

# Infection Control in the Use of Urethral Catheters: Knowledge and Practices of Nurses in a Private Hospital in Iloilo City

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**Abstract** – *Catheter Associated Urinary Tract Infections (CAUTI) are the most common type of healthcare-associated infections. This study was conducted to determine the relationship between the level of knowledge and practices of nurses on infection control in the use of urethral catheters in a private hospital in Iloilo City. A total of 30 nurses participated as respondents. The result revealed that nurses have low level of knowledge and poor infection control practices in the use of urethral catheters. The nurses' level of knowledge has a bearing on their practices on infection control in the use of urethral catheters. In view of the fact that low level of knowledge is related to poor infection control practices, nurses need continuous education and trainings in the use of urethral catheters in order to prevent and decrease incidence of CAUTI.*

**Keywords** – Infection control, Urethral Catheters

## I. INTRODUCTION

Basic infection control measures in any healthcare set-up can reduce the rates of healthcare associated infections (Dogra et al, 2012). Most often it is observed that a patient comes to the hospital for treatment of particular ailment, but has acquired infection prolonging his hospital stay sometimes leading to septicaemia, multi system organ failure, and death. Hospital acquired infections are not only the problem of the patients but also the patient's families, hospital staff, and the community (Aarti et al., 2012).

Indwelling urethral catheters are the frequent cause of healthcare associated infections (Pellowe, 2009). Catheter Associated Urinary Tract Infections (CAUTI) are the most common type of healthcare-associated infections, accounting for more than 30 percent of healthcare associated infections reported by acute care hospitals (Center for Disease Control and Prevention [CDC], 2012). Virtually all healthcare-associated urinary tract infections are caused by instrumentations

of the urinary tract. CAUTI had been associated with increased morbidity, mortality, hospital cost, and length of stay. Each year, more than 13,000 deaths are associated with Urinary Tract Infections (UTI) (CDC, 2009). Urinary catheter use is associated with a range of adverse outcomes, including death (Pellowe, 2009).

Infection control knowledge of nurses in the use of urethral catheters should be sufficient and their practices should adhere to recommended guidelines on infection control in all health care settings. However, many nurses have poor knowledge on infection control, and are not adhering to the recommended guidelines and standards (CDC, 2009). Studies on infection control knowledge vary in some places. In India, Dogra et al. (2012) found in a study among 329 nurses that the nurses' knowledge on infection control was poor. The nurses' knowledge regarding the infection control and transmission of blood borne pathogens were uniformly poor and their awareness was significantly less compared to the doctors. Moreover, in the United States, in a study conducted by Lewis & Thompson (2009) among 150 nurses, results revealed that nurses' knowledge on infection control was limited. Nurses did not identify any perceived barriers or possible cues to action to increase the likelihood of engaging in proper infection control practices. Furthermore, findings of Kang et al. (2009) in their study of 306 nurses in South Korea revealed that nurses' knowledge on the basic concepts of infection control and environmental management has remained insufficient. Nurses are relatively non-compliant to the guidelines in the areas of education (staff, patient, family) and communication.

Infection control practices of nurses were also found to be poor in some studies. In Pakistan, Saleem (2010) found out in a study of 119 nurses that infection control practices of nurses need to be improved as the frequency of infection control measures were also observed to increase with increasing year in the hospital. Moreover, in a study conducted by Dogra et al.

(2012) on 400 nurses in India, results revealed that the nurses' infection control practices were poor. Less than half of the study group used cap, mask and gown as part of the maximal barrier precautions. Nurses used these maximal barrier precautions less in comparison to doctors. Also, Succhitra & Lakshmi (2007) in their study of 50 nurses in India found out that the nurses' practices on infection control remained low. Even the spread of multi-drug resistant pathogens has not compelled nurses to adopt the recommended practices. Nurses' stated multiple reasons for the poor practice which include skin irritation, being too busy, understaffing, inconvenient location of sinks, lack of institutional guidelines, lack of knowledge and experience, lack of a role model, and lack of rewards. Furthermore, in another study conducted by Animesh et al. (2012) among 120 nurses in India, they found out that infection control practices of nurses were poor. Overall, nurses were observed to have poor practices on standard precautions, immunizations, and barrier precautions. There is a need for improvement in the perception and practice of infection control measures among nurses for both self and patient's protection.

The International Nosocomial Infection Control Consortium (INICC) used a sampling of Philippine Hospitals to track infection rates. The prevalence was monitored on 1.9% on catheter associated urinary tract infection (Rosenthal, 2008). In the Philippines, no studies have been done showing a successful intervention to reduce CAUTI rates (Berba, 2010).

Despite collaborative efforts, programs, policies, standards, and advances in the health care setting, there is still an alarming increased CAUTI cases among varied health care settings. This prompted the conduct of this study.

## II. OBJECTIVES OF THE STUDY

This study was conducted to determine the knowledge and practices of nurses on infection control in the use of urethral catheters in a private hospital in Iloilo City. It specifically aimed to: determine the personal characteristics of the nurses in terms of age, sex, civil status, educational attainment, employment status, area of assignment, and length of service; determine the nurses level of knowledge on infection control in the use of indwelling urethral catheters; determine the practices on infection control in the use of indwelling urethral catheters; and determine if there is a relationship between the nurses' level of knowledge and practices on infection control in the use of indwelling urethral catheters.

## III. MATERIALS AND METHODS

A descriptive relational type of research was utilized, and a researcher-made questionnaire was used for data collection. Complete enumeration was used in the study. All nurses who were assigned in units where catheter insertions were done, and who were able to do urethral catheter insertions for the past 30 days were included in the study. A total of 30 nurses participated as respondents.

Frequency distributions, means, and percentages were used to describe the data while Gamma test, was employed to test the relationship between variables set at 0.05 level of significance, and interpreted using the Garrett's scale of interpretation.

## IV. RESULTS AND DISCUSSION

Table 1 shows that majority of the respondents were young with a computed mean age of 25.20 years old. Specifically, it can be seen that almost all (90 percent) of the respondents belonged to age group 21 - 29 years old, single. More than half (56.7 percent) were males, while the rest (43.4 percent) were females. Alittle more than three-fourths (76.7 percent) were only Bachelor's degree holder, while the rest (23.3 percent) have masteral units. More than half (56.7 percent; 53.3 percent; 53.3 percent respectively) were regular employees; were assigned in the wards and have more than 24 months of clinical experience, with a mean length of 25. 367 months. A little more than a quarter (26.7 percent) had only 1 – 11 months of clinical experience, while the rest (20 percent) had 12 – 23 months of clinical experience.

**Table 1. Distribution of respondents according to their personal characteristics**

| Personal Characteristics                       | %    |
|--|------|
| Age  |      |
| 21 to 29 years old                             | 90.0 |
| 30 to 39 years old                             | 10.0 |
| <b>Mean Age = 25.20 years old ; SD = 3.782</b> |      |
| Sex  |      |
| Male   | 56.7 |
| Female   | 43.3 |
| Civil Status                                   |      |
| Single   | 90.0 |
| Married  | 10.0 |
| Educational Attainment                         |      |
| Bachelor's Degree                              | 76.7 |
| With Masteral Units                            | 23.3 |
| Employment Status                              |      |
| Regular  | 56.7 |
| Contractual                                    | 43.3 |
| Area of Assignment                             |      |
| Wards  | 53.3 |
| Special Area                                   | 46.7 |

**Table 1. (cont.) Distribution of respondents according to their personal characteristics**

| Personal Characteristics                                     | %    |
|--|------|
| Length of Experience   |      |
| 1 to 11 months   | 26.7 |
| 12 to 23 months  | 20.0 |
| 24 months and above  | 53.3 |
| <b>Mean Clinical Experience = 25.367 months; SD = 17.345</b> |      |

### Knowledge on infection control in the use of urethral catheters

The knowledge on infection control in the use of urethral catheters of the respondents is classified according to the considerations and techniques for catheter insertion, the different approaches for catheterization and specimen collecting methods, and proper urethral catheter maintenance. In general, respondents had a very poor knowledge on infection control in the use of urethral catheters. The respondents were least knowledgeable about the different approaches to catheterization and specimen collecting methods followed by proper urethral catheter maintenance and lastly, on considerations and techniques for catheter insertion.

As shown in table 2, it is alarming to note that a little more than two thirds (70 percent) had low level of knowledge. Although some (30 percent) of the nurses have average level of knowledge on infection control, there is still a huge number of nurses who are not aware or knowledgeable about infection control on CAUTI prevention which in turn may lead to errors, and lapses that may pose a great risk for patients in acquiring CAUTI during their hospital stay. This is congruent with the findings of Dogra et al. (2012) in a study in India, of Lewis & Thompson (2009) in the United States and of Kang et al. (2009) in South Korea that revealed insufficient or poor knowledge on infection control.

**Table 2. Overall level of knowledge on the infection control in the use of urethral catheters**

| Level of Knowledge | %    |
|--------------------|------|
| High               | 0.0  |
| Average            | 30.0 |
| Low                | 70.0 |

With regards to considerations and techniques for catheter insertion, table 3 shows that two thirds (66.7 percent) knew that Silicone is preferable than Teflon and latex-coated materials in reducing the risk of encrustation for long term catheterized patients who have frequent obstruction. Silicone is preferable to other

materials to reduce the risk of encrustation (CDC, 2012). Majority (80 percent) have mistakenly identified antiseptic lubricants to be more beneficial than non-antiseptic lubricants in reducing the risk of (CAUTI). Several studies comparing antiseptic lubricant to non-antiseptic lubricants found no significant differences (CDC, 2012). A little less than three fourths (70 percent) have mistakenly considered antimicrobial prophylaxis to offer greater benefit in reducing the incidence of CAUTI for patients requiring long-term catheterization. CDC (2012) suggests that there is no benefit in using antimicrobial prophylaxis for patients undergoing both short and long term catheterizations. Moreover, two thirds (66.7 percent) did not know that routine use of antiseptic lubricants were not necessary in preventing infection caused by urinary catheter insertion. Routine use of antiseptic lubricants in catheter insertion is not necessary (CDC, 2012). More than half (63.3 percent) failed to recognize that antiseptic meatal cleansing before catheter insertion is not necessary in reducing the incidence of CAUTI. According to CDC (2012), there is no benefit of antiseptic meatal cleansing regimens before, during or after catheterization to prevent CAUTI. Routine hygiene is appropriate. Two fifths (60 percent) did not know that using alcohol hand sanitizer is comparable to hand washing in preventing CAUTI incidence. Studies have shown that alcohol hand sanitizer and hand washing have no significant differences in reducing CAUTI incidence (CDC, 2012).

In terms of different approaches for catheterization and specimen collecting methods, more than half (60 percent) knew that when obtaining small urine volume for examination, one should aspirate the urine from the needleless sampling port with a sterile syringe after cleansing the port with a disinfectant. On the other hand, more than half (53.3 percent) did not know that they will obtain large volume of urine for special analysis (not culture) aseptically from the drainage bag. According to CDC (2012), when a small volume of fresh urine is needed for examination, aspirate the urine from the needleless sampling port with a sterile syringe/cannula adapter after cleansing the port with a disinfectant, so as to avoid entry of bacteria to the sterile environment inside the catheter. On the other hand, large volumes of urine for special analyses should be obtained aseptically from the drainage bag. Further, a little less than two thirds (63.3 percent) mistakenly identified that meatal cleansing solution post-catheterization offers greater advantage in preventing the incidence of CAUTI. For CDC (2012), there is no benefit of antiseptic meatal cleansing regimens before, during or after catheterization to prevent CAUTI.

**Table 3. Distribution according to itemize knowledge on the infection control in the use of urethral catheters**

| Items (Overall Mean = 2.600)  | %    |
|---|------|
| <b>Considerations and Techniques for Cathether Insertion (Mean = 2.2667)</b>  |      |
| 1. Silicone is preferable than Teflon-coated and latex catheter materials in reducing the risk of encrustation for long term catheterized patients who have frequent obstruction. | 66.7 |
| 2. Using alcohol hand sanitizer is comparable to hand washing in preventing CAUTI incidence.  | 40.0 |
| 3. Antiseptic meatal cleansing before catheter insertion is necessary in reducing the incidence of CAUTI.   | 36.7 |
| 4. Routine use of antiseptic lubricants to decrease the risk of infection is necessary for urinary catheter insertion.  | 33.3 |
| 5. Antimicrobial prophylaxis offers greater benefit in reducing the incidence of CAUTI for patients requiring long-term catheterization.  | 30.0 |
| 6. Antiseptic lubricants are more beneficial than non-antiseptic lubricants in reducing the incidence of Catheter Associated Urinary Tract Infection (CAUTI).                     | 20.0 |
| <b>Different Approaches to Catheterization and Specimens Collecting Methods (Mean = 1.8667)</b>   | 60.0 |
| 7. When obtaining small urine volume for examination, aspirate the urine form the needless sampling port with a sterile syringe after cleansing the port with a disinfectant.     |      |
| 8. If obstruction is anticipated, close continuous irrigation is suggested to prevent obstruction.  | 46.7 |
| 9. Obtain large volume of urine for special analysis aseptically from the drainage bag.   | 43.3 |
| 10. Meatal cleansing with antiseptic solution post-catheterization offers greater advantage in preventing the incidence of CAUTI.   | 36.7 |
| <b>Proper Urethral Catheter Maintenance (Mean = 2.1481)</b>   | 66.7 |
| 11. Adding microbial solutions to drainage bags reduce the incidence of acquiring infection.  |      |
| 12. Silver coated catheters increase the risk of urethral irritation and antimicrobial resistance among catheterized patients.  | 46.7 |
| 13. There is no benefit of clamping versus free drainage before catheter removal in reducing the risk of bacteriuria in catheterized patients.                                    | 30.0 |
| 14. Bladder irrigation, instillation, or washout using antiseptic or antimicrobial agent is beneficial in preventing CAUTI.   | 26.7 |
| 15. Changing indwelling catheters or drainage bags at routine, fixed intervals is recommended for proper catheter maintenance.  | 23.3 |

More than half (53.3 percent) mistakenly identified that close continuous irrigation is not suggested to prevent obstruction. According to CDC (2012), there is a benefit of using a closed rather than open urinary drainage system.

In terms of proper urethral catheter maintenance, two thirds (66.7 percent) knew that adding microbial solutions to drainage bags does not reduce the incidence of acquiring infection. There is no benefit of antiseptic instillation in urinary drainage bags according to CDC (2012). More than three fourths (76.7 percent) mistakenly identified that changing indwelling catheters or drainage bags at routine, fixed interval is recommended for proper catheter maintenance. According to CDC (2012), there is no benefit of routine catheter or drainage bag changes to prevent CAUTI. This was based on no difference or an increased risk of symptomatic urinary tract infection and no difference in bacteriuria with routine change compared to as-needed changes or with more frequent changing intervals. Moreover, an alarming less than three fourths (73.3 percent) of the respondents answered incorrectly that bladder irrigation, instillation, or washout using

antiseptic or antimicrobial agent is beneficial in preventing CAUTI. There is no benefit of antiseptic or antimicrobial bladder irrigation, instillation or washouts in patients with indwelling or intermittent catheters (CDC, 2012). A little less than three fourths (70 percent) mistakenly identified that there is no benefit of clamping versus free drainage before catheter removal in reducing the risk of bacteriuria in catheterized patients. According to CDC (2012), there is no benefit of clamping versus free drainage before catheter removal. More than half (53.3 percent) failed to identify that silver coated catheters do not increase the risk of urethral irritation and antimicrobial resistance among catheterized patients. According to CDC (2012), silver-coated catheters are preferable over standard latex catheters.

### Practices on Infection Control in the Use of Urethral Catheters

The practices on infection control for the use of indwelling urethral catheters of the respondents were classified in three parts: before, during, and after catheter insertion.

**Table 4. Distribution according overall practice on infection control in the use of urethral catheters**

| Practice (N = 30) | %    |
|-------------------|------|
| Good              | 33.3 |
| Poor              | 66.7 |

As shown in table 4, it is very alarming to note that two thirds (66.7 percent) of the respondents had poor practices on infection control. Although some (33.3 percent) of the nurses had good practices, there is still a huge number of nurses prone to making mistakes which posed a risk for patients to develop CAUTI. The findings of this study is congruent to the findings of Animesh et al. (2012), Dogra et al. (2012), Saleem (2010), and Succhitra and Lakshmi (2007).

In terms of the procedures done before catheter insertion as revealed in table 5, it is disturbing that almost all (96.7 percent) had poor practices in cleaning the urethra with an antiseptic solution before inserting the catheter. According to CDC (2012), there is no benefit of antiseptic meatal cleansing regimens before, during or after catheterization to prevent CAUTI.

**Table 5. Correct practices on infection control in the use of urethral catheters (N = 30)**

| Before Catheter Insertion   | %    |
|---|------|
| 1. Using a pair of sterile gloves for catheter insertion                          | 83.3 |
| 2. Opening and handling of indwelling catheter from its packaging                 | 80.0 |
| 3. Number of times using a single pack lubricant jelly                            | 66.7 |
| 4. Washing of hands before catheter insertion                                     | 60.0 |
| 5. Cleaning the urethra with an antiseptic solution before inserting the catheter | 3.3  |

  

| During Catheter Insertion   | %    |
|---|------|
| 1. Maintaining an unobstructed urine flow for the indwelling catheter             | 73.3 |
| 2. Amount of sterile water injected in the needleless port to inflate the balloon | 53.3 |

  

| After Catheter Insertion   | %    |
|--|------|
| 1. Placement of collecting bag after insertion                                   | 100  |
| 2. Ratio of collecting container used per patient in emptying the collecting bag | 100  |
| 3. Use of clean gloves when draining the collecting bag                          | 80.0 |
| 4. Pulling out of catheter   | 56.7 |
| 5. Draining the collecting bag in the collecting container                       | 13.3 |
| 6. Proper sequence of things to do post-catheter insertion                       | 6.7  |
| 7. Implementing Quality Improvement strategies to reduce CAUTI                   | 3.3  |
| 8. Wearing of gown when manipulating the indwelling catheter's collecting bag    | 0.0  |

Majority (83.3 percent) used sterile gloves when inserting a catheter which is a good practice. Also, most of the respondents (80.0 percent) handled and opened the indwelling catheter correctly and aseptically from its packaging before catheter insertion. However, it is alarming that one sixth (16.7 percent) only used clean gloves in catheter insertion while one fifth (20.0 percent) opened the indwelling catheter from its packaging incorrectly. Urinary catheter insertions should be done in aseptic technique and sterile equipment should be used (CDC, 2012). Moreover, although two thirds (66.7 percent) had good practices in the number of times of using a single pack lubricant jelly in their catheter insertions, it is startling that one third (33.3 percent) had poor practices. CDC (2012) recommends use of single pack lubricant jelly strictly for single-use. It is also alarming that more than one third (40 percent) of the respondents did not perform hand washing prior to catheter insertion and donning of sterile gloves which is a poor practice, while only more than half (60 percent) of the respondents performed hand washing before insertion. Routine hand hygiene immediately before and after insertion or any manipulation of the catheter device or site is strictly suggested by the CDC (2012).

In terms of practices during catheter insertion, a little less than three fourths (73.3 percent) had good practices in maintaining an unobstructed urine flow for the urethral catheter. Good practice includes keeping the collecting bag and tube free from kinking to maintain an unobstructed urine flow for the indwelling catheter, while some of the respondents alarmingly pushed 5 mL of sterile water in the needleless port to maintain an unobstructed urine flow which is an incorrect practice. According to CDC (2012), making sure that the collecting bag and tube are free from kinking is the most important and basic way of maintaining an unobstructed urine flow for the indwelling catheter because obstruction increases urinary bladder tension, and bacterial colonization. Three fourths (74.3 percent) injected no larger than 10 milliliters of sterile water in the needleless port to inflate the balloon which is a good practice. No larger than 10 ml of sterile water but not lesser than 5 ml is the suggested amount to anchor a balloon in the urinary bladder (CDC, 2012).

In terms of the practices after catheter insertion, all (100 percent) had good practices on the placement of the collecting bag after insertion. Collecting bags should be placed below the bladder at all times and should not touch the floor (CDC, 2012). All (100 percent) also had good practices when it comes to the

ratio of collecting container used per patient in emptying the collecting bag of the indwelling catheter. This may also attributed to the fact that the hospital implemented that all admitted patients should have an admission kit which contains individual necessity items for each patient which are needed for his admission which also includes a container for draining the catheter. According to CDC (2012), one container for draining the catheter should be utilized by one and the same patient all throughout the hospital stay so as to prevent infection transmission. It is however, alarming to know that all 100 percent had poor practices on wearing of gown during any manipulation of the indwelling catheter's collecting bag. CDC (2012) suggested that Standard Precautions, including the use of gloves and gowns, during any manipulation of the catheter or collecting system is necessary in preventing CAUTI because spillage of urine to the nurses' uniform may lead to infection transmission from the nurse to another patient. Further, although most (80 percent) had good practices in using a pair of clean gloves when draining the catheter, it is alarming to know that one fifth (20 percent) had poor practices. Likewise, almost all (96.7 percent) had poor practices on implementing Quality Improvement strategies to prevent CAUTI. According to CDC (2012), quality improvement (QI) programs or strategies to enhance appropriate use of indwelling catheters and to reduce the risk of CAUTI based on a facility risk assessment should be implemented. Less than half (43.3 percent) had poor practices in pulling out a catheter. According to CDC

(2012), there is no benefit of clamping versus free drainage before catheter removal. Majority (86.7 percent) had poor practices when they drained the catheter. According to CDC (2012), when draining the catheter, contents of the collecting bag should not have any contact with the collecting container through the drainage spigot as it may serve as a portal of entry for bacteria colonization. It is also alarming to note that right after catheter insertion, almost all (93.3 percent) had poor practices on the proper sequence of things to do post catheter insertion. According to CDC (2012), accurate documentation had been proven to reduce the risk of CAUTI because of system implementation, chart audit, and correct surveillance.

#### **Level of Knowledge and Practices on the Infection Control in the use of Indwelling Urethral Catheters**

Table 6 shows that most respondents (77.8 percent) who had an average level of knowledge on infection control had poor infection control practices. On the other hand, more than half (61.9 percent) of the respondents who had low level of knowledge had poor infection control practices. It can be seen that 66.7 percent of all insertions were poorly performed. It was noted that there exist a positive very high correlation between the respondent's level of knowledge and their practices. The result of this study is congruent to the findings of Aarti et al., (2012), Mohamed (2012) and Paudyal (2008) who found that there is a significant relationship between level of knowledge and practice.

**Table 6. Relationship between level of knowledge and practices on the infection control in the use of urethral catheters**

| Level of Knowledge   | Practice         |             |                              |             |           |              |
|----------------------|------------------|-------------|------------------------------|-------------|-----------|--------------|
|                      | Good             |             | Poor                         |             | Total     |              |
|                      | f                | %           | f                            | %           | f         | %            |
| Average              | 2                | 22.2        | 7                            | 77.8        | 9         | 100.0        |
| Low                  | 8                | 38.1        | 13                           | 61.9        | 21        | 100.0        |
| <b>Total</b>         | <b>10</b>        | <b>33.3</b> | <b>20</b>                    | <b>66.7</b> | <b>30</b> | <b>100.0</b> |
| <b>Gamma = 0.366</b> | <b>r = 0.862</b> |             | <i>very high correlation</i> |             |           |              |

In a study conducted by Aarti et al. (2012) in India among 50 nurses, findings stated that there exist a positive relationship between knowledge and practice. Thus, the persons with requisite knowledge will be better performers in their professional practice in preventing and controlling hospital acquired infections. In addition, Paudyal (2008) also found in a study conducted in Nepal among 166 staff nurses that there exist a positive relationship between infection control

knowledge and practices. Similarly, Mohamed (2012) found out in a study among 50 nurses in Saudi Arabia that there is a significant relationship between level of knowledge and practice regarding infection control.

#### **V. CONCLUSIONS, AND RECOMMENDATIONS**

Most of the staff nurses are young. This may be because the older nurses are already occupying the managerial positions. This statistics shows that over the

years, men have been observed to enter the nursing profession which was traditionally a female dominated job. Married nurses are already handling managerial and supervisory positions, while single nurses are handling staff nurses position. Most nurses have not pursued advance studies in the field of nursing. Majority of the nurses have already been regularized. Staff nurses are predominantly working in the general wards. Being a young hospital, most of the staff nurses have only just more than 24 months of experience. It is alarming to know that the nurses had low level of knowledge and poor practices on infection control in the use of urethral catheters. This indicates that nurses need to be educated and trained more on infection control in the use of urethral catheters. The nurses' level of knowledge had a bearing on their practices on infection control in the use of urethral catheters. It is highly recommended that the Administration, together with the Continuous Quality Improvement Department, the Nursing Service Office, the Training Division, the Infection Control Department, and the Human Resource Department to provide and implement current and up-to-date evidence-based guidelines that address catheter use, insertion and maintenance and should provide periodic in service education, monitoring, training, and follow-up to all nurses, healthcare providers, and others that take care of catheters regarding current techniques and procedures for urinary catheter insertion, maintenance, and removal.. A follow-up study on a larger population should be made to verify the result of the present findings. Infection control knowledge and practices requires consistencies at all times.

## REFERENCES

- Aarti, V., Swapna, N., & Shakti, G. (2012). Knowledge and practice of nursing staff towards infection control measures in a tertiary care hospital. *Journal of the Academy of Hospital Administration*, 13(2):7-12. Retrieved on July 1, 2012 from <http://www.indmedica.com/journals.php/journalid>
- Animesh, J., Chetam, M., Jarayam, S., & Yamini, M. (2012). Perception and practice regarding infection control measures amongst healthcare workers in district government hospitals of Mangalore, India. *International Journal of Health and Allied Sciences*, 1(2):68-63. Retrieved on March 20, 2010 from <http://www.ijhas.in/article.asp>
- Berba, R. (2010). Impact of outcome and process surveillance on catheter-associated urinary tract infection rates in six intensive care units of two cities of Philippines: Findings of the international nosocomial infection control consortium. Retrieved on March 17, 2010 from <http://shea.confex.com/sheaf/2010/webprogram/>
- Center for Disease Control and Prevention. (2009). *CAUTI guideline fast facts*. Retrieved on July 2, 2012, from <http://www.cdc.gov/hicpac/CAUTI>
- Center for Disease Control and Prevention. (2012). *Catheter associated urinary tract infection event*. Retrieved July 5, 2012 from <http://www.cdc.gov/nhsn/pdfs>
- Dogra, V., Mishra, B., Jain, M., Thakur, A., & Loomba, P.S. (2012). Infection control practices among doctors and nurses in a tertiary care hospital. *Annals of Tropical Medicine and Public Health*, 5(1):28-33. Retrieved on July 2, 2012, from <http://atmph.org/article.asp>
- Kang, J., Cho, J., Kim, J., Kim, D.H., Lee, J., Park, H.K., . . . Lee, E.N. (2009). Hospital nurses' knowledge and compliance on multidrug-resistant organism infection control guideline. *Journal of Korean Academy of Nursing*, 39(2):186-97. doi: 10.4040/jkan.2009.39.2.186.
- Lewis, K. L. & Thompson, J.M. (2009). Health care professionals' perceptions and knowledge of infection control practices in a community hospital. doi: 10.1097/HCM.0b013e3181b3ea8b.
- Mohamed, A. (2012). The effects of an educational program on nurse's knowledge and practice related to hepatitis C virus: A pretest and posttest quasi-experimental design. *Journal of Applied Sciences Research*, 7(11):564. Retrieved on July 1, 2012 from <http://www.hjn.gr/index>
- Paudyal, P., Simkhada, P., & Bruce, J. (2008). Infection control knowledge, attitude, and practice among Nepalese health care workers. *American Journal of Infection Control*, 36(8):595-7. doi: 10.1016/j.ajic.2007.10.026.
- Pellowe, C. (2009). Reducing the risk of infection with indwelling urethral catheters. *Nursing Times*, 105:36. Retrieved on March 17 2010 from <http://www.nursingtimes.net>
- Rosenthal, V. (2008). International nosocomial infection consortium report, data summary for 2003-2008: Impact of the country socio

- economic level and type of hospital on CAUTI rates in adult and pediatric intensive care units of 25 limited resources countries. Retrieved on March 17, 2010 from <http://shea.confex.com>
- Saleem, T. (2010). Knowledge, attitudes and practices of healthcare personnel regarding needle stick injuries. *Journal of Pakistan Medical Association*, 60(2):151-6. Retrieved on March 20, 2010 from <http://www.ncbi.nlm.nih>
- Succhitra, J.B. & Lakshmi, D., (2007). Impact of education on knowledge, attitudes, and practices among various categories of health care workers on nosocomial infections. *Indian Journal of Medical Microbiology*, 25(3): 181-187. Retrieved on July 2, 2012 from <http://www.ijmm.org>.