HSPC The Open Access Publisher

J C N JOURNAL OF CLINICAL NEPHROLOGY
ISSN 2576-9529

Research Article

Perceived causes and prevention of catheter-associated urinary tract infections among spinal cord injured patients

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Summary

Catheter-associated urinary tract infection (CAUTI) is among the most common nosocomial infections especially in acute care settings. Its economic and unanticipated health implications make it burdensome for the healthcare providers and patients. The paper examined the perceived causes and mode of preventing urinary tract infections in patients with spinal cord injury. Qualitative research approach was utilized; the study site was a Tertiary Hospital in Nigeria. Eight (8) in-depth interviews (IDI) were conducted with healthcare providers managing patients with spinal cord injured in the hospital. The major risk factors causing urinary tract infection identified include financial problems, organization of care, human error, hospital environment and patient-related factors. To prevent urinary tract infections among patients in the hospital, a number of suggestions were made by the participants such as training of caregivers and educating patients and relations. The authors concluded that the incidence of CAUTI could be reduced in the hospital if the opinions of stakeholders are fairly considered.

More Information

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Submitted: 11 November 2019
Approved: 26 November 2019
Published: 27 November 2019

How to cite this article: Malomo Adefolarin O, Kafayat A, Adeolu Augustine A, Adeleye Amos O, Balogun James A, et al. Perceived causes and prevention of catheter-associated urinary tract infections among spinal cord injured patients. J Clini Nephrol. 2019; 3: 175-180.

DOI: dx.doi.org/10.29328/journal.jcn.1001045

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Keywords: Urinary tract infection; Spinal cord injury; Causes; Prevention; Hospital

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Introduction

Urinary tract infection (UTI) occurs when pathogens invade any part of the urinary system, such as the urethra, bladder, ureters and kidney [1]. UTIs are major healthcare acquired infections[1] and about three-quarter of cases are reportedly caused by indwelling urethral catheter use [1,2]. Indicating that Catheter-Associated Urinary Tract Infection (CAUTI) is among the most common nosocomial infections [2] especially in acute care settings [3]. Occurrence of CAUTI may be from internal or external bacteria ascension [3] and the likelihood of patients developing CAUTI depends on risk factors like duration of catheterisation, age, gender and not maintaining a closed drainage system [4]. Other risk factors are level of immunity, acute or elective admission and sources of potential infective organisms (community or hospital) [5,6]. Nicolle for instance, noted that the incidence of UTI is higher among women and older persons [2]. UTI is particularly prevalent among patients with SCI in rehabilitation ward [6] due to the neurogenic bladder caused by their injury.

The clinical and economic implication of catheter-associated infection is worrisome as it may result into increased morbidity, mortality; increased hospital cost and length of hospital stay [3]. Research on CAUTI focus more on prevention, diagnosis and treatment/management strategies [7] while concerned bodies like The Centre for Disease Control and Prevention (CDC) and The Association for Professionals in Infection Control and Epidemiology (APIC) also published specific guidelines for the prevention of CAUTI. With the volume of educational resources available to healthcare givers on CAUTI one would expect its occurrence to be very low however; it is disturbing that its incidence has continued to rise and fall. For instance, the investigators came to know of a report of the routine surveillance conducted by the Infection Control Unit of a major hospital in the South Western part of Nigeria which suggested a trend of increased incidence of UTI as suspected from positive urine culture, among admitted spinal injured patients. With the trend of said increased incidence of UTI, it became necessary to assess factors that might be contributing to the incidence particularly among

patients with spinal cord injury. The need to investigate this cannot be over-stressed given that patients with SCI are on long-term catheterization and the infection may lead to other unintended complications. It is also important because causes of UTI could have patient-related, caregiver -related, hospital, equipment and environment-related factors. Therefore, this study investigated the behavioral factors that could affect the incidence of UTI among inpatients with SCI by examining caregivers' perspectives on the causes of UTI and its prevention.

Materials and Method

Adopting the qualitative research design, in-depth interviews (IDI) were conducted with willing healthcare providers managing spinal cord injured patients at a tertiary healthcare facility in south-west Nigeria. The hospital ward which is designated for the spinal injured patients in the hospital was purposely selected for the study because it had been identified as one of the many wards where increased incidence of UTI was recorded in the hospital. The interest here equally had to do with the bladder dysfunctions which are common among patients on the ward. All the healthcare providers working on the said ward at the time of the study constituted the population of study. In total, eight (8) healthcare workers agreed to participate in the study and they were interviewed, individually. The qualitative interview was stopped when their responses became saturated, that is, when the responses became repetitive and additional information could not be generated from the data. The research instrument was an in-depth interview guide which the interviewers utilized to elicit appropriate information from the participants. The interview guide was designed to carefully explore participants' opinion on the issue under investigation without influencing their responses in the process. Interposition of the interview was avoided as much as possible except when it became necessary. The recorded interviews were transcribed and the transcripts perused by the researcher to get familiar with the data. A number of themes emerged in the process which informed the data analysis. Coding and thematic analysis of the information were done with the aid of Atlas ti software. The results are presented in the next section.

Results

A number of factors believed to be responsible for the incessant occurrence of UTI among patients with spinal cord injury were identified. The results indicated that there are varying perspectives on the causes of UTI when the views of the nurses are compared to the medical doctors'. But this does not imply they did not share common opinions on some issues. The causes of UTI identified are assigned to different categories namely: patient-related factors, hospital-related factors and caregiver-related factors. Others are economic and environmental factors.

Economic factors

Economic problems are the major factors believed to be contributing to the incidence of UTI among patients with spinal cord injury as observed by the participants. The problems identified by the stakeholders include:

- Financial constraints;
- Relations' inability to provide the necessary medical supplies
- Relations rationing the necessary medical supplies
- Poor diet/ not taking adequate fluid

The most mentioned cause of UTI by all the stakeholders is the financial constraint. The financial burden of SCI on patients and their families is enormous. Most patients with the injury are the bread winners of their families and with little or no support the relations find it difficult to keep up with the financial demands of caring for the patients. The views of the study participants are below:

"...The patients' relatives still have to buy most of the things needed by themselves and sometimes there are no gloves. Sometimes there is no savlon, sometimes they are unable to buy the catheter or the urine bag or they are unable to change one thing or the other." (IDI 5/MALE/ Medical Doctor).

The Doctor was trying to explain the practice in the hospital where it is the patients' relations who provide the medical supplies used for the care of patients. He noted that on several occasions relations find it difficult to provide the necessary items for intermittent catheterisation such as the urine bag, gloves and disinfectant when they are needed. The view of another participant goes thus:

"Well, let me relate it with their diet because in a place that the patient is bed-ridden and have to be immobilise for some time and then he is not taking proper diet...for example, they will tell you that it is only *gari* (cassava flakes) they have...Yes I saw it this afternoon and I said 'you are taking *gari* (cassava flakes) with no groundnut' and he said that was what he had. You know that it is what you eat that really matters and in a case that you are not eating adequately it is not helpful so those are things I think." (IDI 2/FEMALE/ Assistant Nursing Officer I).

This view backs up the first one; the Nurse added that the financial constraint is so serious that the relations occasionally find it difficult to even provide the patient with proper meal and adequate nutrition not to talk of medical supplies. She could not contain her shock after seeing a patient taking cassava flakes because it is perceived in this environment as poor man's food. So for the relation to have given the said patient cassava flakes to eat, it is an indication

that they are really drained financially. Although, without any ill health condition, a high percentage of Nigerians are living below the poverty line and cannot afford to eat three times per day. But being a chronic condition SCI has the tendency of pushing people into poverty especially when the needed social support is lacking.

Hospital-related factors

Following the economic problems in the order of mention are the hospital related factors. Although the Nurses and Doctors were unanimous on some of the causes they also disagreed on few. The hospital related factors identified as contributing to the occurrence of UTI among patients in the study site are:

- Improper catheterization before admission
- Use of conform glove rather than sterile glove
- Patients providing medical supplies
- Insufficient personnel (forcing Nurses to carry out procedures on their own)
- Poor/inadequate water supply
- Change of Nurses on the ward
- A lot of people involved in patients' care

Some of the Doctors and majority of the Nurses observed that the sterility of catheterization procedure performed on the patients at the Accident and Emergency Unit (A&E) of the hospital is questionable. A Doctor asserted that:

"Well in relation to that I also think there are hospital issues...the first catheterisation is usually done in A&E and we cannot say that the first catheterisation done at the A&E is 100% sterile." (IDI 5/MALE/ Medical Doctor).

In most hospitals the Accident and Emergency Unit is the port of entry for most patients especially those with trauma. Depending on several factors patients may stay in the A&E for a couple of hours before they are transferred to the ward. During such stay at the A&E the participant believed that the catheterisation on the patient for the most part is not sterile and could predispose patients to UTI. Another factor mentioned is that conform gloves are used for the catheterization procedure which is believed to be un-ideal compared to the sterile/surgical glove. The utilization of conform gloves is said to comprise the procedure which is expected to be as clean and as aseptic as possible.

"We have seen the procedure being done with people using conform gloves, not using the sterile gloves." (IDI 5/ MALE/Medical Doctor).

The reason for allowing the use of conform gloves is economical. The price of conform glove is cheaper than the surgical glove and patients and their families may not be able to afford it given the number of gloves they utilize per day. In the same vein, the hospital practice of using medical supplies provided by patients' relations was found to be another risk factor for the occurrence of UTI among patients. A senior nurse revealed that:

"...If you asked them to give you glove some will bring it out from unhygienic places where they keep it. The glove that's supposed to be clean you will see different kinds of patches on that glove. Some will even tell you they don't have it..." (IDI 6/FEMALE/ CNO).

In her opinion, the practice of asking patients' relations to provide the required items used for catheterisation puts patients in danger of being infected. Most of the relations reportedly hid gloves from the Nurses which may become contaminated in the process. Apart from this there is also the problem of inadequate water supply in the hospital.

"...Most times water will not run, most times the water coming from the tap would be dirty. So you can now look at it what can we do?..." (IDI 6/FEMALE/ CNO).

Clean intermittent catheterisation requires that clean water be used to clean and disinfect the catheter to maintain sterility and prevent the risk of infection but when there is no regular water supply or when the available one is unclean, then there is little the Nurses can do to protect patients against infection. The problem of insufficient personnel was similarly noted by all the interviewees. For proper catheterisation of a patient, two (2) Nurses are required in order to maintain sterility of the procedure and provide support. However, the care providers lamented that the number of personnel on the Ward was inadequate.

"...Limitations on the part of staff, staff strength is limited. You find that in a shift in a ward of about twenty two (22) patients you only have three (3) Nurses and the procedure of catheterisation requires at least two (2) people. The other Nurse will assist in giving you the gel but when it is only three (3) Nurses and you have to do catheterisation not less than three (3) to four (4) times in that shift and also turning of the patients, and drug administration... and for catheterisation that's a two-Nurses-procedure you find that you are the only one doing it. And maybe you have contaminated the glove hand... and infection may occur even when patient is on antibiotic therapy. So that's the major limitation..." (IDI 7/ FEMALE/ANO II).

The response indicates that on some occasions Nurses are left with no option than to perform the catheterization procedure on their own because the number of personnel nurses, especially, is inadequate. Despite their knowledge about the risks involved the Nurses still catheterise patients without assistance due to the volume of their work load on the ward, thus breaching the protocol of the catheterization

procedure. This may be a major source of infection among patients on the ward in question. A highly controversial cause of UTI identified by the Medical Doctors is the change of Nurses on the ward. The Nurses however, totally disagreed with the Doctors on this. A Doctor said:

"…It's nothing new to us, when I say for us I mean those who have been working in the Unit because it's a pattern we have seen when there is a changeover of Nurses in the hospital. There is a time when the Hospital had a whole changeover of Nurses meaning you are bringing a new set of Nurses that are not used to doing a certain procedure to a particular ward. We have noticed a pattern not only on our Ward but some of our other Wards increase in certain forms of morbidity that are peculiar to each of the Wards. So it takes them (Nurses) sometime before they get themselves used to doing it (catheterization) the proper way. Data show that over some weeks or months the incident of that infection then starts dropping when they get used to that." (IDI 5/ MALE/Medical Doctor).

All the Doctors shared this opinion and they strongly believed that the surge in cases of UTI often occurs shortly after the transfer of Nurses from one Unit of the hospital to another. According to them this has been happening for a while and has assumed a regular pattern. It was noted that the incidence of UTI usually peaks after the transfer and later falls once the newly transferred Nurses fully grasp the technique of intermittent catheterisation. The Doctors noted that it takes a while for the new Nurses to master the skill like the old Nurses. On their part, the Nurses countered this opinion shared by the Doctors.

"...That period there was no infection. The 2016 that we are all talking about that the rate of infection was high; those who have been working for the past five (5) to six (6) years were on ground then. Those who can catheterise with their eyes closed." (IDI 6/FEMALE/ CNO).

The Nurses claimed that they always follow the recommended guidelines for catheterization. To them, the issue of transfer of Nurses did not have anything to do with occurrence of UTI. The participant quoted above further stated that the highest rate of UTI was recorded when the old Nurses who have perfectly mastered the techniques of catheterizing were still on the Ward. Being a senior Nurse, she explained that she trained the new Nurses the technique for proper insertion of catheter and also how to take care of the urinary catheter. In her opinion, the Nurses on the Ward have all mastered the signs to watch out for, the timing of catheter change and ways of maintaining sterility of the procedure.

Healthcare giver-related factors

Another probable determinant observed by participants is categorised as healthcare giver-related factors. They include:

- Not maintaining the proper ratio of aseptic agent dilution
- Poor cleaning of the phallus
- Poor adherence or occasional breach in the catheterisation procedure

The issues identified here have a lot to do with the Nurses who are the closest healthcare giver to the patients. While the Nurses claimed that they always follow the recommended procedure when catheterising the patients, some Doctors noted that breach do occur occasionally in the process. This includes not diluting the aseptic agent in the proper ratio and catheterisation of patients by a single person. The last point was actually confirmed by one of the Nurses while discussing challenge of inadequate personnel. Also worthy of note is that a trolley was devised by one of the Senior Nurses for the purpose of ensuring that the Nurses follow the protocol religiously. However, this suggests that some breach had been previously recorded in the process of catheterisation.

Patient-related factors

- Pre-hospitalization infection among patients
- Inadequate fluid intake by patients
- The patients' pathology

The causes related to the patients have more to do with the patients' physiology and inadequate intake of fluid. It was revealed that some patients do not understand the importance of taking adequate fluid because of their immobility hence, the possibility of UTI. In addition, the nature of SCI is also identified as a risk factor for UTI because neurogenic bladder is a common complication of SCI thus making it difficult for patient to void properly. It was also noted that some patients present at the facility with UTI. The opinion of a Nurse on this is next:

"…Most of these patients do come with their infection...I had to call a Doctor's attention to a patient on whom we were yet to start catheterisation and already had some penile discharge. But the Control of Infection told me that any micro-organism they isolate in the first urine sample they don't count it against the ward." (IDI 1/FEMALE/CNO).

As previously noted, the Nurse quoted above revealed that at times the patients may be infected prior their admission on the ward, she further clarified the approach utilized to detect such infection. Pre-hospital infection in her opinion is detected through the screening of patients' urine sample before she/he is catheterised on the ward. According to her, a patient on the ward at the time of the interview was actually experiencing some penile discharge even before the Nurses commenced his catheterisation. As such, taking the pain to screen new patients afforded them the opportunity to distinguish pre-hospital infection from in-hospital infection in order to document the actual source of the UTIs.

Environmental factors

The only cause of UTI categorised as environmental factor is poor hygiene of the patients. The hygienic condition of the bed where patients lie may put them at risk of developing UTI. This was identified by one of the participants as a major contributor to the occurrence of catheter-associated urinary tract infection in the hospital. The observation made by the researcher during visits to the Ward also confirmed this as offensive odour could be perceived from some of the beds couple of steps away.

"...Then hygiene, I don't think the bed sheets have been brought today...but we try to do that any time they are being bed-bath...for our patients on catheter we make sure that if it (bed sheet) is wet we change it and then we use waterproof sheets for them in order not to get their bed stained." (IDI 2/ FEMALE/ANO I).

Here the interviewee was trying to point out a problem while she also absolved herself and other Nurses of any blame in the process. Although, it is understandable that it is not the duty of Nurses to do the laundry however, it is their obligation to ensure that patients stay in a safe and hygienic environment as much as possible.

Prevention of UTI

The purpose of this study is to proffer a lasting solution to the incessant outbreak of catheter-associated urinary tract infections among in-patients particularly those receiving care for spinal cord injury. The participants suggested some methods of reducing UTI on the ward.

- Educate patients and their families

It was suggested that the patients and their informal caregivers be educated on the importance of balanced diet and maintaining good hygiene

- Support for patients with spinal cord injury

Given the financial burden of spinal cord injury on patients and their families it was advised that the government come to their aid. The support could be in any form such as subsidising the cost of care.

- Training of specialised Nurses

It was advised that interested Nurses should be trained to specialise in Neurological Surgery.

- Training of new Nurses

After the changeover of Nurses in the hospital it was suggested that the newly transferred Nurses be trained by the Doctors on how to catheterise patients in a clean intermittent way. Aside from the initial training it was also suggested that they be retrained periodically in order to update their knowledge.

- Change to sterile procedure

Another suggestion is that sterile catheterisation procedure be used in place of the clean intermittent catheterization.

"...Maybe they should let us go back to sterile procedure so we will use surgical and not conform glove, we will not reuse catheter. But will the patients be able to afford it? When they can't even afford this one that we change every week..." (IDI 1/FEMALE/CNO)

- Increase the number of staff

It was unanimously agreed that the number of personnel working on the Ward be increased in order to reduce the burden of care-giving on the healthcare providers

- Use of incentives

The need to incentivise the care of patients with spinal cord injury was also stressed. The incentive could be in form of monetary reward (salary bonus) or leave bonus, this is to motivate the caregivers and appreciate their efforts.

- Provision of medical supplies

Another advice is that the materials used for catheterisation of patients should be provided by the hospital. This is necessary given that the items provided by patients' relations may be contaminated. Some of these opinions are contained in the excerpts next

"...May be if the hospital can provide the consumables and add it to the hospital bills. They should supply us with catheter and gloves... Maybe they should let us go back to the sterile procedure...we will not reuse catheter but will the patients be able to afford it? When they can't even afford this one that we change every week..." (IDI 1/FEMALE/CNO 1)

This view was shared by majority of the participants. It was evident that most of the care providers were concerned about the financial implications of replacing the clean intermittent catheterisation with the sterile catheterisation procedure. They were also doubtful about the likelihood of the hospital making items used for catheterisation available.

Discussion

Spinal cord injury and the use of urinary catheter are major risk factors for UTI, hence spinal cord injured patients undergoing acute care are faced with a precarious situation. A number of behavioral factors which may be underlying the occurrence of UTI at the study site were identified. Evidence suggests that some healthcare providers did not strictly adhere to the guidelines for clean catheterisation because certain breaches did occur in the process. The Doctors questioned the expertise of newly transferred Nurses to the Ward with respect to their compliance with antisepsis procedures when catheterizing patients, while the Nurses reported that they always follow the appropriate disinfection protocol.

An interesting finding from the study is the contributions of financial burden of care-giving to the occurrence of UTI in the study site. This is due to the high rate of dependence on out-of-pocket payments for medical care in the country [8]. Out-of-pocket healthcare expenditure in a poverty-ridden society like Nigeria may endanger the entire population. Moreover, SCI patients and their families are at risk of poverty and in dire need of financial assistance [9]. Another important risk factor for UTI observed in this study is the practice of entrusting the purchase of consumables and medical supplies in the hands of patients' relations. The possibility of contamination cannot be ruled out in such process. Moreover, this practice is an indictment on the hospital management and evidence of failure in our healthcare delivery system. Another evidence of systemic failure in the hospital is the issue of inadequate water supply and keeping patients in soiled bedding or unclean ward environment which exposes patients to grave health risks.

The nurses equally reported that all efforts directed at preventing UTI on the ward are being jeopardised by factors like inadequate personnel. Rather than proposing ways to improve on the existing procedure, the Nurses advised that it be replaced with another technique of catheterisation. They believed the problem may be caused by the reuse of catheter since they believed they always catheterize patients under their watch properly. This is contrary to another study in Swiss hospitals which observed a positive attitude among nurses towards the current practice in their facilities [10]. In conclusion, the present catheterisation procedure at the facility needs review. It can be deduced that lack of adequate monitoring of the procedure by the experienced healthcare providers could be a possible route of infection. As the findings indicate, leaving the junior or inexperienced nurses to catheterise the patients without proper supervision poses a lot of risks.

References

1. Centers for Disease Control and Prevention. Urinary tract infection (catheter-associated urinary tract infection [CAUTI] and non-catheter-associated urinary tract infection [UTI]) and other urinary system infection [USI]) events. Centers for Disease Control and Prevention, Atlanta, GA. 2015.
2. Nicolle LE. Catheter associated urinary tract infections. Antimicrobial resistance and infection control. 2014; 3: 23.
3. The Association for Professionals in Infection Control and Epidemiology (APIC). Guide to Preventing Catheter-Associated Urinary Tract Infections. APIC Implementation Guide. 2014.
4. Lo E, Nicolle LE, Coffin SE, Gould C, Maragakis LL, et al. Strategies to prevent catheter-associated urinary tract infections in acute care hospitals: 2014 update. Infection Control & Hospital Epidemiology. 2014; 35: 464-479.
PubMed: https://www.ncbi.nlm.nih.gov/pubmed/24709715
5. Chukwuocha UM, Dozie UW, Nwawume IC. Bacteriuria in patients with indwelling urethral catheter in Owerri municipality, Nigeria. African Journal of Microbiology Research. 2011; 5: 990-995.
6. Van der Kooi TI, de Boer AS, Manniën J, Wille JC, Beaumont MT, et al. Incidence and risk factors of device-associated infections and associated mortality at the intensive care in the Dutch surveillance system. Intensive Care Med. 2007; 33: 271-278.
PubMed: https://www.ncbi.nlm.nih.gov/pubmed/17146632
7. Trautner BW. Management of catheter-associated urinary tract infection (CAUTI). Current opinion in infectious diseases. 2010; 23: 76.
8. Aregbeshola BS, Khan SM. Out-of-pocket payments, catastrophic health expenditure and poverty among households in Nigeria 2010. Int J Health Policy Manag. 2018; 7: 798-806.
PubMed: https://www.ncbi.nlm.nih.gov/pubmed/30316228
9. Chhabra HS, Sharma S, Arora M. Challenges in comprehensive management of spinal cord injury in India and in the Asian Spinal Cord network region: findings of a survey of experts, patients and consumers. Spinal Cord. 2018; 56: 71-77.
PubMed: https://www.ncbi.nlm.nih.gov/pubmed/28895578
10. Niederhauser A, Züllig S, Marschall J, Schwappach D. Nurses' and Physicians' Perceptions of Indwelling Urinary Catheter Practices and Culture in Their Institutions. J Patient Saf. 2018.
PubMed: https://www.ncbi.nlm.nih.gov/pubmed/29847464