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Crescent Journal of Medical and Biological Sciences
Vol. 2, No. 4, October 2015, 106–110
eISSN 2148-9696

Usefulness of Urinary Catheterization in Patients Admitted to Infectious Ward of Sina Hospital, Tabriz, Iran

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Abstract

Objective: Urinary catheterization is one of most common practices in medical centers and hospitals. Despite the advantages of catheterization, it might cause serious complications such as trauma, urinary tract infection and urinary incontinence. Therefore, improper insertion of the catheter is not only useless, but may also cause morbidity and mortality, cost of diagnosis and treatment and waste of time.

Materials and Methods: In the retrospective study conducted during 2013 to 2014, all hospitalized patients in Infectious Disease ward of Sina hospital in Tabriz were examined and information in respective checklists was recorded. Finally data were analyzed by SPSS 16 software.

Results: Among the 723 patients, 94 (13%) who had undergone catheterization. Twenty-five patients who were catheterized before referring to emergency were excluded. Finally, 69 patients (9.5%) were studied. The mean age was 21.85 ± 65.39. Forty-seven patients (68.1%) were catheterized. Twenty-two patients (31.9%) were improperly catheterized. Causes of improper catheterization were: to make nursing easier and patient care with 9 people (40.9%), medical failure with 8 people (36.4%) and taking urine samples with 5 people (22.7%). Thirty percent of patients had complications such as hematuria, urinary incontinence and urinary tract infection. None of the study variables were significantly associated with improper catheterization ($P < .05$).

Conclusion: Despite the usefulness of insertion of urinary catheter, it is associated with adverse events. Improper catheter increases the risk of complications. About 1/3 of patients in Infectious Disease ward of Sina hospital in Tabriz were improperly catheterized and 30% faced complications.

Keywords: Complications, Urinary catheters, Urinary tract infection

Introduction

Bladder catheterization has been one of the most practices in medical centers, and is being used since 1920 when Mr. Foley first invented it. These days, at least 15%-20% of the patients during hospitalization are catheterized. Urinary tract infection from catheters is a common complication (1-3). The duration of catheterization is the most important risk factor for the development of catheter associated (CA) bacteriuria. Other risk factors for CA-bacteriuria include the lack of systemic antimicrobial therapy, female sex, meatal colonization with uropathogens, microbial colonization of the drainage bags, catheter insertion outside the operating room, catheter care violation, absence of a drip chamber, rapidly fatal underlying illness, older age, diabetes, and elevated serum creatinine at the time of catheterization (1,2).

The main risk factor of insertion of Foley catheter is urinary tract nosocomial infection, mortality and increased healthcare costs (1-8). Bacteria contaminating catheters attach to the inner surface of the device and by creating a biofilm resist the flow of urine, creating a safe environment against host defense mechanism and prevent from the effect of antibiotic (3). Organisms with genetic shift and resistant to antibiotics lead to the complexity of infection treatment caused by the catheter (3,4). Strategies to reduce catheter-related infection include observing asepsis technique during catheter insertion, use of uroshits, proper care of the collection bag and proper hygiene of the perianal region (3,9). Urinary catheter insertion requires asepsis technique and experienced personnel. There is also the possibility of mechanical complications as cystostomy. Long-term usage of catheter causes complications such as urethral obstruction, urolithiasis, chronic pyelonephritis and even bladder cancer. To avoid complications

Received 19 April 2015, **Accepted** 23 August 2015, **Available online** 1 October 2015

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the duration of catheterization must be reduced (1,2,5).

As mentioned, urinary catheter insertion in addition to the probability of urinary tract infection leads to microbial strains resistant to antibiotics and can cause nosocomial urinary tract infection with multidrug resistance and cause main problem in infection control practice in hospital (1,10). On the other hand, improper use of urinary catheters result in urinary incontinence, obstruction of urine flow and this can lead to irreversible damage and even death (3). Studies conducted in the United States, Canada, and Switzerland showed that there are increasing percentages of catheterization with no indication in medical centers (7). In surgical wards the indications for catheterization is clear but in internal cases indications is less clear and generally include urinary tract obstruction, specific surgical interventions, control of urinary volume, patients with unstable vital signs, hematuria, bladder irrigation, bladder neurological dysfunction and urinary retention (6,7).

About 20%-30% of patients have no indication for urinary catheterization. The most common causes are insertion of a catheter to obtain urine samples for laboratory tests, before and after surgery and often for easy patient care (6,7). Elderly individuals, people with normal consciousness, non-surgical patients, patients with underlying disorder and those who were for a long time under the catheterization, the risk of catheterization without indication was high (6,7,11-16).

According to the above-mentioned issues and complication, mortality and morbidity of catheterization and excessive cost for diagnosis and therapy, waste of time and length of hospitalization this study was conducted to investigate the proper indications for catheterization in Infectious Disease ward of Sina hospital in Tabriz.

Materials and Methods

In a retrospective study during 2013 to 2014, all hospitalized patients in Infectious Disease ward of Sina hospital in Tabriz were examined and information was recorded in respective checklists. The questionnaire consisted of demographic information including age, gender, occupation, socioeconomic situation, primary diagnosis of disease, severity (based on vital and clinical signs), chronic underlying diseases, organ infection, prescribed antibiotics, previous use of antibiotics, recent hospitalization, urinary and catheterization, laboratory test results (WBC count, U/A, U/C, B/C), and patient outcome. The results are expressed as mean ± standard deviation and frequency percent using SPSS-16. The quantitative variables were analyzed with student *t* test and Pearson correlation coefficient, and qualitative variables with chi-square and if necessary, Fisher exact test. In all cases, $P < .05$ was considered statistically significant.

Results

During 2013-2014 a retrospective analysis on the file of all patients in the Infectious Disease ward of Sina hospital, Tabriz were studied and investigated. From 723 patients, 94 (13%) were catheterized, 25 were not eligible for inclusion and excluded and finally 64 patients (9.5%) were examined. Age distribution was minimum 17 and maximum 91 years with mean and standard deviation (SD) of 65.39 ± 21.85 years. Sex distribution included 38 (55.1%) male and 31 (44.9%) female. The most common causes of hospitalization are shown in Table 1.

Of the 64 patients, 37 (53%) in the Emergency Department and 32 (46%) in the Infectious Disease ward of Sina hospital Tabriz were catheterized. According to duration of catheterization, patients were catheterized for at least 1 day and maximum 50 days that on average with SD was 12.34 ± 10.7 days. Loss of consciousness and complications of catheterization are shown in Figures 1 and 2. Forty-seven people (68.1%) and 22 people (31.9%) had proper and improper catheterization, respectively.

Among the proper indications of catheterization, neurological problems with 27 patients (57.4%) and among the improper indications patient care and nursing with 9 patients (40.9%), constitute the most common causes (Table 2). There was no significant relationship among age, sex and inappropriate catheterization ($P < .05$). There were not any significant relationship between inappropriate catheterization and the risk of further complications and duration of catheterization ($P < .05$). There were not any significant relationship between the primary causes of hospitalization and the presence of underlying disease with inappropriate catheterization ($P < .05$).

Table 1. Frequency of Underlying Diseases in Patients That Underwent Urinary Tract Catheterization

	No.	Percent	Valid (%)	Cumulative (%)
Valid Pneumonia	22	31.9	31.9	31.9
UTI	16	23.2	23.2	55.1
Sepsis	12	17.4	17.4	72.5
Bed sore	4	5.8	5.8	78.3
Diabetic foot	9	13.0	13.0	91.3
Snake poisoning	1	1.4	1.4	92.8
Subdural empyema	1	1.4	1.4	94.2
Diarrhea	2	2.9	2.9	97.1
Encephalopathy	2	2.9	2.9	100.0
Total	69	100.0	100.0	

Figure 1. The Frequency of Loss of Consciousness in Percentage.

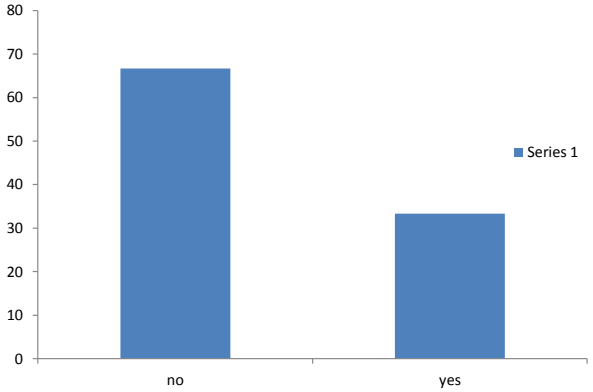

Figure 2. Urinary Catheterization Complications in Percentage.

Table 2. Frequency of Proper and Improper Catheterization

		Appropriate	No.	Percent	Valid (%)	Cumulative (%)
No	Valid	Nursing	9	40.9	40.9	40.9
		Medical failure	8	36.4	36.4	77.3
		Lab	5	22.7	22.7	100.0
		Total	22	100.0	100.0	
Yes	Valid	Neurologic	27	57.4	57.4	57.4
		Intake/Output (I/O)	11	23.4	23.4	80.9
		Urological	3	6.4	6.4	87.2
		Patient at risk	3	6.4	6.4	93.6
		Hematuria	1	2.1	2.1	95.7
		Surgery	1	2.1	2.1	97.9
		Neurologic bladder	1	2.1	2.1	100.0
		Total	47	100.0	100.0	

Discussion

Bladder catheterization is an invasive method to take urine sample from the bladder. It is associated with many complications. The most common side effect of the catheter is urinary tract infection which in turn, is the most common nosocomial infection. Eighty percent of catheterizations are associated with urinary tract infection. And if combined with bacteremia, mortality rate increase up to 10%. However, due to the delayed complications it is not considered dangerous on behalf of physicians and medical staff (17,18).

In our study, 723 persons were studied and 13% had a urinary catheter. In Raffaele et al study urinary catheterization was 10% (461 out of 2629 persons) (6). In Hazelett et al study urinary catheterization was 23% (379 out of 1633 persons) (4) and in Munsinghe et al study (7) urinary catheterization was 10.7% (89 out of the 836 persons).

However, the percentage of catheterization is not an appropriate measure to evaluate and compare the health services and it is better from the percentage of correct catheterization used for statistical analysis. However the low percentage of catheterization in this study can be attributed to evaluation of the health services because it has only been studied in the infectious disease ward. Some of catheterization likes urologic surgical indications is less found in patients and causes to decrease the percentage.

The mean age of our study was 39/65 years with SD 21.86, in Raffaele et al study 63.3 years (6), in Jansen et al study 73 years (12), in Conterno Lde et al study 62.26 years (13) and in Apisarnthanarak et al study it was 61 years (19). High average age is important because older people due immunosuppression are more susceptible to urinary tract infection (14) and in case of the infection they are also affected with further complications (4,14).

The mean duration of catheterization in Conterno Lde et al study was 6.83 days (13), in Raffaele et al study was 5 days (6) and in our study was 12.34 days. The reason of increase in the mean duration of catheterization of both studies (6,13) is that, it was carried out on internal and surgical cases. However, our research has been conducted only on patients admitted in the Infectious ward and since the indications for catheterizations in the case of these patients are usually short-term (immediately before and/or after surgery) so, the mean duration of catheterization was lower in this group.

In this study, the percentage of inappropriate catheterization was 31.9% (22 persons), which was less than Hazelett et al study with 49% (138 out of 379 persons) (4) and Munasinghe et al study with 38% (34 out of 89 persons) (7); and almost equal with Conterno Lde O et al study with

29% (29 out of 100 person) (13) and Raffaele et al study with 30% (138 out of 1589 persons) (6). It was more than Holroyd-Leduc et al study with 24% (214 out of 2841 persons) (16). All of these studies show that about one-third to half of patients are inappropriately catheterized and our study is in the same interval. According to these statistics, it is important to note that despite the valid statutory guidelines used in all of these studies, indications are not clear.

In Hazelett et al study conducted on 379 patients in the United States revealed that in female patients over the age of 65 years misplaced catheterization is more likely to occur (4). However, in our study, neither age nor gender of patients were not significantly associated with misplaced catheterization.

In Raffaele et al study (6) 461 patients from different wards of hospital were studied. In this study, significant relationship was found among the older age, hospitalized ward of patients, underlying disease, non-surgical patients and long-term catheterization with misplaced catheterization (6). In our study, significant relationship was not found among the older age, underlying disease and duration of catheterization with misplaced catheterization.

Jansen study took place in 28 hospitals in Alkan between 2009-2010, in which 3020 (21%) out of 14 522 patients were catheterized. The study found that females, older age and non-surgical patients are the risk factors of misplaced catheterization. Furthermore, to reduce the risk of misplaced catheterization the researchers used special trained medical staff for the insertion of catheter (12). In our study gender and older age was investigated and significant relationship was not found with misplaced catheterization.

Apisarnthanarak et al study (9) was conducted in 2004 in Thailand and 131 patients were evaluated in terms of proper catheterization. In that study females and immobilization were introduced as risk factors for misplaced catheterization. In Munasinghe et al study which was conducted among 89 patients in internal ward, significant relationship was not found between age, physical activity and sex with misplaced catheterization (7). Since the study was conducted only in the internal ward thus it is similar to our study. In our study none of the above items were considered as a risk factor for misplaced catheterization.

Ethical issues

Written informed consent was obtained from the patients.

Conflict of interests

The authors declare no conflict of interests.

Acknowledgments

This work was supported fully by infectious and tropical diseases research center Tabriz University of Medical Sciences, Tabriz, Iran. This is a report of a database from MD thesis of Mr. Aidin Joulaei registered in Faculty of Medicine, Tabriz Branch, Islamic Azad University Tabriz, Iran.

References

1. Bennett JE, Dolin R, Blaser MJ. Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases. 8th ed. Elsevier; 2014:3334-3346.
2. Warren JW. Catheter-associated urinary tract infections. Int J Antimicrob Agents. 2001;17(4):299-303.
3. Newman DK. Prevention and management of catheter associated UTIs. J Infect Dis (Special edition) 2010;13-20.
4. Hazelett SE, Tsai M, Gareri M, Allen K. The association between indwelling urinary catheter use in the elderly and urinary tract infection in acute care. BMC Geriatrics 2006;6:15.
5. Tambyah PA, Knasinski V, Maki DG. The direct costs of nosocomial catheter-associated urinary tract infections in the era of managed care. Infect Control Hosp Epidemiol 2002;23(1):27-31.
6. Raffaele G, Bianco A, Aiello M, Pavia M. Appropriateness of use of indwelling urinary tract catheters in hospitalized patients in Italy. Infect Control Hosp Epidemiol. 2008;29(3):279-281. doi:10.1086/528814.
7. Munasinghe R, Yazdani H, Siddique M, Hafeez W. Appropriateness of use of indwelling urinary catheters in patients admitted to the medical service. Infect Control Hosp Epidemiol. 2001;22(10):647-649.
8. Fakih MG, Dueweke C, Meisner S, et al. Effect of nurse-led multidisciplinary rounds on reducing the unnecessary use of urinary catheterization in hospitalized patients. Infect Control Hosp Epidemiol. 2008;29(9):815-819. doi:10.1086/589584.
9. Apisarnthanarak A, Thongphubeth K, Sirinvaravong S, et al. Effectiveness of multifaceted hospital wide quality improvement programs featuring an intervention to remove unnecessary urinary catheters at a tertiary care center Thailand. Infect Control Hosp Epidemiol. 2007;28(7):791-798.
10. Gardam MA, Amihod B, Orenstein P, Consolacion N, Miller MA. Overutilization of indwelling urinary catheters and the development of nosocomial urinary tract infections. Clin Perform Qual Health Care. 1998;6(3):99-102.
11. Kunin CM, Chin QF, Chambers S. Indwelling urinary catheters in the elderly. Relation of "catheter life" to formation of encrustations in patients with and without blocked catheters. Am J Med. 1987;82(3):405-411.
12. Jansen IA, Hopmans TE, Wille JC, van den Broek PJ, van der Kooi TI, van Benthem BH. Appropriate use of indwelling urethra catheters in hospitalized patients: results of a multicenter prevalence study. BMC Urol. 2012;12:25. doi:10.1186/1471-2490-12-25.
13. Conterno Lde O, Lobo JA, Masson W. The excessive use of urinary catheters in patients hospitalized in university hospital wards (In Portuguese). Rev Esc Enferm USP. 2011;45(5):1089-96.
14. Cove-Smith A, Almond MK. Management of urinary

tract infections in the elderly. Trends Urology Gynecol Sexual Health. 2007;12(4):31-34. doi:10.1002/tre.33.
15. Rayman M, et al. Indwelling urinary catheter usage in the Emergency department. Retrieved October 21, 2011 from:https://idsa.confex.com/idsa/2011/webprogram/Paper32273.html.
16. Holroyd-Leduc JM, Sands LP, Counsell SR. Palmer RM, Kresevic DM, Landefeld CS. Risk factors for indwelling urinary catheterization among older Hospitalized patients without a specific medical indication for catheterization. J Patient Safety. 2005;1(4):201-207. doi: 10.1097/01.jps.0000205737.68588.d5.
17. Saint S, Kowalski CP, Kaufman SR, et al. Preventing hospital-acquired urinary tract infection in the United States: a national study. Clin Infect Dis. 2008;46(2):243-250. doi:10.1086/524662.
18. Johnston JL. An evaluation of the adherence to an indwelling urinary catheter maintenance Bundle. DNP Practice Inquiry Projects. Paper 33. http://inknoweledge.uky.edu/dnp_etds/33. Published 2015
19. Apisarnthanarak A, Rutjanawech S, Wichansawakun S, et al. Initial inappropriate urinary catheters use in a tertiary-care center: incidence, risk factors, and outcomes. Am J Infect Control. 2007;35(9):594-599.