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ORIGINAL ARTICLE

Appropriate versus Inappropriate urinary catheterization: A cross-sectional study in a Tertiary Care setup.

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ABSTRACT… Objective: To determine the frequency and appropriateness of urinary catheterization among adult patients admitted to the medical and surgical wards of a tertiary care hospital and the most common indication for each. **Study Design:** Cross-sectional Descriptive study. **Setting:** Abbasi Shaheed Hospital, Karachi. **Period:** April 1, 2021, to April 30, 2021. **Methods:** All adult patients of both genders admitted to the medical and surgical wards, including their respective sub-specialties, were included in the study, while the pediatric patients were excluded. Data was collected from all catheterized patients, including demographic characteristics and the indications for catheterization, regardless of the duration of catheter use. The appropriateness of catheterization was recorded based on established clinical indications. **Results:** Among 712 admitted patients, 348 (48.8%) were catheterized with an indwelling urinary catheter. Of the 348 catheterized patients, 210 (60.3%) were appropriately catheterized, whereas 138/348 (39.6%) patients were inappropriately catheterized. Altered state of sensorium was found to be the most common reason for catheterization whereas catheterization secondary to urinary incontinence without sufficient skin breakdown was found to be the most common reason for inappropriate catheterization. **Conclusion:** The frequency of inappropriate urinary catheterization at our tertiary care setup was found to be 39.6%, which is alarmingly high. These numbers highlight that a significant number of admitted patients are catheterized without a valid indication. These inappropriate catheterizations can be avoided, thereby preventing the complications related to urinary catheterization. The study results highlight the need for strict implementation of guidelines which will not only reduce the complication but will also cause financial benefit to the patients.

Key words: Indwelling Urinary Catheter, Nosocomial Infection, Urinary Catheterization, Urinary Tract Infection.

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INTRODUCTION

Urinary catheters are devices commonly used for the purpose of draining the bladder or urine collection. Among the different types of urinary catheters, Indwelling urethral catheters (IUC) are the most commonly used catheters in any hospital setting[1], despite of the known side effects and serious complications including recurrent/chronic urinary tract infections and their repeated treatment leading to antibiotic resistance, urethral trauma, colonization of bacteria in urinary tract.[2] Considering these disadvantages of IUC (Indwelling Urinary Catheters), researchers around the world have spent a great deal of time to assess the ongoing practices of urinary catheterization in admitted patients so that inappropriate use of catheters can be minimized.

Among hospitalized patients, Urinary catheterization is the most common intervention but as any other medical procedure, it has its own risks and complications. Catheter acquired urinary tract infection was found to be the most frequently occuring complication with catheterized patients at a 3-7% increased risk of developing CAUTI each day.[3] About, 67% of all UTIs diagnosed among hospital inpatients[4], and 97% diagnosed in ICUs were catheter induced.[5] The risk of CAUTI was found to be positively related to the duration of catheterization.[6] This not only increases the cost of healthcare significantly but has a major impact on the overall mortality and morbidity of patients. A study from Australia showed that the overall cost of treating a patient diagnosed with CAUTI was double as compared to the cost of treating patients without CAUTI.[7] One of the most prominent reasons being increased length of the patient's hospital stay.[8]

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Owing to the lack of local research, local data on CAUTI is scarce. However, a recent study from Peshawar, Pakistan found the incidence of CAUTI to be 37%. E.Coli was found to be the most common causative agent followed by Klebseilla Pneumoniae.[9]

We firmly believe that in a low-resource government funded hospital, cost effective patient care should be our priority. Considering the range of complications associated with IUCs and the heavy costs that accompany, a study to find out its frequency along with the common indications of catheterization in our setting is essential. This will not only add to the local data but will help us in reducing the rate of unnecessary catheterization ultimately saving both monetary and human resources.

METHODS

The primary objective of this study was to determine the frequency of catheterization in patients admitted at Abbasi Shaheed Hospital while the secondary objective was determining the frequency of appropriate and inappropriate catheterization and the most common indication for each.

This was a cross-sectional study conducted at Abbasi Shaheed Hospital from the 1st of April 2021 to 30th April 2021 to find out the frequency of IUC from Adult inpatient wards, including Medicine and Allied wards (Medical ICU, Nephrology, Neurology) and Surgery and Allied wards (Gynaecology, Surgical ICU, Orthopedics, Neurosurgery). All patients that were willing to participate and were catheterized with a Foley's catheter were included in the study. Peadiatric patients and patients with other forms of catheters such as supra-pubic or condom catheters were excluded from our study.

A pilot study, to assess the validity of our study and questionnaire was done prior to the final study. Ethical Approval to conduct the study was obtained from Institutional ethical and scientific research committee (Ref no. 006/19). Data was collected using a self-designed questionnaire containing 6 items. The content of the questionnaire was checked for clarity, accuracy, adequacy and understanding of language. The questionnaire included: Age and gender of the patient, place of catheterization (Emergency or ward), functional status of the patient (Ambulatory or non-ambulatory) and indication for catheterization. Table-I, shows the guidelines for insertion, ongoing care and removal indwelling urethral catheters as standard (CG-T/2011/140).[10] The indications included in this guideline were considered appropriate while remaining were labeled inappropriate.

Patients in our study were also categorized according to their mental status (Alert or altered sensorium)[11,12] as confirmed by the consultant and the indication for their catheterization was inquired about in detail.

The selection of patients was done by non-probability sampling. Both verbal and written consent from both doctors and the patients was obtained. Age and Gender was confirmed at the time of obtaining consent and was also confirmed through patient files. Their doctors were then asked to fill out the study questionnaire.

The collected data was analyzed using SPSS version 20.0. The over-all frequency along with the frequency of appropriate and inappropriate catheterization was calculated. The mean age of patients, gender frequency, frequency of patients catheterized in wards and emergency and the most common indication in Medicine and Surgery wards was assessed individually.

RESULTS

A total of 712 patients were admitted in our hospital during the study period in both medical and surgical wards combined. Among these 348 patients were catheterized and therefore the frequency of catheterization was 48.8%. Out of these 348 patients, 180 (51.7%) were in medicine and allied wards, 122 (35%) in surgical and allied wards, 32(9.19%) in medical ICU and 14 (4.02%) in surgical ICU. This showed that the maximum number of catheterizations was done in the medical and allied wards.

Our study sample consisted of more females as compared to males, 188/348 and 160/348 respectively. The male to female ratio was 0.85:1. Age of our patients was between 20 to 78 years with more than half being about the age of 60 (188/348 (54.9%). Only 144 patients were catheterized in the

wards (41.3%) while the majority (188/348(54.0%) were catheterized in the emergency. (Table-II)

Among the patients in medical and allied wards, the majority had CNS (28.7%) or Gastrointestinal (16.09%) involvement while the involvement of other systems was rare (6.89%). Among patients in surgical and allied wards, most common indication was pre-operative catheterization (18.4%) followed by suspected postoperative urinary retention (16.67%). In both medical and surgical ICU, all patients were catheterized either for urinary output measurement or for altered sensorium. (Table-III)

Our study highlights that the rate of inappropriate catheterization was alarmingly high at 39.6% (138/348). The most common indication for inappropriate catheterization was found to be CNS involvement secondary to cerebrovascular accidents or dementia while the least number of inappropriate catheterizations were noted in patients with respiratory disorders such as Asthma, COPD etc as shown in Table-IV.

Among females, who had a higher frequency of catheterization, the most common cause was urinary incontinence

On the other hand, altered sensorium was the most common indication for appropriate catheterization followed by catheterization for bladder emptying preoperatively and catheterization in critically ill patients.

TABLE-I

Acceptable indications for catheterization[10]

• Retention of urine (confirm with a bladder scanner first)
• Preoperative bladder emptying
• Bladder Irrigation
• For determining residual urine
• For introduction of cytotoxic drugs as a treatment for bladder cancer
• To conduct urodynamic tests
• Accurate measurement of urine output in critically ill patients or patients with shock
• In urinary incontinence when other measures have failed and some other special circumstances

TABLE-II

Demographic data of catheterized patients

Variable	n (%)
Gender	
Male	160 (45.9%)
Female	188 (54.0%)
Male: Female	0.85:1
Age	
>60 years of age	188 (54.0%)
Catheterized Patients	
Emergency	204 (58.6%)
Wards	144 (41.3 %)

TABLE-III

Frequencies of various indications of catheterization

Catheterized Patients	n(%)	Appropriate Indications n(%)	Inappropriate Indications n(%)
Medical Wards n (%) = 180/348 (51.7%)			
CNS indications	100/348 (28.7 %)	56/100 (56%)	44/100 (44%)
GIT indications	56/348 (16.09 %)	14/56 (25%)	42/56 (75%)
Other indications	24/348 (6.86 %)	8/24 (33.3%)	16/24 (66.7%)
Surgical Wards n (%) = 122/348 (35%)			
Pre-operatively	64/348 (18.4%)	22/64 (34.4%)	42/64 (65.6%)
Post- operatively	58/348 (16.67%)	34/58 (58.6%)	24/58 (41.3%)
Catheterization in Medical/Surgical ICU n (%) = 46/348 (13.2%)			
Altered level of sensorium or measurement of urinary output.	46/348 (16.04 %)	46/46 (100%)	0/23 (0%)

DISCUSSION

The goal of this study was to determine the frequency and indication of indwelling urinary catheterization in medical and surgical wards at a tertiary care hospital. The study's findings were in line with those of other hospitals that had been previously cited, and our setup shows that inappropriate catheterization is a common practice among hospital in-patients.

TABLE-IV

Appropriate and inappropriate catheterisation in our study

APPROPRIATE INDICATIONS n=210		INAPPROPRIATE INDICATIONS n=138	
Altered level of sensorium	80(38.1%)	Urinary incontinence (without significant breakdown of skin)	90 (65.2%)
Prooperative bladder eptying	64(30.5%)	Diabetic Foot	16 (11.6%)
Critically ill patients	46 (21.9%)	No explicit indication	14 (10.1%)
Urinary retention confirmed on bladder scan	20 (9.5%)	Suspected Retention	10 (7.2%)
		Old age	8 (5.7%)

According to the recognized justifications for this article, many patients were inappropriately catheterized even though they did not require one, and this may have led to catheter-related problems in some of these patients.

Our findings indicate that the overall prevalence of IUC was 48.8%; of these catheterizations, 39.6% were improper, which was comparable to the estimated prevalence of inappropriate catheterization in the prior studies13 (which ranged from 21% to 54%). In this investigation, which was carried out in the Netherlands, medical patients (32.4%) experienced more inappropriate catheterization than surgical patients (10.4%).[13]

This statistical result highlights the necessity for stricter enforcement of recommendations for when a Foley catheter should be used, combined with improved infection control and aseptic procedures. Along with greater execution, this highlights the need for center-specific standards given that almost 40% of our urinary catheterizations were not necessary.

The most prevalent incorrect cause for urinary catheterization, according to the study, was urine incontinence without severe skin breakdown. However, it's possible that these catheterizations were carried out to make care by family members and nursing personnel easier. Since there is only one public restroom per ward in our arrangement, poor hygiene in these restrooms was a primary factor in why most patient attendants sought a Foley catheter. The majority of the patients in this group suffered from ischemic strokes, urine incontinence, were elderly and had trouble using the restroom, and no one was available to care for them. We came to the conclusion that doctors should exercise caution when prescribing catheterizations and utilize external catheters when necessary.

Minority of individuals had no obvious signs of IUC despite extensive analysis of their medical records. 7/174 (10.1%). Along with the foregoing, another sign of improper catheterization was presumed urine retention, which sonographically could not confirm in 5/174 (7.2%) cases.

According to our study, changed state of sensorium was the most common reason for a proper catheterization. This might be for a number of reasons, including the patient's incapacity to voice a desire to micturition, their limited mobility, or the requirement to assess urine flow. A recent research at a tertiary care facility in New Delhi found that 42.7% of patients with altered states of consciousness had their catheters inserted correctly.[14] The second most frequent and well-established indication for proper catheterization was emptying the bladder before surgery. Catheterization is recommended for a sizable portion of critically sick patients because treating these patients frequently necessitates accurate monitoring of urine flow. According to a study by M. Todd Greene, 40.3% of all catheterizations that were medically necessary but also accurately managed fluids in severely sick patients.[15]

Although the frequency of male and female catheterization was nearly equal in our patients, inappropriate catheterization among females may have occurred in part because of prevailing cultural

factors, such as women's privacy when using the bed pan, women's ease of catheterization, or the request of their carers. Most female patients at our facility liked to have their catheters placed, as did their attendants. Inappropriate catheterization has been linked to female sex and non-ambulatory functional status, according to a prior study.[16]

Our survey revealed that emergency departments performed the majority of incorrect catheterizations. A large patient load and a poor assessment of the necessity for catheterization may be to blame for this. This was demonstrated by the fact that the majority of patients who had emergency catheterizations ultimately had them removed, which accounts for the brief mean catheterization length of 4.3 days. Data from a study published in 2014 demonstrate that UTI (urinary tract infection) is thought to be the most prevalent healthcare-associated illness. These figures illustrate how the increasing improper catheterization may result in the delirious adverse effects in these individuals (HAI)[17] up to 36% of all illnesses connected with healthcare.[18]

However, our survey doesn't examine how many of the ineffective and effective catheterizations resulted in a CAUTI. International research has previously shown this. Topal et al. found a relationship between CAUTI and improper catheterization, and that incidence of CAUTI was considerably decreased (P 0.001) by reducing urinary catheter usage and length.[19] Further studies are needed to demonstrate a clear association because research also indicates that the best method to decrease the frequency of CAUTI is to decrease improper catheterization.[20]

Because of the various constraints of this survey and the fact that the patients were chosen sequentially and the sample was not drawn randomly, it is possible that the findings may not be regarded as a realistic representative of the complete community. Because the study was one-centric, its findings might not be relevant globally or even locally. Therefore, we advise that the majority, if not all, tertiary care facilities with busy emergency sets look forward to reviewing their indwelling urinary catheterization practise. Additionally, a pre-established indication criterion was used to analyse the patients together with their clinical notes. In several circumstances, the decision-maker for catheterization was not explicitly questioned.

We chose not to share the purpose and specifics of this study with the doctors who were questioned for patient information in order to prevent potential bias. In most, if not all patients, stating a valid rationale for catheterization may have occurred accidentally as a result of disclosing the reason. We do, however, think that there were no other substantial constraints, and that they would not have had a significant impact on the findings of our investigation.

As a result, our study differed from earlier ones since it is the first of its kind to examine the prevalence of urinary catheterization in Pakistan. The findings also suggest that catheterization is a common procedure at one of Karachi's three main tertiary care facilities. The report then goes on to reveal a very significant issue connected to one of the most prevalent procedures in our neighbourhood hospitals. Inappropriate urinary catheterization may lead to an increase in possible adverse effects of catheterization, such as CAUTI, which are susceptible to not being followed up on given our healthcare system.

The survey's findings will undoubtedly make treating doctors more cautious when determining whether an indwelling urinary catheter is necessary. Condom drainage, intermittent catheterization, or even supra-pubic catheters, should be preferred over urethral catheterization in suitable patients.[21] Prevention is always preferable to treatment, and CAUTI can be prevented if patients are carefully chosen for indwelling urinary catheters and stringent aseptic procedures are followed while utilising catheters. In addition, some studies demonstrate that a straightforward reminder to the treating physicians to remove an unnecessary urinary catheter results in a proportionally significant reduction in the duration of urinary catheterization and, as a result, results in a decreased CAUTI rate during the hospital stay.[22,23] Although this specific aspect was not evaluated in our study, it was a regrettable consequence in other settings, thus it should make us as responsible practitioners more vigilant when caring for our patients.

CONCLUSION

The disturbing findings in our setup call for doctors to evaluate urinary catheterization and its indications in local contexts and develop guidelines that better suit our epidemiological framework, as we would want to end our discussion on this note. A clinical audit, in our opinion, would be the best method to evaluate this in the majority of settings and would provide us a clearer view of not just the frequency but also the specifics of urinary catheterization as a clinical operation. We intend to follow up on this research with another study that will try to analyze this widespread clinical practise in more depth due to constraints at our setup and the lack of a mechanism to conduct an audit.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORSHIP AND CONTRIBUTION DECLARATION	
1	**Jamal Ara:** Data analysis.
2	**Aneela Altaf Kidwai:** Interpretation.
3	**Saleemullah Paracha:** Conception.