KAP STUDY

Knowledge and attitude of health workers regarding catheter-associated urinary tract infection in tertiary care hospitals, Pakistan

Sanniya Khan Ghauri,[1] Arslaan Javaeed,[2] Tabinda Abbasi,[3] Abdus Salam Khan,[4] Khawaja Junaid Mustafa[5]

Abstract

Objectives: To assess the knowledge and attitude of house officers, residents, specialists and nurses regarding urinary catheterisation and catheter-associated urinary tract infection in tertiary care hospitals.

Methods: The cross-sectional study was conducted from February to July 2018 at 9 hospitals in Rawalpindi and Islamabad, Pakistan, and comprised doctors and nurses. Data were collected using an interviewer-administered questionnaire. Knowledge and attitude regarding urinary catheterisation were compared between doctors and nurses. Data was analysed using SPSS 23.

Results: Of the768 individuals approached, 485(63%) agreed to participate. Of them, 358(74%) were doctors and 127(26%) were nurses. Among the doctors, 261(73%) were house officers, 58(16%) residents and 39(11%) specialists. When asked if avoiding catheter kinking was an effective way to prevent CAUTI, 194(54.19%) doctors got it correct as opposed to 102(80.31%) nurses. When the doctors and nurses were asked if the catheter should be removed whenever it is convenient for healthcare personnel, 354(98.88) doctors and 112(88.18) nurses gave the correct answer (p=0.041).

Conclusion: There was reasonable knowledge and attitude among nurses and doctors towards urinary catheterisation and preventive measures related to catheter-associated urinary tract infection.

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Introduction

Catheterisation is the procedure of introducing a urinary catheter into a patient's urinary bladder through the urethra. It can serve as a diagnostic and therapeutic tool and, in some instances, it can also be used as a tool of investigation. The broad usage of the urinary catheter makes it a frequent point of call for house officers, residents, specialists and nurses. As beneficial as urinary catheterisation can be for health staff in performing the lifesaving duties, it is not without its negatives. This procedure, if done inadvertently, can introduce a large number of pathogens into the patient's body. In fact, the patients are the ones at the receiving end of most of the positives as well as the negatives of this procedure. The significance can be comprehended by the fact that among nosocomial and hospital-acquired infections (HAIs)), the catheter-associated urinary tract infection (CAUTI), accounts for about 40%.[1-2] Among all hospital admissions, 25%require a urinary catheterisation for a host of reasons and independent of the length of stay in hospital.[3,4] A crucial area of every tertiary hospital is the intensive care unit (ICU). The frequency of urinary catheterisation in ICU is as high as 100%,[5] which may be due to the fact that continuous fluid balance monitoring is vital for unconscious and critically ill patients.

CAUTI can cause a lot of complications. It increases morbidity and the length of hospital stay. CAUTI patients can complain of symptoms like fever, voiding discomfort and malaise. Besides, these patients would require extended courses of antibiotics use, subsequently providing a breeding ground for antibiotic-resistant which may start a problematic chain reaction of the spread of nosocomial infections.[6] Other CAUTI risks include catheter blockage, development of renal stones or stones along the urinary tract, and increased risk of urinary tract cancers. The worst part is that the cost of care is significantly raised in such patients, especially if it gets complicated by bacteraemia, meningitis and septic shock which significantly increase the risk of mortality in these patients.[7]

Even though it remains an important procedure, some doctors and other healthcare personnel (HCP), like nurses, are not familiar with the true indications of catheterisation. This leads to needless catheterisation as well as unnecessarily prolonged usage of the catheter. This increases chances of CAUTI, especially because the incidence of CAUTI has a proportional relationship with the number of days a catheter remains insitu. This

[1,4,5]Department of Emergency Medicine, Shifa International Hospital, Islamabad, [2]Department of Pathology, [3]Final Year MBBS Student, Poonch Medical College, Azad Kashmir, Pakistan.
Correspondence: Sanniya Khan Ghauri. Email: sanniyaghauri89@gmail.com

explains why CAUTI is higher in ICUs since the duration of catheter time is longer than in the wards. Some studies, however, have counteracted this, showing no significant difference in the rates of CAUTI among ICU and non-ICU patients.[8,9] As such, no group of hospital patients should be specifically selected for supervision and prevention by the infection control team as there is a chance that all hospital patients carry significant CAUTI risk. Studies have supported minimising unnecessary catheterisation as the single most important modifiable risk factor in reducing CAUTI incidence.[4,10] A good example of a preventive measure is having the catheter reminder in place which may limit the number of unnecessary catheter days.[10,11]

Many hospitals do not have strict guidelines for CAUTI prevention, which is, unfortunately, the case even among departments where urinary catheterisation is more frequently done. Therefore, it is important that HCP are well-trained as, when preventive measures are instituted and priority placed on them, the incidence of CAUTI does fall.[10,11]

Not many studies in Pakistan have previously tested the knowledge and attitude of HCP regarding catheterisation and CAUTI. The current study was planned to assess the knowledge and attitude of house officers, residents, specialists and nurses in tertiary care hospitals.

Subjects and Methods

The cross-sectional study was conducted from February to July 2018 at 9 hospitals in Rawalpindi and Islamabad, Pakistan, and comprised doctors and nurses.

After approval from the ethics review board of Poonch Medical College, Rawalakot, Pakistan, identification numbers of all currently employed HCP were obtained from the respective human resource (HR) departments, and the numbers were fed into a computer system.

For sample size calculation, $n = z^2 * p (1-p)/ d^2$ formula was used considering a prevalence rate of 50% since the actual prevalence was unknown. Assuming a response rate of 50%, HCP approached were twice as many as the required sample size. HCP were selected using the random number generator of the computer system.

The only tool for data collection was an interviewer-administered questionnaire. The study questionnaire was validated by two epidemiologists. The questionnaire consisted of structured 33items (Knowledge 25-items, Attitude 8-Items), and was distributed among house-officers, residents, specialists and nurses to assess their knowledge of indications for urinary catheterisation, measures to be taken to prevent CAUTI, and attitude regarding urinary catheterisation. Demographic details, such as age and gender, were also noted. Informed written consent was obtained from each participant.

Data was analysed with 95% confidence interval (CI) using SPSS 23. Categorical variables were presented as frequencies and percentages, while continuous variables were presented as mean ± standard deviation (SD). Associations were checked with chi-square test and the level of significance was kept at $p<0.05$.

Results

Of the 768 individuals approached, 485(63%) agreed to participate. Of them, 358(74%) were doctors with a mean age of 34.5±8.25 years, and 127(26%) were nurses with a mean age of 30.8±7.25 years. Among the doctors, 261(73%) were house officers, 58(16%) residents and 39(11%) specialists (Table-1).

The level of knowledge among doctors increased with their rank. An example of this is regarding the question of urethral stricture being an indication for catheterisation; only 84(32.18%) house officers had the correct response compared to 22(44.82%) residents and 36(92.31%) specialists. This pattern was consistent for all the 10 questions except in two: 'neurogenic bladder due to paraplegia or quadriplegia' (255[97.70%] house officers vs 52[89.65%] residents), and 'prolonged immobilisation due to unstable lumbar spine fracture' (237[90.84%] house officers vs 52[89.65%] residents). Overall, the knowledge of doctors was better than the nurses with nurses only having a superior percentage in three of the 10 items. Among these 3 items, two items were statistically significant; 'urethral stricture causing obstruction to urinary flow' (p=0.001), and 'for assisting healing of decubitus ulcers in incontinent patients' (p=0.031) (Table-2).

Specialist doctors had the highest percentage of correct answers followed by the residents and house-officers for all questions (Table-3), but, when the overall percentage of doctors was compared with that of the nurses, the

Table-1: Demographic characteristics (n=485).

Characteristics	Attributes	N (%)/ mean ± SD
Age in years	Doctors	34.5 ± 8.25
	Nurses	30.8 ± 7.25
Gender	Male	311 (64.12)
	Female	174 (35.87)
Doctors		358 (73.81)
Categories of doctors	House officers	261 (53.81)
	Residents	58 (11.96)
	Specialists	39 (8.04)
Nurses		127 (26.18)

Table-2: Frequencies and percentages of correct responses to indications for urinary catheterisation by the doctors and nurses and statistical difference between the responses given by the doctors and nurses using Chi-squared test. (n = 485).

Indications for urinary catheterisation	Correct response	Correct response N (%) House Officers	Residents	Specialists	Doctors	Nurses	p value
Urethral stricture causing obstruction to urinary flow	Indicated	84(32.18)	26(44.82)	36(92.31)	146(40.78)	103(81.10)	.001
Neurogenic bladder due to paraplegia or quadriplegia.	Indicated	255(97.70)	52(89.65)	39(100)	346(96.64)	108(85.03)	.077
Prolonged immobilization due to unstable lumbar spine fracture	Indicated	237(90.84)	52(89.65)	39(100)	328(91.62)	111(87.40)	.211
Urine output monitoring in a mobile patient	Not indicated	147(56.32)	44(75.86)	39(100)	249(69.55)	105(82.68)	.062
For assisting healing of decubitus ulcers in incontinent patients	Indicated	119(45.59)	47(81.03)	37(94.87)	203(56.70)	100(78.74)	.031
Obtaining urine sample for culture and sensitivity testing	Not indicated	198(75.86)	55(94.82)	39(100)	292 (81.56)	101(79.52)	.091
Palliative care in terminally ill patient	Indicated	239(91.57)	54(93.10)	39(100)	332 (92.73)	114(89.76)	.094
Nursing care for incontinent patient	Not indicated	226(86.59)	57(98.27)	39(100)	322 (89.94)	101(79.52)	.073
Routine before any kind of surgical procedure in a patient	Not indicated	244(93.45)	57(98.27)	39(100)	340 (94.97)	115(90.55)	.006
In patients anticipated to receive large volume infusions or diuretics during surgery	Indicated	143(54.78)	50(86.20)	36(92.31)	229 (63.96)	26(20.47)	.001

Table-3: Frequencies and percentages of correct responses to preventive measures for catheter associated urinary tract infection by the doctors. (n = 485).

Preventive measures for catheter associated urinary tract infection	Correct response	House Officers N (%)	Residents N (%)	Specialists N (%)
Hand washing should be done immediately before and after manipulation of catheter site or apparatus.	Effective	177(67.81)	53(91.37)	38(97.43)
The smallest catheter should be used to minimize urethral trauma.	Effective	202(77.39)	45(77.58)	39(100)
It should be inserted only when necessary and removed as soon as possible	Effective	208(79.69)	49(84.48)	39(100)
Use of other methods of urinary drainage such as condom catheter drainage, suprapubic or intermittent catheterization for selected patients.	Non-effective	117(44.82)	50(86.20)	36(92.30)
Avoid kinking of the catheter to maintain an un-obstructed flow of urine.	Effective	108(41.37)	49(84.48)	37(94.87)
Irrigation of the bladder with anti-microbial solution/ iodine solution at least once daily.	Non-effective	175 (67.04)	48(82.75)	38(97.43)
Twice daily meatal care with anti-septic solution	Non-effective	161(61.68)	51(87.93)	38(97.43)
Collecting bag should be emptied regularly	Effective	223(85.44)	53(91.37)	39(100)
Collecting bag should be kept below the level of bladder	Effective	245(93.86)	58(100)	39(100)
Regular bacteriological monitoring of catheterized patients	Non-effective	105(40.22)	31(53.44)	38(97.43)
Catheter should be inserted only by personnel proficient in technique of aseptic insertion.	Effective	112(42.91)	35(60.34)	38(97.43)
Isolation of patients known to have UTI from other non-infected patients.	Non-effective	201(77.01)	47(81.03)	39(100)
Prophylactic anti-microbials should be given for 3 days when catheter is inserted	Non-effective	229(87.73)	54(93.10)	35(89.74)
Regular educational training regarding basic urinary catheter care	Effective	213(81.61)	52(89.65)	36(92.30)
Routinely used anti-microbial coated catheters	Effective	45(17.24)	39(67.24)	31(79.48)

UTI: Urinary tract infection.

Table-4: Frequencies and percentages of correct responses to preventive measures for catheter associated urinary tract infection by the doctors and nurses and statistical difference between the responses using Chi-squared test. (n = 485).

Preventive measures for catheter associated urinary tract infection	Correct response	Doctors	Nurses	p-value
Hand washing should be done immediately before and after manipulation of catheter site or apparatus.	Effective	268 (74.86)	66 (51.96)	.007
The smallest catheter should be used to minimize urethral trauma.	Effective	286 (79.88)	109 (85.82)	.095
It should be inserted only when necessary and removed as soon as possible	Effective	296 (82.68)	111 (87.40)	.081
Use of other methods of urinary drainage such as condom catheter drainage, suprapubic or intermittent catheterization for selected patients.	Non-effective	203 (56.70)	83 (65.35)	.052
Avoid kinking of the catheter to maintain an un-obstructed flow of urine.	Effective	194 (54.19)	102 (80.31)	.004
Irrigation of the bladder with anti-microbial solution/ iodine solution at least once daily.	Non-effective	261 (72.90)	78 (61.41)	.067
Twice daily meatal care with anti-septic solution	Non-effective	250 (69.8)	81 (63.77)	.466
Collecting bag should be emptied regularly	Effective	315 (87.9)	114 (89.76)	.612
Collecting bag should be kept below the level of bladder	Effective	342 (95.55)	122 (96.06)	.711
Regular bacteriological monitoring of catheterized patients	Non-effective	174 (48.60)	99 (77.95)	.002
Catheter should be inserted only by personnel proficient in technique of aseptic insertion.	Effective	185 (51.67)	103 (81.10)	.001
Isolation of patients known to have UTI from other non-infected patients.	Non-effective	287 (80.16)	104 (81.88)	.123
Prophylactic anti-microbials should be given for 3 days when catheter is inserted	Non-effective	318 (88.88)	100 (78.74)	.022
Regular educational training regarding basic urinary catheter care	Effective	301 (84.07)	113 (88.97)	.083
Routinely used anti-microbial coated catheters	Effective	115(32.12)	66 (51.96)	.005

Table-5: Frequencies and percentages of correct responses to (urinary catheterisation) attitude-related statements by the doctors and nurses and statistical difference between the responses using Chi-squared test. (n = 485).

Attitude-related statements	Correct response	Correct response N (%) by the					p value
		House Officers	Residents	Specialists	Doctors	Nurses	
Renewal reminders for catheters prevents CAUTI	Yes	148(56.70)	42(72.41)	35(89.74)	225(62.84)	80(62.99)	.654
Catheter can be inserted for nursing staff convenience	No	256(98.08)	58(100)	39(100)	353(98.60)	125(98.42)	.752
It helps if CAUTI prevention is in high priority list of hospitals	Yes	223(85.44)	55(94.82)	39(100)	317(88.54)	114(89.76)	.422
CAUTI is not a very serious illness	No	67(25.67)	44(75.86)	34(87.18)	145(40.50)	11(8.66)	.001
Education regarding basic catheter care helps prevent CAUTI	Yes	259(99.23)	58(100)	39(100)	356(99.44)	127(100)	.756
Catheter should be removed whenever it is convenient for HCP	No	257(98.46)	58(100)	39(100)	354(98.88)	112(88.18)	.041
CAUTI is a common problem and virtually impossible to prevent it	No	198(75.86)	52(89.65)	38(97.43)	288(80.44)	76(59.84)	.005
Maintaining a close drainage system prevents CAUTI	Yes	209(80.07)	57(96.61)	39(100)	305(85.19)	69(54.33)	.001

CAUTI: Catheter-associated urinary tract infection.
HCP: Healthcare personnel.

nurses knew more about CAUTI preventive measures than the doctors, scoring higher in 11 out of the 15 items (Table-4).

When asked if renewal reminders for catheters help prevent CAUTI, 225(62.84%) doctors and 80(62.99%) nurses rightly agreed. When asked if the catheter can be inserted for nursing staff's convenience, 353(98.60%) doctors and 125(98.42%) nurses rightly disagreed. When asked if the catheter should be removed whenever it is convenient for HCP, 354(98.88) doctors and 112(88.18) nurses gave the correct answer (p=0.041). Also, 305(85.19%) doctors compared to 69(54.33%) nurses believed that "maintaining a closed drainage system prevented CAUTI (p<0.05) (Table-5).

Discussion

Urinary catheters are often kept inserted even when there is no more indication for their use.[12] This is no doubt one of the reasons why CAUTI is one of the commonest nosocomial infections.[1,2] It has also been shown that the single most effective way to reduce the occurrence of CAUTI among hospitalised patients is to limit the use of the catheter to only cases where it is correctly indicated and to discontinue immediately after this indication is no longer present.[13] Of course, one of the factors that would make this possible is the knowledge level of HCP. The current study found that overall the doctors were more knowledgeable about the indications of catheterisation than the nurses (p<0.05) which is similar to an earlier finding.[14] This means that educating the nurses on the indications of catheterisation would go a long way in reducing the incidence of CAUTI as they would be able to serve as reminders for doctors once the indication for the catheterisation is over. This is in tandem with studies that have shown that the nurses' zeal towards the need to have a catheter insitu helps to reduce the occurrence of CAUTI.[15] When compared to a study[14] in which 79% nurses wrongly justified the use of catheters for nursing care of incontinent patients as opposed to the 21% in the current study, it is clear that there is a better knowledge on the indication of catheterisation among the nurses who participated in this study. Nevertheless, close to one-third of both doctors and nurses agreed that catheters can be used to collect the sample for culture and sensitivity testing, which is similar to the result obtained earlier.[14] Even though this may appear to be a small percentage, it could lead to a significant increase in catheter usage. Hence, it is important to keep educating the doctors and the nurses on these indications as a way to check the unnecessary use of catheters.[13,15] There was also some paucity of knowledge noted among doctors regarding the effective preventive measures for CAUTI with more than half (about 52%) of the doctors wrongly agreeing that bacteriological monitoring is an effective prevention against CAUTI. This is similar to the earlier study[14] in which about 77% healthcare professionals wrongly agreed to the same proposition. This would unnecessarily lead to an increase in workload on the laboratories. Furthermore, it will increase the overall cost of patient-care. The same study[14] reported that 45% HCP felt prophylactic antimicrobials for 3 days can prevent CAUTI. The current study found <25%, indicating a better knowledge among the doctors and nurses. Over 95% subjects in the current study knew that the collecting bag should be placed below the level of the bladder, but in the earlier study done,[14] more than a third of nurses did not know this. All these simple measures have shown to be of great effect in CAUTI prevention and, as such, health workers must be knowledgeable.[2,10-12]

The current study, unlike other studies,[14-16] showed a significant difference in the knowledge among the experience levels of the doctors, with the specialists

having more knowledge than the residents and the house officers. The current study, however, is in consonance with others[10,14-16] in the fact that educating HCP regarding both the indications and preventive measures will lead to better outcomes on this front. The current study also showed a reasonably good attitude of nurses and doctors towards urinary catheterisation. It will, however, be important to check for the incidence of CAUTI in the hospitals studied here to have a statistical correlation between the knowledge and attitude of the doctors and nurses to the incidence of CAUTI. This will no doubt serve as a basis for instituting protocols and other studies can be undertaken from there onwards.

In terms of limitations, the current study was conducted in only two major cities, and, therefore, may not be considered a representative sample of health workers nationwide. Also, being an observational study, the temporal relationship between cause and effect could not be obtained.

Conclusion

Doctors with more experience scored better on most questions. The nurses and medical officers should also have the similar level of knowledge as most of them are directly involved with catheterisation. Proper training regarding indication, maintenance and procedure of catheterisation may lower the incidence of CAUTI.

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