ORIGINAL RESEARCH PAPER
Volume - 14 | Issue - 08 | August - 2025 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

APPLICATION OF QUALITY INDICATORS IN IMPROVEMENT AND CONTROL OF URINARY TRACT INFECTIONS AMONG CATHETERIZED PATIENTS AT TERTIARY CARE HOSPITAL, UDAIPUR

Microbiology

Dr. Aditi Kothari* Assistant Professor, American International Institute of Medical Sciences, Udaipur, Rajasthan-313001 *Corresponding Author

Dr. Mohammed Tofiq Associate Professor, American International Institute of Medical Sciences, Udaipur, Rajasthan-313001.

Dr. Sheetal Jain Assistant Professor, American International Institute of Medical Sciences, Udaipur, Rajasthan-313001

ABSTRACT

Quality indicator are one of the methodologies to improve the quality of hospital services. The patients admitted in hospital to which catheters are applied as a part of treatment are more likely to suffer with UTI. To determine the effectiveness of application of quality indicator in reduction of cases of UTI and preventing CAUTI and bacteriuria of catheterized patients. The study conducted on patients requiring catheterization as a part of treatment. The problem of post catheterization UTI is to be addressed as a main problem. The technique, duration, underlying diseases etc. plays a major role in development of UTI among them. Intervention by proper training and explanation of medical and paramedical staff will decrease the events of UTI among them and this parameter is utilized as a quality indicator in present study. The intervention includes pre-test, lecture and demonstration, training of proper insertion, maintenance and removal of catheter and post-test. The results of pre and post intervention were compared. The present study includes 1645 patients with catheterization from different sections of the hospital. The required data collected including 878patients before intervention and 767 patients after intervention deemed second part of the study. Clinically suspected patients of UTI among catheterized patients were 80 with 8 culture confirmation of infection and 2 of them with multidrug resistant isolates. In second part of study, there were 28 patients suspected with infection with 4 culture positives. A significant improvement was observed after the application of QI. It is recommended to apply such indicators not only of urinary tract infections but different types of services in hospital to benefit both hospital and patient. Application of QI in different medical services is beneficial to improve various health services.

KEYWORDS

Quality indicators, CAUTI, HAI, UTI

INTRODUCTION

Urinary tract infection attributed to the use of an indwelling urinary catheter is one of the most common infections acquired by patients in health care facilities.1 which can lead to the development of urinary catheter complications, including catheter-associated urinary tract infection (CAUTI) 2. CAUTI is the most common Hospital-acquired infections (HAI) accounting for 40% of all HAI and is the second most common cause of nosocomial septicemia.[1] According to the Center for Disease Control and Prevention (CDC), CAUTI increases the morbidity and mortality by 2.8-fold and length of hospitalization by 1–3 days.[4] Approximately 25% of hospitalized patients undergo urinary catheterization, whereas among critically ill ICU patients, it reaches to more than 70%, resulting in >30 million urinary catheter insertions each year.[5] In majority of the cases, use of catheter without proper indication, prolonged catheter days, improper procedural technique, and improper catheter care contribute to the development of CAUTI[6,7]. Bacteriuria also leads to unnecessary antimicrobial use, and urinary drainage systems can be reservoirs for multidrug-resistant bacteria and a source of transmission to other patients.[8] It is decided to improve the services by providing specific training to the concerned medical and paramedical staff about the right technique of insertion and maintenance of catheter. The study throughs light on importance of application of quality indicator for improvement of patient care for this particular action. The same quality indicators can also be applied for different types of patient care.

MATERIAL AND METHODS

The prospective cross-sectional study of monthly CAUTI rates per 1000 device days was conducted in 6 months duration from October 2021 to March 2022 at American international institute of medical science and GBH hospital, Udaipur, Rajasthan in the Department of Microbiology, and was conducted on patients requiring catheterization as a part of treatment. Data was extracted from the records by infection control team following the National Healthcare Safety Network Guideline (NHSN, 2015) due to increase in the CAUTI rates a multidisciplinary committee organised a task force including all health care workers from physicians, nurses, infection control and quality. Many brainstorming sessions was conducted and areas of difficulty was identified. Strategies evolved for prevention of CAUTI rates by a series of operations.

The study was carried in 2 parts including analysis before intervention, intervention and after intervention phases, phase 1 included a 3-month pre-intervention from October 2021 to December 2021, phase of intervention and phase 2 included the post-intervention phase of 3 months duration (January to march 2022). Phase 1 - records of patient with urinary catheters suspected of CAUTI was noted for a prescribed time period with any episode of UTI among them. After intervention the study was again conducted as phase 2 which records the patients with urinary catheters suspected of CAUTI after interventions and was noted and compared with phase 1.

In both the phases baseline sample was collected from patients before urinary catheter insertion to exclude any patients with preexisting UTIs

Exclusion criteria included Patients with signs and symptoms of UTI on or patients with a positive urine culture ($\geq 10^5$ /microorganisms per ml of urine) with no more than 2 species of microorganisms that were suffering from any of the following: fever more than 38°C, urgency, frequency, dysuria, or suprapubic tenderness with no other recognized cause. It also included patients suffering from at least 2 of the previous signs and symptoms with either of pyuria (urine specimen with ≥10 white blood cells [WBC]/mm3 or ≥3 WBC/high power field of unspun urine) and symptomatic catheterized patients

The problem of post catheterization UTI is to be addressed as a main problem. The technique, duration, underlying diseases etc. plays a major role in development of UTI among them. Intervention by proper training and explanation of medical and paramedical staff will decrease the events of UTI among them and this parameter is utilized as a quality indicator in present study. The intervention includes organizing classroom presentations, pre and post -test lecture and demonstration, Onsite trainings for collection as well as processing of sample Implementation of care bundles, Surveillance of positive CAUTI cases training of proper insertion, maintenance and removal of catheter.

RESULTS

Phase 1

This part of study includes 878 patients with catheterization from different sections of the hospital out of which 556 were males and 322 were females with a mean age group was 59 years. Total catheter days were noted, clinically suspected cases of CAUTI with symptoms of UTI that is fever, discoloration in urine, lower back pain etc. were sent for culture and sensitivity, and culture confirmed CAUTI cases were

evaluated which was 8 with 2 cases of which multidrug resistance were isolated.

Phase Of Intervention Included:

i. 54 class room lectures, 10 for medical doctors and 44 for paramedical staff involved in procedure
ii. Multiple onsite training in different sections of hospital by infection control nurse
iii. Inspecting correct method of catheterization and catheter care by appointed link nurse
iv. Monitor compliance with catheter care bundles based of evidence-based guidelines
v. Promote consistent perineal care practices.
vi. Correct method of collecting urine sample from catheterized patients.

Phase 2

The second part of the study included 767 patients with catheters from different parts of the hospital. Out of which 345 were males and 411 were females and the mean age group was 46 years. Data of both phases were compared and suspected cases were sent for confirmation by culture and sensitivity testing, which reveled that all the 4 cases were pan sensitive

Table 1 Sex Data

Observations	Cycle 1	Cycle 2
Number of patients	878	767
Number of males	556	345
Number of females	322	411
Mean age	59 years	46 years

Table 2 Clinically Suspected Cases

Duration	Total Catheter Days	Suspected CAUTI	Confirmation of CAUTI	Percentage of CAUTI
Nov 2021-Dec 2021	1226	80	8	6.52%
January 2022-March 2022	1156	28	4	3.46%

$$\text{Percentage of CAUTI} = \frac{\text{Number of infections}}{\text{Total number of catheter days}} * 1000$$

DISCUSSION

Present study provides an example of utility of QI in improvement of medical services. Initial infection rate was 6.52%. After intervention this rate decreased to 3.46 this difference is statistically significant. Similar study was carried out by Taha et al [8]and found improved CAUTI rates per 1000 catheter days from 6.8 in March to 5.0 in May 2015 to 3.64 in August 2015.

CONCLUSION

The use of an indwelling urethral device is connected to inflated possibilities of the presence of bacteria in the blood and manifested urinary tract infections, as well as increased morbidity from non-infectious consequences. To reduce infections linked to the use of these devices, infection management programs must create, apply, and observe rules and procedures. A significant improvement was observed after the application of QI and this lesson was disseminated throughout the organization. The present study focus on one of the parameters of medical services resulting in significant as well as sustained reduction in CAUTI rates. It is recommended to apply such indicators not only of urinary tract infections but different types of services in hospital like central line infections, post operative infections, hospital stay, rate of errors in laboratory report etc to benefit both hospital and patient. Application of QI in different medical services is beneficial to improve various health services.

Acknowledgements: Thanks to ICO of GBH AIIMS for all their support and empowerment and to frontline staff in the medical units for their engagement. Special thanks to the infection control team.

Declaration Of Interests: None of the authors have any declared conflict of interest.

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