       | Pre-Test           | Post-Test | Pre-Test      | Post-Test |       |   |
| Positive              | NIL                | 04        | NIL           | 16        | 20    | χ <sub>2</sub> = 10.80<br>P VALUE = 0.009 SS* |
| Negative              | 30                 | 26        | 30            | 14        | 40    |   |

P<0.05\* SS- Statistically Significant

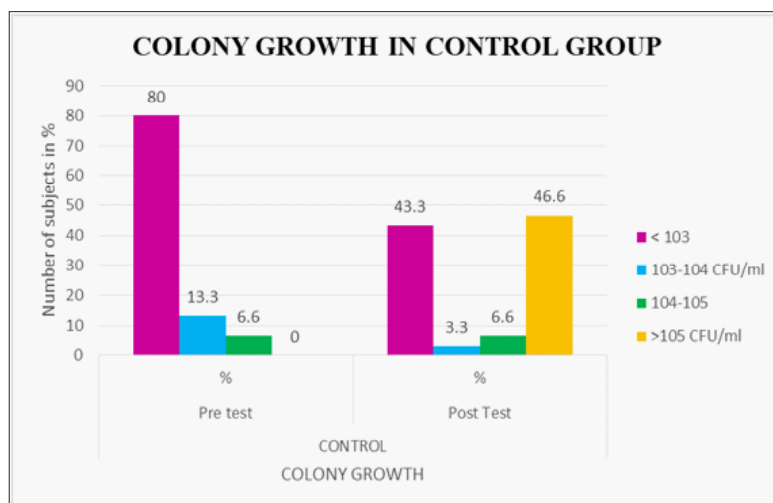


**Table 3.** Comparison of Pre and Post-test level of colony growth in both experimental group and control group among patients with indwelling catheter

| COLONY GROWTH RATE                      | EXPERIMENTAL GROUP |      |           |      | CONTROL GROUP |      |           |      |
|---|--------------------|------|-----------|------|---------------|------|-----------|------|
|   | PRE TEST           |      | POST TEST |      | PRE TEST      |      | POST TEST |      |
|   | n                  | %    | n         | %    | n             | %    | n         | %    |
| < 10 <sup>3</sup> CFU/ ml               | 20                 | 66.6 | 26        | 86.6 | 24            | 80   | 13        | 43.3 |
| 10 <sup>3</sup> -10 <sup>4</sup> CFU/ml | 04                 | 13.3 | 0         | 0    | 4             | 13.3 | 1         | 3.3  |
| 10 <sup>4</sup> -10 <sup>5</sup> CFU/ml | 06                 | 20   | 2         | 6.6  | 2             | 6.6  | 2         | 6.6  |
| >10 <sup>5</sup> CFU/ml                 | 0                  | 0    | 2         | 6.6  | 0             | 0    | 14        | 46.6 |



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**Table 4.** Association of CAUTI with selected demographic variables

| Demographic variable |                 | Control   |            |       |                                   | Experimental |           |       |                                   |
|----------------------|-----------------|-----------|------------|-------|-----------------------------------|--------------|-----------|-------|-----------------------------------|
|                      |                 | Negative  | Positive   | total | Chi-Square / Fishers Exact test   | Negative     | Positive  | total | Chi-Square / Fishers Exact test   |
| Age                  | 18-40 years     | 7 (63.6%) | 4 (36.4%)  | 11    | 0.25c<br>d.f = 2<br>p=0.879<br>NS | 6 (66.7%)    | 3 (33.3%) | 9     | 0.06c<br>d.f = 2<br>p=0.966<br>NS |
|                      | 41-65 years     | 2 (20%)   | 8 (80%)    | 10    |                                   | 10 (100%)    | 0 (0%)    | 10    |                                   |
|                      | > 60 years      | 5 (55.6%) | 4 (44.4%)  | 9     |                                   | 10 (90.9%)   | 1 (9.1%)  | 11    |                                   |
| Gender               | Male            | 8 (50%)   | 8 (50%)    | 16    | 0.69c<br>d.f = 2<br>p=0.706<br>NS | 16 (88.9%)   | 2 (11.1%) | 18    | 0.99f<br>d.f = 2<br>p=0.606<br>NS |
|                      | Female          | 6 (42.9%) | 8 (57.1%)  | 14    |                                   | 10 (83.3%)   | 2 (16.7%) | 12    |                                   |
|                      | Transgender     | 0         | 0          | 0     |                                   | 0            | 0         | 0     |                                   |
| Marital status       | unmarried       | 1 (25%)   | 3 (75%)    | 4     | 0.60c<br>d.f = 3<br>p=0.896<br>NS | 1 (50%)      | 1 (50%)   | 2     | 0.25c<br>d.f = 3<br>p=0.968<br>NS |
|                      | Married         | 13 (52%)  | 12 (48%)   | 25    |                                   | 24 (88.9%)   | 3 (11.1%) | 27    |                                   |
|                      | Divorced        | 0         | 0          | 0     |                                   | 0            | 0         | 0     |                                   |
|                      | Widow           | 0 (0%)    | 1 (100%)   | 1     |                                   | 1 (100%)     | 0 (0%)    | 1     |                                   |
| Financial status     | < ₹ 50000       | 4 (66.7%) | 2 (33.3%)  | 6     | 1c<br>d.f = 3<br>p=0.801<br>NS    | 10 (90.9%)   | 1 (9.1%)  | 11    | 0.09c<br>d.f = 3<br>p=0.992<br>NS |
|                      | ₹ 5001-10,000   | 4 (36.4%) | 7 (63.6%)  | 11    |                                   | 9 (100%)     | 0 (0%)    | 9     |                                   |
|                      | ₹ 10,001-15,000 | 3 (50%)   | 3 (50%)    | 6     |                                   | 3 (60%)      | 2 (40%)   | 5     |                                   |
|                      | ₹ > 15,000      | 3 (42.9%) | 4 (57.1%)  | 7     |                                   | 4 (80%)      | 1 (20%)   | 5     |                                   |
| Religion             | Hindu           | 8 (38.1%) | 13 (61.9%) | 21    | 0.23c<br>d.f = 3<br>p=0.971<br>NS | 21 (95.5%)   | 1 (4.5%)  | 22    | 0.04c<br>d.f = 3<br>p=0.997<br>NS |
|                      | Christian       | 4 (80%)   | 1 (20%)    | 5     |                                   | 1 (25%)      | 3 (75%)   | 4     |                                   |
|                      | Muslim          | 2 (50%)   | 2 (50%)    | 4     |                                   | 4 (100%)     | 0 (0%)    | 4     |                                   |
|                      | Others          | 0         | 0          | 0     |                                   | 0            | 0         | 0     |                                   |



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|                           |                     |            |            |    |   |            |           |    |   |
|---------------------------|---------------------|------------|------------|----|---|------------|-----------|----|---|
| <b>Diet pattern</b>       | Vegetarian          | 2 (50%)    | 2 (50%)    | 4  | <b>0.99f</b><br>d.f = 1<br>p=0.317<br><b>NS</b> | 1 (100%)   | 0 (0%)    | 1  | <b>0.99f</b><br>d.f = 1<br>p=0.317<br><b>NS</b> |
|                           | Non-vegetarian      | 12 (46.2%) | 14 (53.8%) | 26 |   | 25 (86.2%) | 4 (13.8%) | 29 |   |
| <b>Educational status</b> | Graduate            | 6 (37.5%)  | 10 (62.5%) | 16 | <b>0.46c</b><br>d.f = 4<br>p=0.976<br><b>NS</b> | 11 (78.6%) | 3 (21.4%) | 14 | <b>0.31c</b><br>d.f = 4<br>p=0.988<br><b>NS</b> |
|                           | Higher Secondary    | 0 (0%)     | 1 (100%)   | 1  |   | 1 (100%)   | 0 (0%)    | 1  |   |
|                           | Primary             | 2 (50%)    | 2 (50%)    | 4  |   | 2 (66.7%)  | 1 (33.3%) | 3  |   |
|                           | Illiterate          | 6 (66.7%)  | 3 (33.3%)  | 9  |   | 11 (100%)  | 0 (0%)    | 11 |   |
|                           | Others              | 0          | 0 (0%)     | 0  |   | 1 (100%)   | 0 (0%)    | 1  |   |
| <b>Occupation</b>         | Unemployed          | 4 (66.7%)  | 2 (33.3%)  | 6  | <b>0.37c</b><br>d.f = 4<br>p=0.984<br><b>NS</b> | 5 (100%)   | 0 (0%)    | 5  | <b>1c</b><br>d.f = 4<br>p=0.909<br><b>NS</b>    |
|                           | Daily labour        | 5 (50%)    | 5 (50%)    | 10 |   | 9 (90%)    | 1 (10%)   | 10 |   |
|                           | Self-employed       | 0 (0%)     | 2 (100%)   | 2  |   | 4 (80%)    | 1 (20%)   | 5  |   |
|                           | Government employee | 0 (0%)     | 1 (100%)   | 1  |   | 0          | 0         | 0  |   |
|                           | Private employee    | 5 (45.5%)  | 6 (54.5%)  | 11 |   | 8 (80%)    | 2 (20%)   | 10 |   |

### DISCUSSION

The objective was to know the effectiveness of Nursing Care Bundle on Catheter Associated urinary Tract Infection among patients with indwelling catheter. In experimental group urine culture during post-test were positive for only 4 samples, whereas the other 26 samples were negative. In control group during post-test, urine culture was positive for 16 samples and 14 samples were negative. The calculated P-value ( $P < 0.0009^*$ ) was less than 0.05 level & statistically significant at  $p < 0.05$  level. There was no association with the most of the demographic variables like age, educational status and occupation. There was an association with gender with Catheter Associated urinary Tract Infection.

### CONCLUSION

CAUTI is more prevalent in most of the hospitals now a days. Nurses play a vital role in the healthcare delivery system. Periodically following the steps in nursing a patient with a urinary catheter can help to prevent and reduce the risk of Catheter Associated Urinary Tract Infection and hence preventing any related complications and decreasing patients stay in the hospital. To undertake this task, regularly follow this Nursing Care bundle of care for the catheterized patient and periodic surveillance of the CAUTI rates to reduce the risk of Catheter Associated urinary Tract Infection.

### REFERENCES

- [1] Hinkle, Janice L., and Kerry H. Cheever. Brunner & Suddarth's Textbook of Medical-Surgical Nursing. 2018.
- [2] Catheter-Associated Urinary Tract Infections (CAUTI) | HAI | CDC. 19 July 2017, [https://www.cdc.gov/hai/ca\\_uti/uti.html](https://www.cdc.gov/hai/ca_uti/uti.html).
- [3] Lo, Evelyn, et al. "Strategies to Prevent Catheter-Associated Urinary Tract Infections in Acute Care Hospitals: 2014 Update." Infection Control & Hospital Epidemiology, vol. 35, no. 05, May 2014, pp. 464–79. Cross ref, DOI: 10.1086/675718.
- [4] Chanda R Vyawahare, Nageswari R Gandham, Rabindra Nath Misra, Savita V Jadhav, Neetu S Gupta, Kalpana M Angadi, Occurrence of catheter-associated urinary tract infection in critical care units 2015. DOI: 10.4103/0975-2870.164974
- [5] Hooton TM, Bradley SF, Cardenas DD, et al. Diagnosis, prevention, and treatment of catheter-associated urinary tract infection in adults: 2009 international clinical practice guidelines from the infectious diseases society of America. Clinical Infectious Diseases. 2010; 50(5):625–663. [PubMed]
- [6] Saint S, Kowalski CP, Kaufman SR, et al. Preventing hospital-acquired urinary tract infection in the

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- United States: a national study. *Clinical Infectious Diseases*. 2008; 46(2):243–250. [PubMed]
- [7] Gould CV, Umscheid CA, Agarwal RK, et al. HICPAC Guideline of Prevention of Catheter-Associate Urinary Tract Infections. Atlanta, Ga, USA: Centers for Disease Control and Prevention; 2009.
- [8] McDonnell G, Russell AD. Antiseptics and disinfectants: activity, action and resistance. *ClinMicrobiol Rev* 1999;12:147-79.
- [9] Hugo WB, Longworth AR. Some aspects of the mode of action of chlorhexidine. *J Pharm Pharmacol* 1964;16:655-62
- [10] Klevens, R., Edwards, J., Richards, C. R., Horan, T., Gaynes, R., Pollock, D., & Cardo,
- [11] D. (2007). Estimating health care-associated infections and deaths in U.S.
- [12] hospitals, 2002. *Public Health Reports*, 122(2), 160–166. Retrieved from
- [13] <http://www.cdc.gov/nhsn/PDFs/dataStat/2008NHSNReport>
- [14] Lo E, Nicolle LE, Coffin SE, Gould C, Maragakis LL, Meddings J, et al. Strategies to prevent catheter-associated urinary tract infections in acute care hospitals: 2014 update. *Infection Control and Hospital Epidemiology* 2014; 35:464-79.
- [15] American Nursing Association. ANA CAUTI Prevention Tool. <http://nursingworld.org/ANA-CAUTI-Prevention-Tool>.
- [16] Association for Professionals in Infection Control and Epidemiology, Inc. APIC implementation guide: guide to preventing catheter-associated urinary tract infections. [http://apic.org/Resource\\_/EliminationGuideForm/Off6ae59-0a3a-4640-97b5-eee38b8bed5b/File/CAUTI\\_06.pdf](http://apic.org/Resource_/EliminationGuideForm/Off6ae59-0a3a-4640-97b5-eee38b8bed5b/File/CAUTI_06.pdf).
- [17] Allen-Bridson K. NHSN catheter-associated urinary tract infection surveillance in 2015. <http://www.cdc.gov/nhsn/pdfs/training/2015/cauti-2015-w-answers.pdf>.
- [18] Gould CV, Umscheid CA, Agarwal RK, et al. Guideline for prevention of catheter-associated urinarytractinfection2009. <http://www.cdc.gov/hicpac/pdf/CAUTI/CAUTIguideline2009final.pdf>.
- [19] Md. Yousuf Khan, C. Venkateshwarlu, G. Sreenivas, P. Rahul. Study of incidence and risk factors of urinary tract infection in catheterized patients admitted at tertiary care hospital, Nizamabad, Telangana State, India. *IAIM*, 2016; 3(8): 83-92.

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