

**UTILIZATION OF CATHETER ASSOCIATED URINARY TRACT INFECTION
BUNDLE AMONG CRITICAL CARE NURSES - KENYATTA NATIONAL HOSPITAL**

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REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTER OF SCIENCE
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2016

DECLARATION

This is to declare that this dissertation does not incorporate without acknowledgement any material previously submitted. It does not contain any material previously published or written by any other person except with reference made in this text.

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CERIFICATE OF APPROVAL

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DEDICATION

This dissertation is dedicated to my loving parents Mr. Wycliffe Assanga and Mrs. Abigail Violet Okusih Assanga for their never ending support throughout this process. I also wish to dedicate this work to my aunt Mrs. Elizabeth Munde Amuyunzu for her support and encouragement that has kept me going along during my nursing academic journey.

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LIST OF ABBREVIATION AND ACRONYMS

| | |
|-------------|--|
| BScN | Bachelor of Science Nursing |
| CAUTI | Catheter Associated Urinary Tract Infection |
| CDC | Centre of Disease Control |
| HAI | Hospital Acquired Infection |
| ICU | Intensive Care Unit |
| IHI | Institute for Healthcare Improvement |
| KMTC | Kenya Medical Training College |
| KNH | Kenyatta National Hospital |
| KNH/UoN-ERC | Kenyatta National Hospital/University of Nairobi-Ethics and Research Committee |
| MScN | Master of Science Nursing |
| NHSN | National Healthcare Safety Network |
| ORN | Operating Room Nurse |
| PPE | Personal Protective Equipment |
| RN | Registered Nurse |
| SPSS | Statistical Package for the Social Sciences |
| USA | United States of America |
| UTI | Urinary Tract Infection |
| UoN | University of Nairobi |
| WHO | World Health Organization. |

DEFINITION OF TERMS

Catheter associated urinary tract infections – Infections caused by bacteria or fungi that enter the urinary tract during the catheter’s insertion, through the catheter’s tube or the external surface of the catheter.

Care bundle – A set of processes of care implemented to prevent morbidity and mortality from HAIs.

Closed drainage system – Catheter inserted into the urinary bladder and connected via tubing to a drainage bag with sufficient slack in the tube between the body and thigh.

Elements of CAUTI bundle – Specific components that make up the CAUTI bundle that is maintaining a closed drainage system, meatal cleaning, maintaining an unobstructed urinary flow, drainage bag care and securing the catheter to the abdomen or thigh.

Hospital acquired infections – Infections acquired during hospitalization that were absent at the time of admission.

Incidence – New cases of a characteristic arising in a population over a given period of time.

Personal protective equipment – Protective clothing, goggles or other clothing or equipment designed to protect the wearer’s body from injury or infection and to minimize exposure to serious workplace injuries and illnesses.

Prevalence rate – The proportion of a population who have or had a specific characteristic in a given period of time.

Urinary tract infections – Infection of any part of the urinary system.

ABSTRACT

Background

Majority if not all patients admitted in the Critical Care Units (CCU) have indwelling urinary catheters. These catheters stay for the entire period that these patients are admitted, hence the risk of developing Catheter Associated Urinary Tract Infections (CAUTI). Due to the high prevalence of CAUTI worldwide, the Centre of Disease Control (CDC) initiated reduction strategies. These strategies were bundled into prevention care bundles recommended as gold standard in caring for catheterized patients. The prevalence has still remained high even with the introduction of the bundles increasing the morbidity, mortality, hospital stay and cost. Nurses are charged with the responsibility of catheter care making them accountable for the utilization of the CAUTI bundle. This bundle should be utilized all the time during patient care.

Study objective: To determine the extent of Catheter Associated Urinary Tract Infection bundle utilization among critical care nurses at Kenyatta National Hospital.

Methodology: This was a cross-sectional descriptive study on 95 nurses. Cochrane formula was used to determine the sample size which was selected using cluster sampling that comprised of the critical care units. Systematic random sampling was used in each cluster. A structured questionnaire and an observation checklist was used to collect data based on the elements of the bundle. Analysis of data was done using the Statistical Package for Social Sciences (SPSS) version 21.0. Descriptive statistics that is mean, mode, median & standard deviation and inferential statistics that is chi-square test, odds ratio & pearsons' correlation were used to analyze the data which was presented in form of figures and tables.

Results

The nurses utilized the bundle though some elements were better utilized than others. The nurses who had knowledge on the bundle utilized it 24.1 times more than those who did not [OR 24.1; 95% CI 6.7 - 104; P < 0.01]. It was also noted that utilization of the bundle was 36.2 times higher among the nurses who knew about the bundle elements [OR 36.2; 95% CI 9.98 - 144; P < 0.001]. Generally, the nurses utilized the bundle. They also adhered to the bundle at 49.5% (P > 0.005) though there was no statistically significant association between the demographic characteristics and adherence to the bundle. There was a weak correlation between the reported and observed bundle utilization [r = 0.043; 95% CI 0.16 – 0.24; P = 0.678].

Conclusion

Nurses working at Kenyatta National Hospital's critical care units utilized and adhered to the bundle. There was a weak correlation between the observed and reported bundle utilization. The nurses faced various challenges that hindered their practice on bundle utilization and adherence. The challenges which hindered utilization and adherence to the bundle were resources, resistance to change, lack of audits, continuing medical education and standardized way of practice that is standard operating procedures, checklist. It is therefore recommended that there be continuing medical education on the bundle within the units, formulation of standard operating procedures and checklist, clinical audits and reaudits and the nurses be provided with enough resources. Further research is needed on other aspects of the bundle and in different settings, the culture preventing transfer of knowledge into practice by the nurses and challenges.

CHAPTER ONE: INTRODUCTION

1.1: Background

Urinary Tract Infections (UTI) consist of 32 to 40% of all the HAIs occurring in approximately 1.7 million patients annually worldwide with more than 75% of these UTIs being associated with indwelling urinary catheters (CDC, 2015). Catheter Associated Urinary Tract Infections (CAUTIs) increase morbidity and mortality as well as the length of hospital stay and cost (Weber *et al*, 2011).

The focus on prevention of CAUTI was developed in 2009 when the Center of Disease Control (CDC) developed guidelines that were later bundled into multi-modal sets of interventions using scientific evidences (CDC, 2009; Saint *et al*, 2009). These guidelines were used to form the CAUTI bundle that consist of maintaining a closed drainage system, meatal cleaning, maintaining an unobstructed urinary flow, securing the catheter and drainage bag care (Lo *et al*, 2008; Gould *et al*, 2010; Hooton *et al*, 2010). Each of these elements has scientific evidence sufficient to represent a standard of care. The development of the bundle was due to high mortality rate and prevalence of CAUTI in the CCUs. Implementation of this bundle is considered a gold standard worldwide (Reser *et al*, 2012). There should be adherence and utilization of all the elements of the bundle on every catheterized patient 100% of the time (Horner *et al*, 2011). A study was conducted in Turkey on multidimensional infection control approaches on CAUTI and the findings had reduction in CAUTI rates with bundle utilization (Leblebicioglu *et al*, 2013).

Nurses are responsible for catheter care making them accountable for the utilization of this care bundle within the CCUs. All CCUs should consider improvement in the care of patients a priority by utilizing the bundle to prevent CAUTIs. Although many studies have been conducted on this aspect of patient care the prevalence rate of CAUTI still remains high. This prompted a scientific evaluation of the utilization of the bundle among nurses working at KNH's CCUs being the largest teaching and referral hospital in East Africa.

1.2: Statement of the Problem

Catheter Associated Urinary Tract Infections (CAUTI) comprise of 30 to 40% of all HAIs occurring worldwide (Gould *et al*, 2010). There is an estimated 1 million CAUTIs per year worldwide, this causes an additional cost when complicated by bloodstream infections at \$ 400 million (Clarke K, 2013). Since most if not all patients in the CCUs have indwelling urinary catheters the chances of developing CAUTIs increase with increased incidences of morbidity, mortality, hospital costs and stay.

The prevalence rate of CAUTI in the CCU settings is 2.4 to 35 infections per 1000 catheter days worldwide (CDC, 2015). That of the developed countries is 3.3 to 17.4 infections per 1000 catheter days. The developing countries have a rate of 9.9 to 35 infections per 1000 catheter days. Studies indicate that 17 to 69% of CAUTIs can be prevented and there can be reduction in the prevalence by good utilization and adherence to the CAUTI bundle (Gould *et al*, 2010). This is because most infections occur during patient care especially by nurses who are accountable for the bundle utilization and adherence.

In most countries, there is lack of utilization of the CAUTI bundle hence the high incidences of CAUTI in the CCUs. The United States of America (USA) being a developed country has CAUTI rate of 12.9 infections per 1000 catheter days. In Europe the rate is at 19.6 infections per 1000 catheter days while India which is a developing country has a rate of 4.59 infections per 1000 catheter days. Among the African countries, Senegal has a prevalence rate of 4.5 infections per 1000 catheter days, South Africa is at 4.8 infections per 1000 catheter days being lower than that of the developing countries and 12.3 infections per 1000 catheter days in Nigeria with Kenya having 30.5 infections per 1000 catheter days (WHO, 2009; Roux *et al*, 2011; INTECH, 2013; Raji A, 2013; Tillekeratne *et al*, 2014; Kazi M, 2015). At Kenyatta National Hospital, the incidence rate of CAUTI is 32% with that of the CCUs being 18% (Maturi P, 2010; Inyama *et al*, 2011). This high prevalence of CAUTI at KNH poses a greater challenge to quality health care of the patients. Hence the need to conduct a study on the utilization of CAUTI bundle by nurses in our CCUs at KNH. Nurses do provide direct care to patients and are responsible and accountable for the utilization of the bundle.

Catheter Associated Urinary Tract Infections (CAUTI) increase morbidity, mortality and hospital stay hence compromising on bed occupancy which is 100% at KNH's CCUs. The CAUTI bundle was introduced to help in reducing the rate of CAUTIs worldwide. Nurses are responsible

and accountable for the bundle utilization while caring for catheterized patients. They should always adhere to the CAUTI bundle so as to reduce the incidences, reduce disease burden and cost to the patients. CAUTIs reflect poor healthcare and risk to patient safety. Specific HAIs with CAUTI as an example have stopped being reimbursed in the USA by insurance companies since 2008 (Gould *et al*, 2009; Umscheid *et al*, 2011), which could be effected by insurance companies in Kenya. The impact of CAUTIs can take many years post discharge from the hospital whereby these patients may develop urethral strictures.

1.3: Justification

There is a high indication for the use of indwelling urinary catheters among critical care patients. These patients usually have a long stay in the CCUs, they are bedridden and most are unconscious hence need for catheterization.

These catheters are indicated for therapeutic uses that is hourly urine monitoring & monitoring of the hemodynamic status and providing comfort to the patients who in most cases are not able to take care of their elimination hence are at a high risk of developing CAUTI. Most of the patients develop immunosuppression due to the nature of their illness. The medications that they are usually on tend to reduce immunity hence are at risk of acquiring infections such as CAUTI.

Despite evidence based researches being conducted on prevention of CAUTIs, the incidence rates still remain high. Currently there is no evidence of studies conducted in Kenya on utilization of the CAUTI bundle. This necessitated the need to conduct a scientific study in this area of patient care.

1.4: Research Objectives

1.4.1: Broad Objective

To determine the extent to which critical care nurses utilize catheter associated urinary tract infection bundle at Kenyatta National Hospital.

1.4.2: Specific Objectives

1. To evaluate the utilization of the catheter associated urinary tract infection bundle by critical care nurses at Kenyatta National Hospital.
2. To assess the adherence of the critical care nurses to catheter associated urinary tract infection bundle at Kenyatta National Hospital.
3. To correlate the observed with the reported practices related to catheter associated urinary tract bundle utilization by critical care nurses at Kenyatta National Hospital.

1.5: Research Questions

1. To what extent do critical care nurses at Kenyatta National Hospital utilize the catheter associated urinary tract infection bundle?
2. To what extent do the critical care nurses at Kenyatta National Hospital adhere to the application of catheter associated urinary tract infection bundle?
3. What is the correlation between the observed and the reported practices on catheter associated urinary tract infection bundle utilization?

1.6: Research Hypothesis

1.6.1: Null Hypothesis

There is no significant difference between the observed and reported practices related to catheter associated urinary tract infection bundle utilization by the critical care nurses at Kenyatta National Hospital.

1.6.2: Alternative Hypothesis

There is a significant difference between the observed and reported practices related to catheter associated urinary tract infection bundle utilization by the critical care nurses at Kenyatta National Hospital.

CHAPTER TWO: LITERATURE REVIEW

2.1: Introduction

Catheter Associated Urinary Tract Infections (CAUTIs) have an impact on the quality of life as well as financial burden due to the increased cost of treatment and length of hospital stay. The CAUTI bundle is composed of elements which are grouped into the insertion and maintenance bundles. This study focused on the maintenance bundle. An analysis of patient safety practices by the Agency for Healthcare Research and Quality emphasized the important role of nurses in preventing CAUTI (Saint *et al*, 2008). Nurses are at a better position to utilize and adhere to the CAUTI bundle elements.

Most of the critical care patients if not all have indwelling urinary catheters hence are at risk of developing CAUTI. Catheter associated urinary tract infections (CAUTI) have a prevalence rate of 2.4 to 17.4 % worldwide (CDC, 2015), in Kenya it's at 30.5% (Tillekeratne *et al*, 2014) while at KNH it's at 32% with that in CCU at KNH being at 18% (Maturi P, 2010; Inyama *et al*, 2011). Anecdotal evidence suggest that the utilization and adherence to the CAUTI bundle by nurses working at the CCUs in KNH is not up to the recommended gold standard hence the importance of the study.

2.2: Utilization of the CAUTI Bundle by Critical Care Nurses

A care bundle is a group of individual evidence based practice interventions that have been shown to reduce infections and improve patient outcomes. These actions and interventions may not always all be done consistently by nurses. Implementation of the CAUTI bundle is a gold standard and ensures consistency in evidence based patient care (Meddings *et al*, 2014; IHI, 2011).

To utilize the CAUTI bundle, the nurses should be knowledgeable of the bundle's existence and the current evidence based practices. Lack of knowledge especially on the maintenance bundle within the CCUs affect the nurses' ability to utilize and adhere to the bundle. A non-randomized control trial in 13 CCUs in Turkey had findings of reduction in CAUTI rates when the nurses were educated and became knowledgeable on the bundle. The nurses were provided with catheter bundling education which included anchoring the catheter, maintaining a closed drainage system, preventing kinks in the tubing, emptying the drainage bag frequently and meatal cleansing. Compliance was then monitored through daily observations of catheter care

and findings revealed a decrease in CAUTI prevalence rate (Leblebicioglu *et al*, 2013). There were inconsistencies in the nurses' knowledge regarding maintenance of indwelling urinary catheters in a study by Drenkoja *et al*. After reeducation and training, there was modest decrease in the number of inconsistencies in patient care (Drenkoja *et al*, 2010). Enhancing nursing knowledge is important as it is based on the utilization of nursing practices within the hospitals. This provides quality care that is safe and assists in the prevention of CAUTI (Brunett *et al*, 2010). It has been noted that there is lack of translating knowledge into practice (Dingwal & McLafferty, 2006).

According to the American Association of Critical-Care Nurses (ACCN), CAUTI is a nurse sensitive indicator. Training and education of nurses on evidence based practices and guidelines has impact on decreasing CAUTI rates. A study was conducted which had a statistically significant reduction in CAUTI rates from 12.3 to 1.8 per 1000 catheter days (Crouzet *et al*, 2007). Nurses should receive continuing medical education regarding the current evidence based practices as well as on the institutional policies regarding CAUTI prevention (Meddings *et al*, 2013). Catheter Associated Urinary Tract Infections (CAUTIs) are associated with infections that include sepsis, acute pyelonephritis and other adverse outcomes (APIC, 2008). In the USA, a study was conducted, where by a hospital completely revamped its policies and procedures related to the use of urinary catheters. There were 548 fewer CAUTIs in the year after intervention compared to the year preceding the intervention (Ribby K, 2006). Nurses caring for patients with urinary catheters require education on indwelling urinary catheter maintenance to adequately utilize the bundle.

2.3: Nursing Practice on Utilization and adherence to CAUTI Bundle

Urethral catheter predispose patients to CAUTI. This is by provoking inflammation and traumatizing the mucosa of the urethra and bladder neck. Inflammation and mechanical damage increase the risk of UTI and compromises the ability to mount an effective immune response to bacteria. Catheter care is completed primarily by the nursing staff hence the importance of prevention of CAUTI by bundle utilization (Blanck *et al*, 2014). The practices on the CAUTI prevention based on the elements of the maintenance bundle include maintenance of a closed drainage system, proper hand hygiene, daily meatal care, maintenance of an unobstructed urinary flow, emptying of the drainage bag with a clean and separate container for each patient, drainage bag maintenance and securing the urinary catheter to the thigh or abdomen. Utilization of this bundle reduces CAUTI, improves catheter care practices and spares hospitals millions of dollars.

The bundle was developed from a statewide initiative in Michigan and was adopted by the CDC as a gold standard of care of the catheterized patients (CDC, 2009).

Increased adherence to the recommended CAUTI bundle reduces CAUTI incidence. A study conducted on implementation and adherence to the maintenance bundle had findings of a significantly strong negative relationship between improvement in the rate bundle adherence and CAUTI prevalence rates (Amine *et al*, 2014). A similar study conducted in a rural hospital in Egypt had findings of reduction in the rate of CAUTI from 90.12 to 65.69 infections per 1000 catheter days on implementation and adherence to the CAUTI bundle elements. There was also an increase in the adherence to the maintenance bundle from 40 to 70%. Utilization and adherence to the recommended CAUTI bundle should become part of patient safety worldwide. Bacteria should be prevented from gaining access to the internal surface of the drainage system or urine. This is done by keeping the system closed and avoiding manipulation of the catheter with unclean and ungloved hands. Also, the drainage bag should be emptied with a clean and separate container for each patient.

Hand hygiene a crucial component of effective infection prevention. The healthcare professionals should ensure that they adhere to the five moments of hand hygiene. This ensures safety for the patient receiving care and for subsequent patients the nurse interacts with decreasing the risk of infection transmission to the population and the healthcare professionals (WHO, 2009). Routine meatal cleaning is necessary and should be performed at least twice daily or as needed for a patient with an indwelling urinary catheter. The CDC recommends the use of soap and water during meatal care.

Maintaining a closed urinary drainage system is important to prevent introduction of microorganisms. Bacteria are usually introduced when the closed drainage system is opened leading to internal or intraluminal accession of microorganisms increasing the risk of CAUTIs. Nurses should monitor the patency of the system to prevent pooling of urine within the tubing that cause urine backflow predisposing the patients to CAUTIs. Urine in the drainage bag is an excellent medium for microorganism growth, on this regard, every effort must be made to prevent microorganisms from gaining entry into the indwelling urinary catheter and the drainage system. Bacteria can travel up the drainage tubing to grow in pools of urine that can easily backflow to the bladder (Gould *et al*, 2009). There should be maintenance of an unobstructed urinary flow by keeping the catheter and collecting tube free from kinking (Gould *et al*, 2010).

Retrograde bacterial migration from the urine drainage bag outlet tube is a major source of bacterial contamination. A study by Maki *et al* found out that not allowing the drainage tubing to drop lower than the drainage bag was associated with a significantly increased risk of CAUTI (Maki *et al*, 2008). Drainage bags should be hung on the end of the bed with the tubing in a straight line, avoiding looping or kinking hence promoting unobstructed urine flow.

The drainage bag should be positioned below the level of the bladder to utilize gravity hence facilitating drainage. Correct positioning of the tubing should be by the use of a securement device or tape to facilitate drainage into the bag and prevent reflux of urine into the bladder (Titsworth *et al*, 2012) . It has been demonstrated that the use of a securement device to prevent movement of the catheter as the patient moves is effective in reducing CAUTI rates by 70% (Gould *et al*, 2009). Urinary catheters should be secured, though this is not routinely performed in practice. The CDC guidelines and standards have been put in place to ensure that catheters are secured to the thigh or abdomen (CDC, 2015). Unsecured urinary catheters have been reported to be leading to bleeding, trauma, pressure sores around the meatus and bladder spasms from pressure and traction (Hanchett M, 2002).

The drainage bag should be emptied regularly as a separate procedure into a clean container for each patient. The nurses should ensure that they avoid splashing urine and ensure that the drainage spigot does not come into contact with the non-sterile collecting container during emptying of the urine drainage bag (CDC, 2009). Urine collection containers should be disinfected after each use. The drainage bag should be emptied when half to two thirds full to avoid traction on the catheter from the weight of the drainage bag that can easily lead to urethral traction as well as CAUTI (Gould *et al*, 2010).

Assessment and auditing of adherence to all elements of the bundle should be done using a simple “yes” or “no” for each of the elements of the bundle. It is recommended that if all elements have been accomplished or an element was contraindicated, the bundle is counted as complete. In case any of the elements are absent, the bundle is incomplete since there is no partial credit. The goal of adherence to the bundle should be at 95% or greater since it’s measured as either 100% or 0%. To achieve 100% all the elements of the bundle must be implemented. This focuses attention on the importance of delivering all elements. Care bundle adherence allows measurement of target improvements and demonstrates adherence against key practices hence improving patient care (IHI, 2011).

Summary of literature review

| Author | Topic | Summary | Gaps |
|-----------------------------------|--|---|---|
| Saint <i>et al</i> , 2008 | A multicenter qualitative study on preventing Hospital Acquired UTI in the United States Hospitals. | Role of nurses in CAUTI Prevention. | Nurses did not utilize the bundle. |
| Meddings <i>et al</i> , 2014 | Reducing unnecessary urinary catheter use and strategies to prevent CAUTIs: An integrative review. | CAUTI Bundle as a gold standard in patient care. | No consistency in the utilization of the CAUTI bundle. |
| Leblebicioglu <i>et al</i> , 2015 | Impact of a multidimensional infection control approach on CAUTI rates in adult Intensive Care Units in 10 cities of Turkey. | Nursing education on CAUTI bundle. | Nurses became knowledgeable post education on the bundle utilization hence reducing CAUTI rates |
| Drenkoja <i>et al</i> , 2010 | Internet survey of foley catheter practices and knowledge among Minnesota nurses. | Nurses' knowledge on CAUTI bundle. | No transfer of knowledge into practice by nurses |
| Blank <i>et al</i> , 2010 | A Quasi experimental study to test a prevention bundle for CAUTIs. | CAUTI bundle utilization led to reduction of CAUTI by 50%. | Nil |
| Amine <i>et al</i> , 2014 | Evaluation of an intervention program to prevent Hospital Acquired CAUTIs in acute care hospitals: The bundle approach. | CAUTI bundle utilization led to reduction in CAUTI from 107.4 to 29.54 infections per 1000 catheter days. | Nil |
| Maki <i>et al</i> , 2008 | Engineering out the risk for infection with urinary catheters. | Kinked urinary drainage tubings led to urinary drainage obstruction hence causing retrograde bacterial migration hence CAUTI. | Bacterial contamination associated with significantly increased risk in CAUTI. |
| Gould <i>et al</i> , 2009 | Guideline for prevention of CAUTIs. | Securement of the catheters reduces movement hence inflammation and CAUTI | No routine securement of catheters |

2.4: Theoretical Framework

This research adopted *the Donabedian's model of healthcare*. This model allows for conceptualization of the underlying mechanisms that may contribute to poor quality of care in patients. The model was developed to assess the quality of care in clinical practice and is composed of three categories which are the structure, process and outcome. Each of the categories represents information that may be collected to draw inferences about the quality of care in a given system (Dimick C, 2010). It is a useful framework for quality assessment of healthcare services and evaluating the quality of healthcare provided since improvement in the structure of care should lead to improvements in clinical processes that should in turn improve patient outcome.

The structure is composed of the settings where care is delivered, staff credentials, ratios & training, facility operating capacities, environment, hospital buildings, financing and equipment. Healthcare institutions should ensure that those who take care of the catheterized patients especially the nurses are trained and competent in the utilization of the CAUTI bundle. The process is the transactions between patients and health care providers. This reflects the procedures such as maintenance of indwelling urinary catheters and captures the timeliness and accuracy in diagnosis and prevention of complications such as CAUTI. While applying **the process**, information is obtained from medical records, interviews with patients and practitioners or direct observations of healthcare delivery procedures and skills. The nurses should be audited frequently on utilization of CAUTI bundle. There should be protocols to guide prevention of CAUTI. The process also measures the quality of care given to the patients. **The outcome** is the effect of healthcare on the health status which includes the changes in individuals and population such as morbidity, mortality, hospital stay and additional costs. The outcome tracks the desired states resulting from care processes as effects of healthcare on patients. The nurses should ensure that they utilize the CAUTI bundles so as to reduce or eliminate the occurrence of CAUTI (Dimick C, 2010).

This model was selected for the study because it has direct association with the development of catheter associated urinary tract infections hence the nurses' role in prevention of the infection with good utilization of the structure and process leading to prevention of the outcome being the CAUTI.

2.5: Conceptual Framework

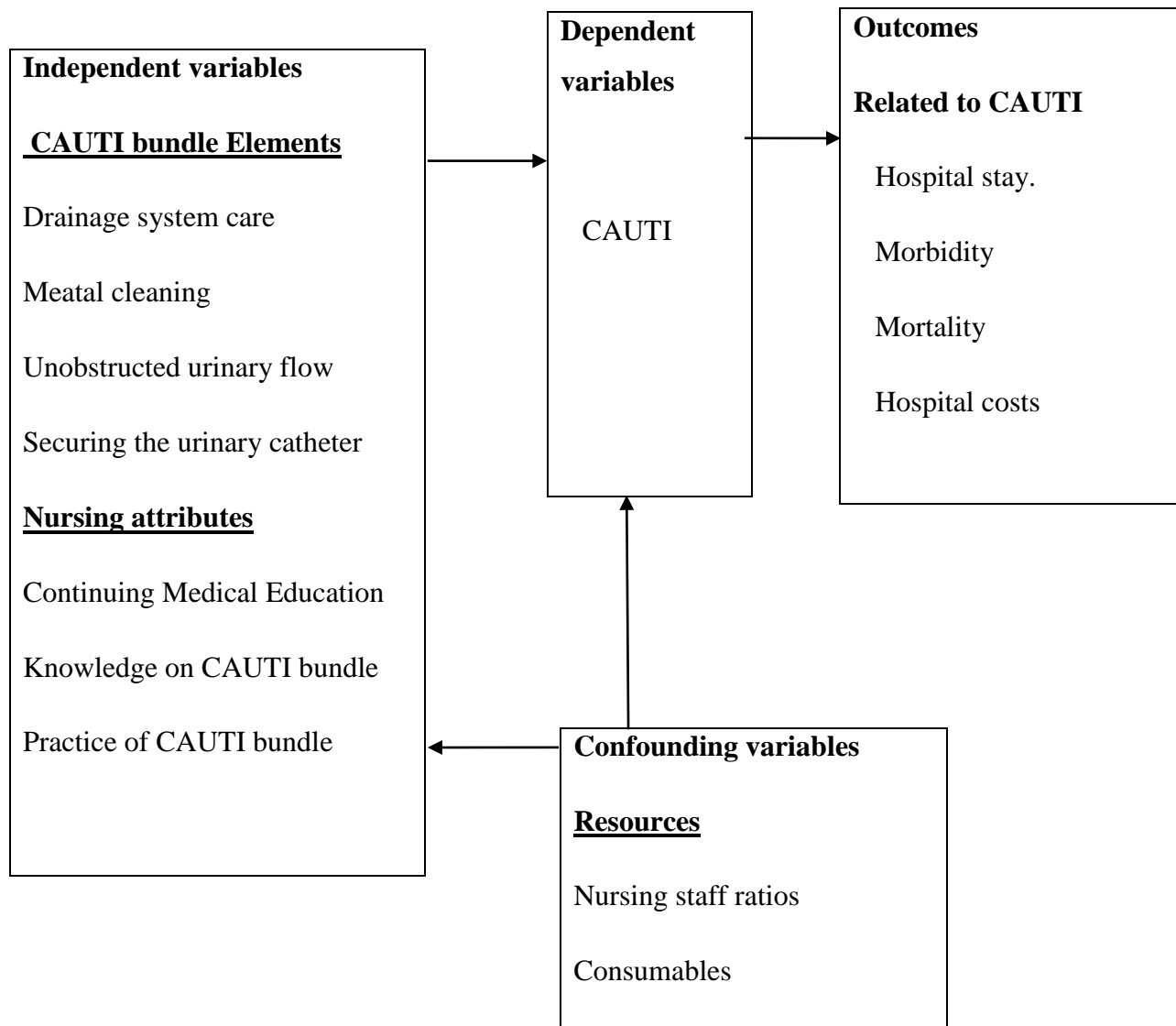


Figure 1: Conceptual Framework

CHAPTER THREE: METHODS

3.1: Introduction

This chapter highlights the research process and method of data analysis.

3.2: Study Design

This was a descriptive cross-sectional study. The researcher did not interfere with the study participants and was examining the relationship between the study variables as they existed in the population. This was done at a single point in time. The researcher was also interested in the characteristics of the population under study and finding out about the association and relationship between the variables.

3.3: Study Area/Site

The study was conducted at Kenyatta National Hospital's (KNH) Critical Care Units (CCUs). Currently the hospital has a bed capacity of 1800 with over 6000 staff and is the largest teaching and referral hospital in East Africa as well as a research center. The hospital is situated about 3 kilometers from Nairobi city center.

Kenyatta National Hospital has various departments. The medicine department has various units among them specialized units under which there is the critical care unit with its satellite units. KNH has a main CCU which is located on the first floor and is close to special units being the theatre, burns, renal and cardiac. The hospital also has satellite critical care units which are cardiothoracic, neurosurgical and acute care. The units are multidisciplinary admitting patients of different ages with various conditions such as medical, surgical and obstetrical emergencies. There are mixed disciplines within the unit being the doctors, nurses, physiotherapists, psychologists and social workers.

Currently the bed capacity within these critical care units is 36. The main critical care unit has 21 beds where patients with any condition requiring critical care are admitted. Acute care critical unit is located within the accident and emergency department and has 5 beds admitting patients with emergency cases within the accident and emergency department requiring critical care services. The cardiothoracic critical care unit is located on the fourth floor and has 5 beds admitting patients with various cardiac conditions and post cardiothoracic surgeries. The neurosurgical critical care unit has 5 beds admitting patients with neurological conditions as well as post neurosurgical surgeries. The bed occupancy within these units is 100% with a nursing

ratio of 2 nurses for every 3 patients. The total number of nurses who are working in these units on permanent employment according to the off duty roster is 136 (Umani K, 2014; KNH, 2016).

3.4: Study Population

This consisted of the nurses who were employed on permanent basis at Kenyatta National Hospital and were working within the Critical Care Units. There were 136 registered nurses on permanent employment which consisted of the population.

3.4.1: Inclusion criteria

- a) Nurses who were on permanent employment and working at KNH's CCUs. This is because the nurses on permanent employment are responsible and accountable for the direct care of the patients. They mentor and guide other nurses being those on temporary employment as well as the student nurses whom they work with. Hence, they are at a better position to provide information regarding the standardized care within these units and utilization of the policies. The nurses who are on temporary employment are under guidance of those who are permanently employed, this is because they are better placed knowledge on policies and procedures.
- b) Consenting nurses.
- c) Nurses eligible and available to participate in the study.

3.4.2: Exclusion criteria

- a) Non-consenting nurses working in the Critical Care Units on permanent basis.
- b) Nurses working in the critical care units on permanent employment but were on leave.
- c) Nurses on part-time employment – these nurses are under the direct supervision and mentorship of the permanently employed nurses who ensure that care is provided as per the hospital policies.
- d) Student nurses working in the Critical Care Units – these students are under supervision and mentorship of the permanently employed nurses.

3.5: Sample Size Determination

The sample size was calculated using Cochran's formula (Cochran 1963:75) to obtain a sample size that is best representative of the population.

$$n = \frac{Z^2 pq}{e^2}$$

Where: n = sample size

Z^2 = value for the selected alpha level (1.96 at 95% confidence level)

e= desired level of precision (5%)

p= estimated proportion of an attribute that is present in the population (estimated adherence to the CAUTI prevention care bundle - 70% (Amine *et al*, 2014))

q= 1-p

$$n = \frac{1.96^2 \times 0.7 \times 0.3}{0.05^2} \quad n = 323$$

If the population is small then the sample size is calculated using the correction formula:

$$n_f = \frac{n}{1 + \frac{(n - 1)}{N}}$$

Where: n_f = adjusted sample size

N= population size (the number of nurses on permanent employment working in the critical care units from the off duty roster – 136)

$$n_f = \frac{323}{1 + \frac{(323 - 1)}{136}} = 95$$

Hence the sample size was 95.

3.6: Sampling Technique

The study participants were first clustered into their respective critical care units being the main, cardiothoracic, neurosurgical and acute care. Systematic random sampling was then used to get the required sample size from each cluster. The sampling interval was 2. By use of the off duty roster, every second nurse on the list was included in the study and the population had an equal chance to participate in the study.

3.7: Data Collection Method

Data was collected using administered structured questionnaires (Appendix 1) to collect data on knowledge on the bundle and the reported level of utilization of the bundle. Observation checklist (Appendix 2) was also used to identify the observed utilization of the bundle elements.

3.7.1: Recruitment and training of research assistants

Two research assistants were recruited from the nurses working within the CCUs to assist in data collection. They were trained on the study instruments for a day so as to standardize the data collection process.

3.7.2: Study instruments

Structured Questionnaires (Appendix 1)

Self-administered structured questionnaires were used to collect data. The questions were in the form of closed ended and Likert scale with specific focus on the nurses' demographic data, practices and utilization of the CAUTI bundle within the units. These included hand hygiene, catheter securement, maintaining an intact seal, meatal care, care of the drainage bag and maintenance of an unobstructed urinary flow. The questions also explored the various challenges that nurses faced on utilization of the bundle.

Observational Checklist (Appendix 2)

The study also entailed the use of observation checklist to rate the various observed practices related to utilization of the elements of the CAUTI bundle. These included hand hygiene, catheter securement, maintaining an intact seal, meatal care, care of the drainage bag and maintenance of an unobstructed urinary flow. These data was collected by participant observation. The approach was based on a 'yes' or 'no' answer on the specific bundle elements. The observation was done three times as the participants cared for catheterized patients during

their shifts. This was to take care of the Hawthorne effect of which the participants would easily change practice with a single observation. The observation checklist was adopted and modified from the Comprehensive Unit-based Safety Program (CUSP): stop CAUTI supplement (APIC, 2014).

3.7.3: Pretesting of the study instruments

The study instruments were pretested at KNH's acute care CCU in the accident and emergency department. The pretest focused on checking the validity and reliability of the study instruments. The pretest was carried out on 10 participants who covered 10% of the sample size.

3.7.4: Recruitment, consenting and data collection procedure

Permission to conduct the study at KNH was sought from the hospital authority upon clearance by the Kenyatta National Hospital – University of Nairobi Ethics and Research Committee (KNH-UoN ERC). The head of critical care department was then approached and informed of the study who gave permission for the study to be conducted. The nurses in charge of the specific units were also informed of the study to allow the study participants to participate. The study participants were approached during the shift change over time. Those who were eligible to participate in the study were explained to the aim and the procedure of the study. They were also given an explanation on the benefits and consequences of participating in the study in details. They then gave consent after being taken through the consent form to enhance their comprehension and understanding of the intended study (Appendix 3). This was done on a voluntary basis from those who were eligible.

Data collection was done upon obtaining consent. The study participants were first observed as they rendered care to the catheterized patients. The observation was structured whereby an observation checklist was used with specific variables derived from the elements of the CAUTI maintenance bundle (Appendix 2). The study participants were observed at three different encounters during their shifts. Then the structured questionnaires were administered to the study participants to fill (Appendix 1). This was used to collect reported data related to their utilization of the CAUTI bundle. The reason of collecting data on observation before filling in the questionnaires was to prevent change in practice by the study participants. These participants would change practice based on information in the questionnaires when they filled the questionnaires before being observed.

3.8: Data Analysis and Management

3.8.1: Data cleaning and entry and storage

The data collected was then counterchecked for complete entry, coded, edited for accuracy and then entered into Statistical Package for Social Sciences (SPSS) version 21.0. All the raw data was stored in box files which were kept under key and lock and in firewall and password protected computers.

3.8.2: Data analysis

Analysis of the cleaned data was by use of SPSS version 21. The data was analyzed by both descriptive and inferential statistics for the quantitative data and manually for the qualitative data. Descriptive statistics was done for the socio-demographic characteristics and knowledge on the bundle. Manual analysis was done for both observed & reported bundle utilization, challenges to bundle utilization and bundle adherence. Inferential statistics was done for the relationship between the socio-demographic characteristics & bundle utilization, relationship between bundle utilization & knowledge, relationship between audit conduction & bundle utilization and correlation between the observed & reported bundle utilization. Data was presented in the form of frequency distribution tables and figures. Pearson's correlation and chi-square test were used to find the correlation and relationship between the observed with the reported practices on utilization of the CAUTI bundle.

3.9: Benefits of the Study

It is expected that these findings will be helpful in designing educational programs especially in the CCUs on preventing CAUTIs. The findings may also be utilized by key policy makers and the critical care unit team to improve on utilization of the bundle and eventually reduce the incidences of CAUTI.

Study Limitations and Delimitations

Hawarthone effect which was counteracted by performing three observations before administration of questionnaires and debriefing. The researcher was also a participant in the care of the patients during the study period.

3.10: Ethical Consideration

The study was conducted following approval by the Kenyatta National Hospital/University of Nairobi Ethics and Research Committee (KNH/UON ERC). Authority to conduct the study was sought from Kenyatta National Hospital's Research & Programs department. The Critical Care department and nurse in-charges of the critical care units gave permission for the study to be conducted. The study was registered by the Kenyatta National Hospital-University of Nairobi and Research Committee (KNH-UoN ERC) registration number P192/03/2016 and the Kenyatta National Hospital's Research and Programs Department registration number CCU/23/2016.

Written consent was individually obtained from every study participant and none participated without a signed consent form. Consent for participation in the study was sought from the nurses who were also informed of the benefits and implications of participating in the study. A signature was accepted as proof of voluntary consent. The participants were free to withdraw from the study at any stage of the study.

Confidentiality & anonymity was guaranteed and maintained throughout the study period. The questionnaires were coded instead of using names. The observational checklists that were used also did not have any name on them but instead had numbers that correlated to the questionnaires. All the questionnaires and observational checklists that were filed and kept confidential throughout the study period. This was under key and lock and in password and firewall protected computers.

This study was undertaken in partial fulfilment of a Master of Science in Nursing (Critical Care Nursing). The findings will be discussed first with the academic staff and fellow students at the school. They will also be shared with the nursing officers at the CCUs and the hospital authority. The findings will also be published and shared with other researchers and institutions of higher learning. The thesis will be stored in the university libraries for future references.

CHAPTER FOUR: RESULTS

4.1: Introduction

This chapter entails the findings of the study which are interpreted based on the study objectives. The data was collected at KNH from 95 nurses working in the Critical Care Units giving a response rate of 100%.

4.2: Socio-demographic Characteristics

Majority of the participants that is 71% (67) were females while 29% (28) were males. Forty two point one percent (40) of the participants were 30 to 39 years, 34.7% (33) were 40 to 49 years, 17.9% (17) were 20 to 29 years and 5.3% (5) were 50 to 59 years. The participants who were higher diploma holders were 53.7% (51), diploma holders were 22.1% (21), bachelor's degree holders were 23.2% (22) and only 1.1% (1) master in nursing degree holder. The participants who had critical care nursing training were 70% (68) with 22% (21) having accident and emergency training and 6% (6) not having any specialty training. The participants who had 1 to 5 years of experience were 34.7% (35), 31.6% (30) had 6 to 10 years of experience and 16.8% (16) had more than 10 years of experience while 14.7% (14) had less than one year of experience in the critical care unit. Table 1 illustrates findings of the demographic characteristics of the participants.

Table 1: Socio-demographic Characteristics

| Characteristic | Frequency (n) | Percentage (%) |
|--|-----------------------|-----------------------|
| <i>Gender</i> | | |
| Male | 28 | 29 |
| Female | 67 | 71 |
| <i>Age in Years</i> | | |
| 20 – 29 | 17 | 17.9 |
| 30 – 39 | 40 | 42.1 |
| 40 – 49 | 33 | 34.7 |
| 50 – 59 | 5 | 5.3 |
| Above 60 | 0 | 0 |
| The mean age was 37.2, median 37.6, mode 37.7 and standard deviation 7.5. | | |
| <i>Level of Education</i> | | |
| Diploma | 21 | 22.1 |
| Higher Diploma | 51 | 53.6 |
| Degree | 22 | 23.2 |
| Masters | 1 | 1.1 |
| <i>Specialty Training</i> | | |
| Critical Care Nursing | 68 | 72 |
| Accident and Emergency Nursing | 21 | 22 |
| None | 6 | 6 |
| <i>Years of Experience</i> | | |
| Less than 1 Year | 14 | 14.7 |
| 1 – 5 Years | 35 | 36.8 |
| 6 – 10 Years | 30 | 31.6 |
| More than 10 Years | 16 | 16.9 |

The mean was 6.2, median 5.8, mode 1.81 and standard deviation 4.76.

The participants' cadre

The cadre distribution was 35% (33) of the participants being Senior Nursing Officers (SNO), Nursing Officer II (NO II) were 31% (30), Nursing Officer III (NO III) were 18% (17) and Nursing Officer I (NO I) were 16% (15) as shown in Figure 2.

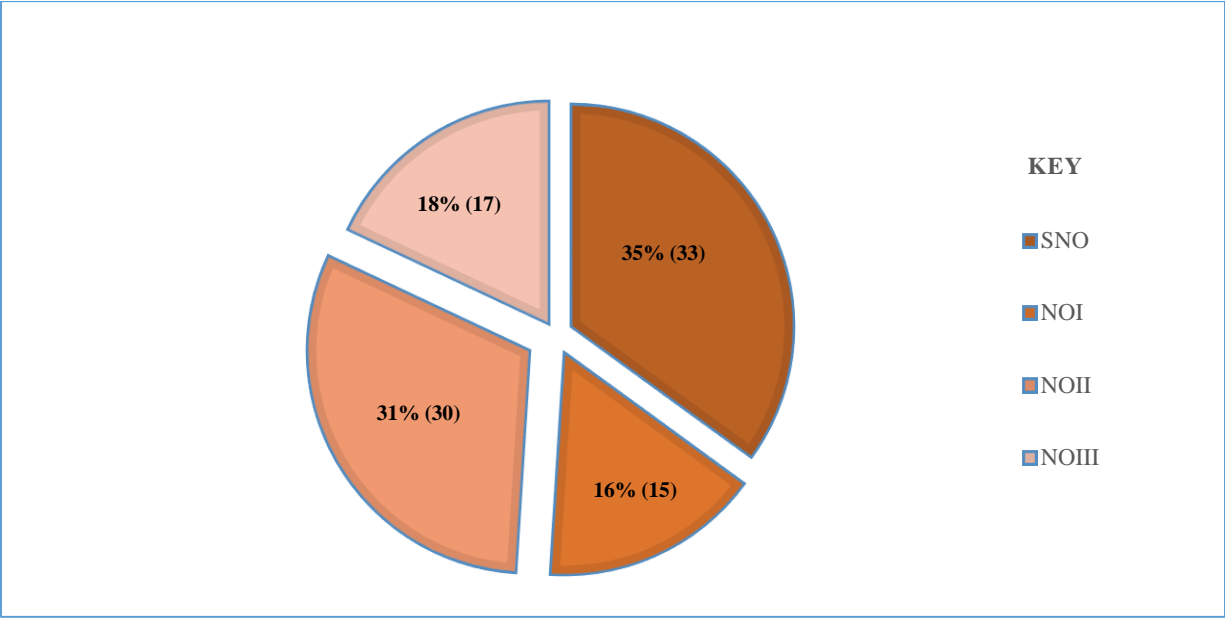


Figure 2: Participants' cadre

4.3: Utilization of CAUTI Bundle

4.3.1: Knowledge on the bundle

a) General knowledge

The participants were asked to respond to either “yes” or “no” on specific questions pertaining to the CAUTI prevention care bundle knowledge. The responses are as shown in Table 2. Fifty three (55.8%) of the participants knew about the bundle and 48.4% (46) had knowledge on the elements of the bundle. Forty three (45.3%) reported to be utilizing the bundle while 81.1% (77) reported that they were not audited on the utilization of the bundle.

Table 2: General Knowledge on the bundle

| Statement | Response | Frequency (n) | Percentage (%) |
|---|------------|---------------|----------------|
| Knowledge on the CAUTI bundle | Yes | 53 | 55.8 |
| | No | 42 | 44.2 |
| Aware of the elements of the CAUTI bundle | Yes | 46 | 48.4 |
| | No | 49 | 51.6 |
| Utilize the CAUTI prevention care bundle in your unit | Yes | 43 | 45.3 |
| | No | 52 | 54.7 |
| Audited on the utilization of the CAUTI bundle | Yes | 18 | 18.9 |
| | No | 77 | 81.1 |

Interpretation: half of the participants had knowledge on the bundle with three quarters indicating that they were audited on the bundle.

b) Knowledge on bundle utilization

A five Likert scale was used to collect data on the knowledge on bundle utilization and the findings were as shown in Table 3. From the results, majority of the participants strongly agreed with the listed practices. That is 91.6% (87) on hand hygiene being performed for every patient contact, 84.2% (84) on maintaining a closed drainage system, emptying the drainage bag with a clean container for each patient at 72.6% (69) and drainage bag not touching the floor at 87.4% (83). On maintenance of an unobstructed urinary flow, 72.6% (69) strongly agreed with 71.6% (68) strongly agreeing on securing the urethral catheter.

It was noted that none of the participants reported that they strongly disagreed with any of the listed practices. The response on strongly disagreed was therefore omitted from the table.

Table 3: Knowledge on utilization of the CAUTI bundle

| Practice on maintenance bundle | Responses | | | |
|---|-----------------------------|--------------------|------------------------|-----------------------|
| | Strongly Agree % (n) | Agree % (n) | Undecided % (n) | Disagree % (n) |
| Hand hygiene should be performed for every patient contact | 91.6(87) | 8.4(8) | 0(0) | 0(0) |
| A closed drainage system should be maintained always | 84.2(84) | 14.7(21) | 1.1(1) | 0(0) |
| When there is a break in the closed drainage system, the whole system should be changed aseptically | 67.4(64) | 27.4(26) | 4.2(4) | 1.1(1) |
| Drainage bag should be emptied using a clean and separate container for each patient | 72.6(69) | 22.1(21) | 2.1(2) | 3.2(3) |
| Drainage bag should not touch the floor or surfaces | 87.4(83) | 11.6(11) | 0(0) | 1.1(1) |
| There should be maintenance of an unobstructed urinary flow | 72.6(69) | 25.3(24) | 1.1(1) | 1.1(1) |
| Indwelling urinary catheters should be secured | 71.6(68) | 26.3(25) | 2.1(2) | 0(0) |
| There should be initiatives on reminding colleagues and doctors on catheter removal | 71.6(68) | 28.4(27) | 0(0) | 0(0) |
| CCU's should have daily checklists for CAUTI maintenance bundle | 69.5(66) | 29.5(28) | 1.1(1) | 0(0) |

Interpretation: Most of the participants strongly agreed on the listed practices of bundle knowledge.

c) Knowledge on emptying of the urine drainage bag

The participants were asked the extent to which they agreed with when the urine drainage bags should be emptied using a five Likert scale. Most of the participants that is 72.6% (69) strongly agreed on emptying when necessary. It was also noted that the participants also strongly agreed on other aspects being, 31.6% (30) at the end of the shift, 13.7% (13) when half full and 30.5% (29) when full. However, there were varied responses as shown in Table 4.

Table 4: Emptying of the urine drainage bag

| When to empty drainage urine bag | Strongly agree % (n) | Agree % (n) | Undecided % (n) | Disagree % (n) | Strongly disagree % (n) |
|---|-----------------------------|--------------------|------------------------|-----------------------|--------------------------------|
| Full | 30.5(29) | 17.9(17) | 4.2(4) | 24.2(23) | 23.2(22) |
| Half full | 13.7(13) | 32.6(31) | 10.5(10) | 27.4(26) | 15.8(15) |
| At the end of the shift | 31.6(30) | 26.3(25) | 2.1(2) | 21.1(20) | 18.9(18) |
| When necessary | 72.6(69) | 16.8(16) | 2.1(2) | 1.1(1) | 6.3(6) |

Interpretation: The participants strongly agreed on the listed options of drainage bag emptying though drainage bag should be emptied when necessary.

4.3.2: Utilization of the CAUTI bundle

a) Reported utilization of the CAUTI bundle

The participants were asked to respond to “yes” for the performed or “no” for not performed practices regarding the utilization of the CAUTI bundle. The responses are as shown in Table 5. From the results, with the exception of maintaining an intact tamper evident seal that was at 58.9% (56), all the others were reported to be utilized by more than 80% (76) of the participants. It was noted that 96.8% (92) of the participants reported to ensuring that the urine drainage bags were not touching the floor.

Table 5: Reported Utilization of the CAUTI bundle

| Bundle Element | Yes %(n) | No %(n) |
|--|---------------------|--------------------|
| Maintaining an intact seal | 58.9(56) | 41.1(39) |
| Securing the catheter | 85.3(81) | 14.7(14) |
| Hand hygiene with every patient contact | 92.6(88) | 7.4(7) |
| Daily meatal care | 84.2(80) | 15.8(15) |
| Emptying the drainage bag with a clean container | 88.4(84) | 11.6(11) |
| Ensuring that the drainage bag is not overfilled | 90.5(86) | 9.5(9) |
| Ensuring that the drainage bag is not touching the floor | 96.8(92) | 3.2(3) |
| Maintaining an unobstructed urinary flow | 93.7(89) | 6.3(6) |

Interpretation: More than 80% of the participants reported to be practicing the bundle.

b) Observed utilization of the CAUTI bundle

The participants were observed using an observation checklist as they rendered care to the patients based on the utilization of the CAUTI bundle. Three observations were made to ascertain the actual practice on the elements. Average observation for each and every element was then calculated. This was based on three observations of which if a participant was observed to be utilizing the element two times out of the three observations, then the individual got a yes and vice versa.

Table 6 illustrates the results from the observed practices. It was observed that most of the participants did not practice the reported elements apart from 93% (88) who ensured that the urine drainage bags were not touching the floor and 82.1% (78) who ensured that the urine drainage bags were not overfilled while 100% (95) maintained an intact tamper evident seal. It was also noted that only 2.1% (2) had secured the patients' catheters and 22.1% (21) performed hand hygiene with every patient contact.

Table 6: Observed Utilization of the Bundle

| Bundle Element | Response | Episodes of encounter | | | Average % (n) |
|--|----------|-----------------------|-----------------------|-----------------------|-----------------|
| | | 1 st % (n) | 2 nd % (n) | 3 rd % (n) | |
| Maintaining an intact seal | Yes | 100(95) | 100(95) | 100(95) | 100(95) |
| | No | 0(0) | 0(0) | 0(0) | 0(0) |
| Securing the catheter | Yes | 97.8(93) | 2.2(2) | 2.2(2) | 2.1(2) |
| | No | 2.2 (2) | 97.8(93) | 97.8(93) | 97.8(93) |
| Hand hygiene with every patient contact | Yes | 41.1 (39) | 11.6(11) | 13.7(13) | 22.1(21) |
| | No | 58.9 (56) | 88.4 (84) | 86.3(82) | 77.9(93) |
| Daily meatal care | Yes | 91.6 (87) | 6.3 (6) | 7.4(7) | 35.1(33) |
| | No | 8.4 (8) | 93.7 (89) | 92.6(93) | 64.9(62) |
| Emptying the drainage bag with a clean container | Yes | 34.7 (33) | 8.4 (8) | 9.5(9) | 17.5(17) |
| | No | 65.3 (62) | 91.6 (87) | 90.5(86) | 82.5(78) |
| Ensuring that the drainage bag is not overfilled | Yes | 98.9 (94) | 80.0 (76) | 67.4(64) | 82.1(78) |
| | No | 1.1 (1) | 20.0 (19) | 32.6(31) | 17.9(22) |
| Ensuring that the drainage bag is not touching the floor | Yes | 93.7 (89) | 92.6 (88) | 92.6(88) | 93(88) |
| | No | 6.3 (6) | 7.4 (7) | 7.4(7) | 7(7) |
| Maintaining an unobstructed urinary flow | Yes | 51.6 (49) | 38.9 (37) | 42.1(40) | 44.2 (42) |
| | No | 48.4 (46) | 61.1(58) | 57.9(55) | 55.8(53) |

Interpretation: Most of the bundle elements were poorly utilized on observation with some being utilized by less than 50% of the participants.

c) Meatal care

The participants were asked how often they performed meatal care. Sixty four (67.4%) of the respondents reported to be performing meatal care with every care and when the patient had incontinence. However, 27.4% (26) reported to be performing meatal care once per shift with 5.3% (5) not performing meatal care as shown in Figure 3.

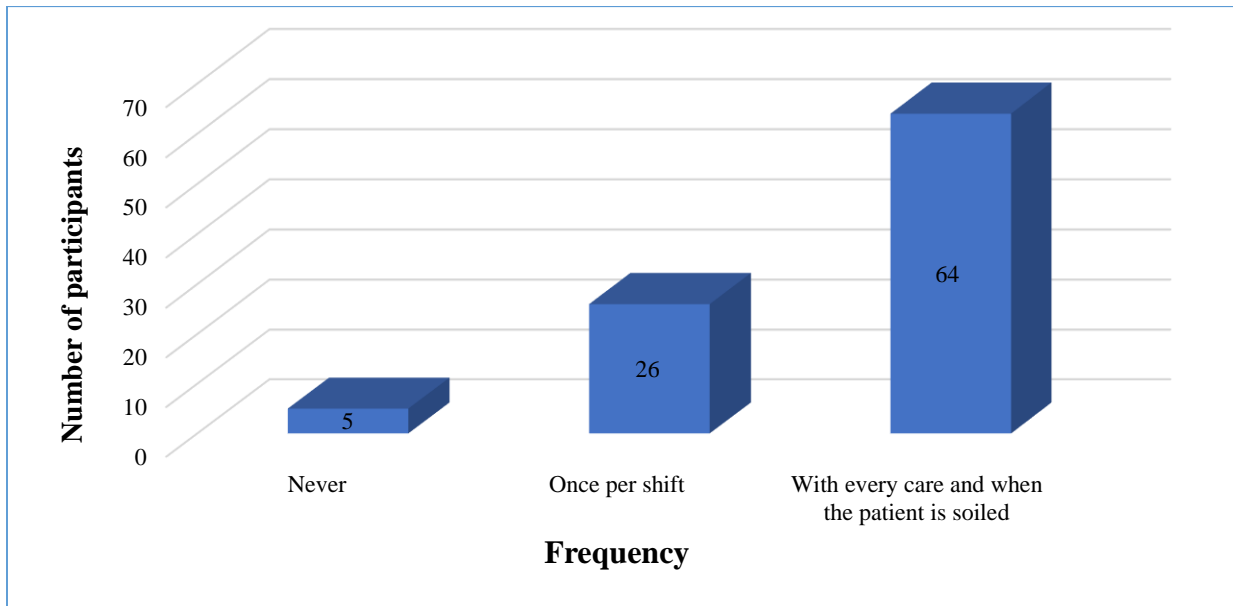


Figure 3: Meatal care frequency

d) Solution used for meatal care

Forty three (45%) of the respondents reported to be using antiseptic solution with 28% (27) using plain water and 27% (25) using soap and water as shown in Figure 4.

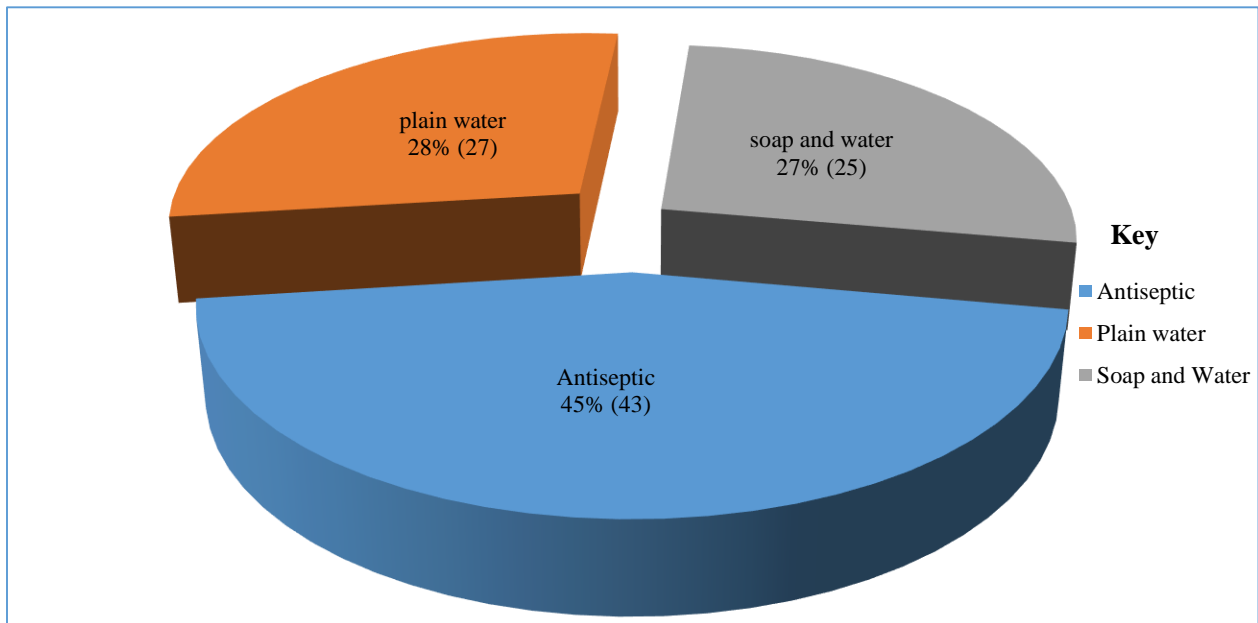


Figure 4: Solution used for meatal care

4.4: Adherence to the CAUTI bundle

4.4.1: Introduction

Assessment of adherence to all elements of the bundle was done using a simple “yes” or “no” for each of the elements of the bundle. If all elements had been accomplished or an element was contraindicated, the bundle was counted as complete. If any of the elements were absent, the bundle was incomplete since there was no partial credit. The goal of adherence to the bundle was 95% or greater since it was measured as either 100% or 0%. To achieve 100% all the elements of the bundle were to be implemented. Hence, a score of 95 or above was rated as acceptable with that which was less than 95% was unacceptable. Bundle adherence was used as a measurement of target improvements and demonstrated adherence against key practices hence improving patient care (IHI, 2011).

Table 7: Adherence to the bundle

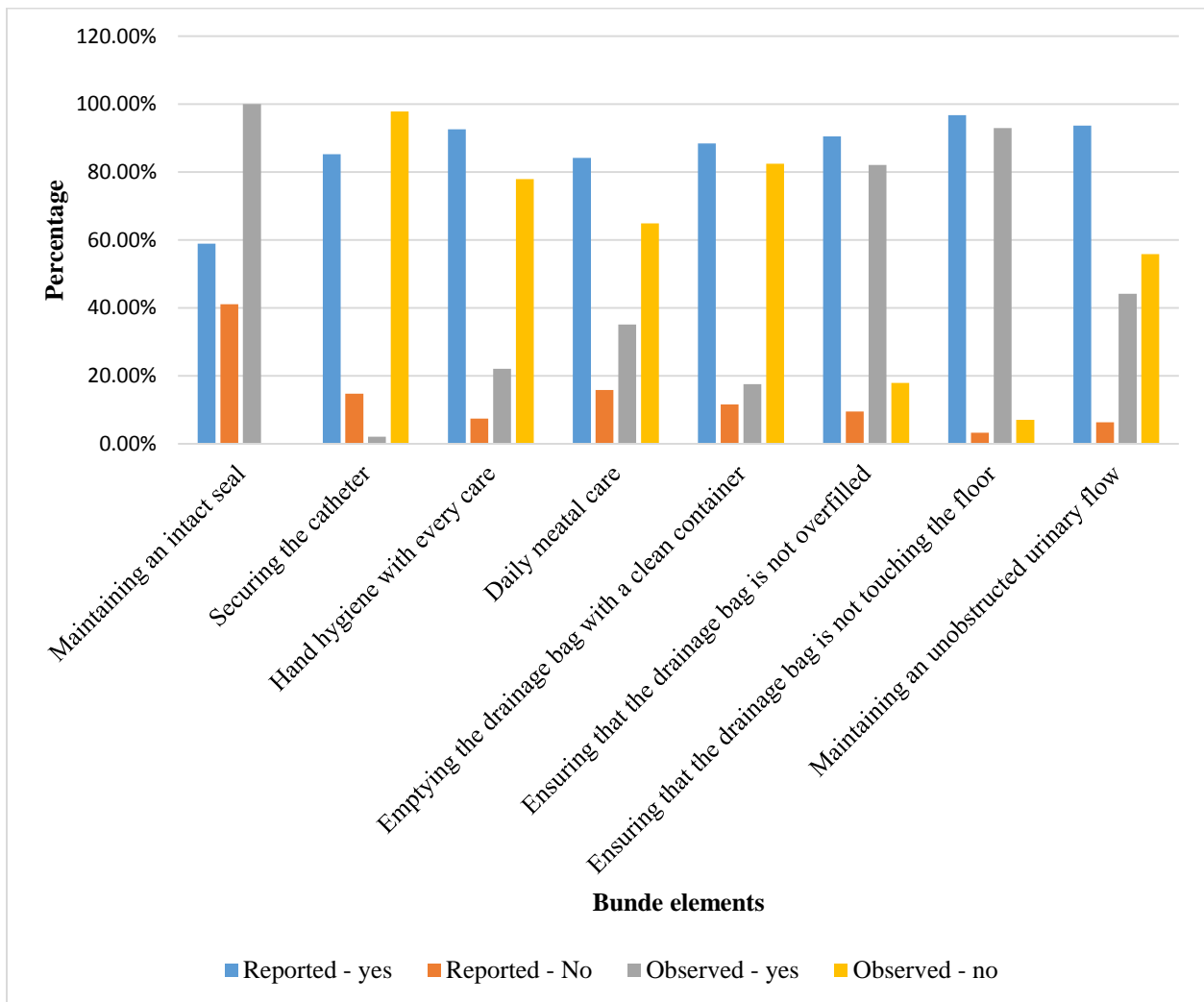
| Bundle criteria element | Average observed practice | |
|--|---------------------------|-------------|
| | n | % |
| Maintaining the tamper evident seal intact | 95 | 100 |
| Securing the catheter | 2 | 2.1 |
| Hand hygiene with every patient contact | 21 | 22.1 |
| Daily meatal care | 33 | 35.1 |
| Emptying the drainage bag with a clean container | 17 | 17.5 |
| Ensuring that the drainage bag is not overfilled | 78 | 82.1 |
| Ensuring that the drainage bag is not touching the floor | 88 | 93 |
| Maintaining an unobstructed urinary flow | 42 | 44.2 |
| Average bundle adherence | 95 | 49.5 |

Interpretation: The participants adhered to the bundle at 49.5%.

4.4.2: Comparison between the reported and observed bundle utilization

A comparison was made between the reported and observed bundle utilization. It was noted that most of the participants that is 80% (72) reported to be utilizing the bundle elements. This was compared to what was actually practiced and there was a difference since most of the elements were not performed as required compared to the reported values as shown in Table 8.

Table 8: Comparison between the observed and reported bundle utilization



4.4.3: Relationship between demographic characteristics and bundle utilization

Odds ratio was done to determine the association between the demographic characteristics and bundle utilization. There was no significant association between the utilization of the bundle and the respondents’ demographic characteristics (all $p > 0.05$) as shown in Table 9.

Table 9: Relationship between the demographic characteristics and bundle utilization

| Characteristic | Utilization of the bundle | | OR | 95% CI | | X ² value (df) | X ² Test (p-value) |
|-----------------------------|---------------------------|----------|------|-------------|-------------|---------------------------|-------------------------------|
| | Yes | No | | Lower Limit | Upper Limit | | |
| Age in years | | | | | | | |
| 20-29 | 7(41.2) | 10(58.8) | 1.0 | | | 0.32(3) | 0.957 |
| 30-39 | 19(47.5) | 21(52.5) | 1.29 | 0.36 | 4.86 | | |
| 40-49 | 14(42.4) | 19(57.6) | 1.05 | 0.28 | 4.14 | | |
| 50-59 | 2(40) | 3(60) | 0.95 | 0.1 | 10.85 | | |
| Sex | | | | | | | |
| Male | 11(39.3) | 17(60.7) | 1.0 | | | 0.39(1) | 0.532 |
| Female | 31(46.3) | 36(53.7) | 1.33 | 0.5 | 3.65 | | |
| Specialty in nursing | | | | | | | |
| Critical Care | 9(42.9) | 12(57.1) | 1.0 | | | 0.1(2) | 0.952 |
| Accident and Emergency | 30(44.1) | 38(55.9) | 1.05 | 0.35 | 3.24 | | |
| None | 3(50) | 3(50) | 1.33 | 0.14 | 12.4 | | |
| Years of experience | | | | | | | |
| Less than 1 | 3(21.4) | 11(78.6) | 1.0 | | | 6.48(3) | 0.09 |
| 1 – 5 | 20(57.1) | 15(42.9) | 4.89 | 1.0 | 31.1 | | |
| 6 – 10 | 14(46.7) | 16(53.3) | 3.21 | 0.64 | 21 | | |
| >10 | 5(31.3) | 11(68.8) | 1.67 | 0.24 | 13.2 | | |
| Cadre | | | | | | | |
| NOIII | 7(41.2) | 10(58.8) | 1.0 | | | 2.97(3) | 0.397 |
| NOII | 16(53.3) | 14(46.7) | 1.63 | 0.42 | 6.5 | | |
| NOI | 4(26.7) | 11(73.3) | 0.52 | 0.1 | 2.88 | | |
| SNO | 15(45.5) | 18(54.6) | 1.52 | 0.4 | 7.0 | | |

4.4.4: Relationship between utilization and knowledge on the bundle

Odds ratio was done to ascertain the relationship between bundle utilization and knowledge. The participants who had knowledge on the bundle utilized it 24.1 times more than those who did not know of the bundle [OR 24.1; 95% CI 6.7 - 104; P < 0.01]. Utilization of the bundle was 36.2 times higher among the participants who knew about the bundle elements [OR 36.2; 95% CI 9.98 - 144; p < 0.001] as illustrated in Table 10.

Table 10: Cross tabulation between utilization and knowledge on the bundle

| Variable | Do you utilize the CAUTI bundle in your unit? | | OR | 95% CI | | X ² Value (df) | X ² Test (p-Value) |
|---|---|----------|------|-------------|-------------|---------------------------|-------------------------------|
| | Yes | No | | Lower limit | Upper limit | | |
| Do you know the CAUTI bundle? | | | | | | | |
| No | 4(9.5) | 38(90.5) | 1.0 | | | | |
| Yes | 38(71.7) | 15(28.3) | 24.1 | 6.7 | 104 | 36.72(1) | <0.001 |
| Are you aware of the elements of the CAUTI bundle? | | | | | | | |
| No | 5(10.2) | 44(89.8) | 1.0 | | | | |
| Yes | 37(80.4) | 9(19.6) | 36.2 | 9.98 | 144 | 47.45(1) | <0.001 |

4.4.5: Comparison between performance of audits on the bundle and its utilization

Chi-square test was done to determine the association between performance of audits and bundle utilization. There was a significant association between the performance of audits in the units and the reported utilization of CAUTI bundles [$X^2 (1, 95) 17.97 P < 0.001$] as shown in Table 11.

Table 11: Cross tabulation between performance of audits and bundle utilization

| | Audits done on CAUTI utilization | | X ² Value | df | X ² test (P value) |
|--|----------------------------------|----------|----------------------|----|-------------------------------|
| | Yes | No | | | |
| Do you utilize the CAUTI bundle in your unit? | | | | | |
| No | 2(3.8) | 51(96.2) | | | |
| Yes | 16(38.1) | 26(61.9) | 17.97 | 1 | <0.001 |

4.5: Correlation between the reported and observed bundle utilization

A correlation was run on the specific bundle elements based on the observed and reported utilization. These elements were maintaining an unobstructed urinary flow, drainage bag maintenance, securing the catheter, daily meatal care, hand hygiene and maintaining an intact seal. The participants commonly reported to be performing either seven 32.7% (31) or all the eight 41.1% (39) CAUTI prevention care bundle elements. During observation of care it was

established that nurses performed either three 40% (38) or four 35.8% (34) elements of the CAUTI prevention care bundle. This is shown in Figure 5.

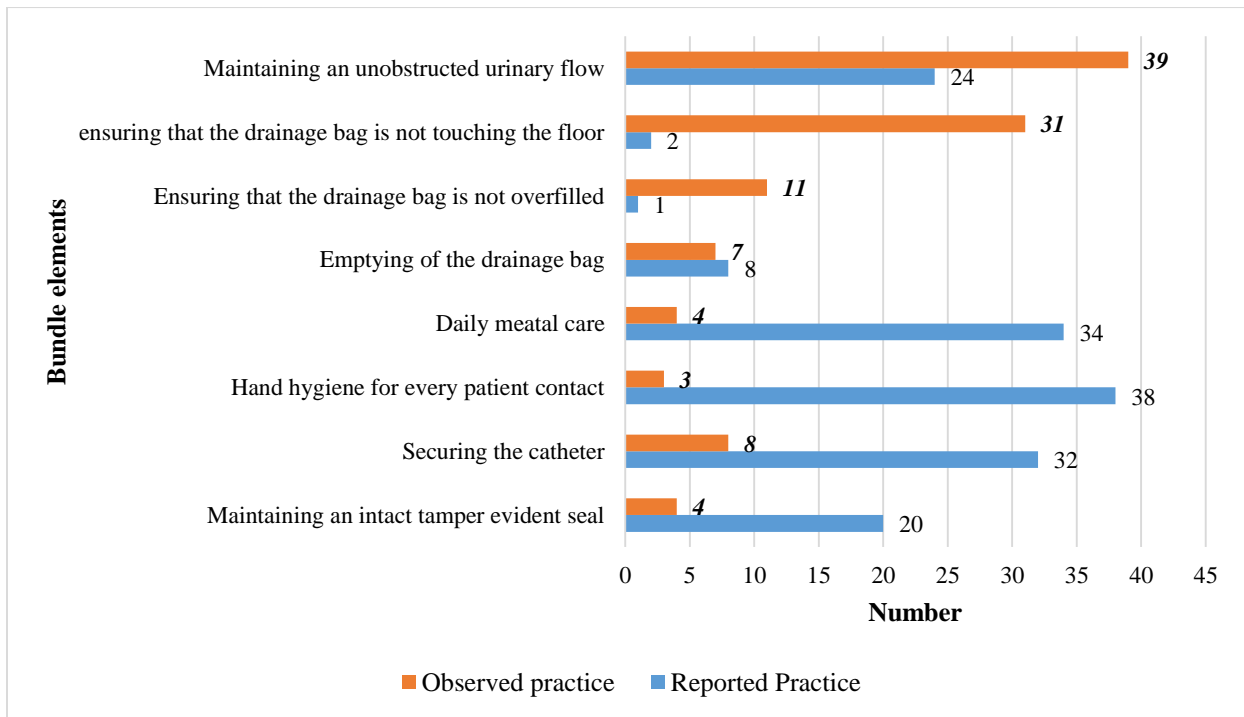


Figure 5: Reported and observed bundle utilization

Pearson’s Correlation coefficient

Pearson’s correlation was used to determine the relationship between the observed and reported utilization of the care bundle. There was a weak correlation between the observed and reported utilization of the CAUTI prevention care bundle [$r = 0.043$; 95% CI 0.16 - 0.24; $P = 0.678$]. This implied that most of the participants who reported to be utilizing the CAUTI prevention care bundle were not actually utilizing it on observation as shown in Table 12.

Table 12: Pearson's Correlation Coefficient of bundle utilization

| | | Reported | Observed |
|-----------------|---------------------|----------|----------|
| Reported | Pearson Correlation | 1 | 0.043 |
| | P – Value | | 0.678 |
| | n | 95 | 95 |
| Observed | Pearson Correlation | 0.043 | 1 |
| | P – Value | 0.678 | |
| | n | 95 | 95 |

4.6: Challenges of utilization of the care bundle

The participants were asked the extent of agreement on various challenges by use of a five Likert scale. The responses are presented in Table 13. From the table most participants agreed that these challenges affected their level of practice on utilization of the care bundle. No audits on CAUTI bundle and workload had the highest aggregate of agreement (i.e. strongly agree plus agree) at 77.9% and 75.8%.

Table 13: Challenges on utilization of the bundle

| Challenge | Strongly agree | Agree | Undecided | Disagree | Strongly disagree |
|--|-----------------|-----------------|-----------|-----------------|-------------------|
| | %(n) | %(n) | %(n) | %(n) | %(n) |
| Equipment | 37.9(36) | 34.7(33) | 2.1(2) | 15.8(15) | 9.5(9) |
| Supplies | 34.7(33) | 35.8(34) | 5.3(5) | 14.7(14) | 9.5(9) |
| Staffing | 33.7(32) | 35.8(34) | 6.3(6) | 14.7(14) | 9.5(9) |
| Workload | 37.9(36) | 37.9(36) | 4.2(4) | 11.6(11) | 8.4(8) |
| Lack of CAUTI Prevention surveillance | 32.6(31) | 40(38) | 20(19) | 0(0) | 7.4(7) |
| No audits on CAUTI bundle | 29.5(28) | 48.4(46) | 4.2(4) | 14.7(14) | 3.2(3) |
| Presence of active resistors to change within the unit | 27.4 | 25.3(26) | 10.5(10) | 28.4(27) | 8.4(8) |
| Lack of CME's on CAUTI bundle | 33.7 | 41.1(39) | 6.3(6) | 12.6(12) | 6.3(6) |

Interpretation: Most of the listed challenges were reported to be agreed on by the nurses as to be affecting their utilization of the bundle.

CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1: Introduction

This chapter discusses the findings of the study and compares them with other published findings. It also gives the conclusions and recommendations of the study.

5.2: Discussion

5.2.1: Utilization of the CAUTI bundle

The participants utilized the bundle although some elements were utilized more than others. Those that were highly utilized by more than 80% of the participants were maintaining an intact tamper evident seal, preventing the drainage bag from touching the floor and being overfilled. The other elements were utilized by less than 50% of the participants. These were preventing obstruction of the urinary flow, daily meatal care, hand hygiene, emptying the urine drainage bags and securing the catheter. It was noted that the study participants utilized these components which were similar to a study by Thompson *et al* 2010. In their study, 88% of the participants ensured that the drainage bags were not touching the floor. The drainage bags should be emptied regularly since when they are overfilled they cause traction to the urethral meatus predisposing patients to inflammation and eventually CAUTIs. Although most of the nurses utilized this element, it was contrary to a study by Thompson *et al* who had 100% utilization of the bundle by the participants. Catheter care should always be practiced while taking care of catheterized patients. Nurses should ensure that urine drainage bags are not touching the floor and overfilled. All these elements are important in preventing infection to the patients.

A low percentage of the nurses (2.1%) ensured that the catheters were secured which correlated with a study conducted by Siegel *et al* who had a finding of 4.4% participants utilizing this element. Appah *et al* had findings that were closely similar to this study in which only 18% of their participants secured the catheters. However some studies indicate higher utilization of this element. A study by Shum *et al* had 100% utilization of the bundle as well as Thompson *et al* in whose study 94% of the participants utilized this element of the bundle. Urine is an excellent culture medium for microorganisms hence catheters need to be secured to prevent urine backflow and maintain an unobstructed urinary flow. Securement of the catheters ensures continuous drainage of the urine hence preventing backflow as well as urinary flow obstruction.

It was established that 44.2 % of the nurses maintained an unobstructed urinary flow hence preventing loop dependent. It was also observed that most of the participants did not secure the catheters hence there were loop dependents obstructing urinary flow which may have contributed to the low level of utilization of these elements. This was contrary to a study by Thompson *et al* who found out that only 18% of the participants utilized the bundle. There should be maintenance of an unobstructed urinary flow in the catheter drainage system and prevention of loop dependent. This was attributed to absence of catheter securement devices although there can be use of the locally available materials to be used in catheter securement such as adhesive tapes that are usually available within these units. The nurses need to be educated on the importance of securing catheters since the unsecured catheters can cause irritation to the urethra which can lead to inflammation hence CAUTI.

The participants who emptied the drainage bags with a clean and separate container were 17.5%. It was also observed that there was use of a single container to empty urine drainage bags of two or more patients. It was noted that there were few urine jugs in these units. The participants reported to be having challenges of equipment and supplies which was attributed to the low utilization of the bundle. The urine drainage bags should be emptied with clean and separate containers that should not be shared between patients without disinfection and cleaning. As it was noted in this study, there was sharing of the containers without disinfection and cleaning. This puts the patients at risk of cross infection of microorganisms that cause CAUTIs. The drainage bag should be emptied regularly as a separate procedure into a clean container for each patient (CDC, 2009). Hence, the importance of nursing education on this aspect of patient care.

The participants who performed meatal care at least daily and with incontinence were 35.1% with 67.4% reporting to be performing meatal care as required, that is every shift and with incontinence. 27% of the participants reported to be using soap and water during meatal care. The findings from this study were in congruent with those of Fink *et al* in whose study 43% of the respondents performed meatal care as per the guidelines. Meatal care should be performed at least daily and after bowel incontinence with soap and water. There was low utilization of this element. This may be related to the fact that the nurses had a lot of workload impeding utilization of the bundle element. It was noted that the respondents were actually performing meatal care only once when they provided care especially when they were rendering baths. However, it was noted that the nurses only changed the patients without performing meatal care when they had fecal incontinence. This was contrary to the recommendations of which catheter hygiene and

meatal care should be performed daily and after any episode of incontinence or bowel movement (Clarke *et al*, 2013). In a randomized study by Koskeroglu *et al*, there was no benefit in using antiseptics for perineal care on prevention and decreasing the rate of CAUTI.

The participants who utilized hand hygiene practice with every patient care was 22.1%. It was also observed that the participants wore gloves without first washing their hands and there was an increase in hand hygiene post removal of gloves. This was similar to a study by Ghorbani *et al* in whose study hand hygiene compliance was poor among the critical care nurses before wearing gloves at 14.8% and that they wore gloves without washing hands. Contrary to these findings is a study by Fikah *et al* who had 89% of their participants performing hand hygiene. The participants' lack of adequate utilization of hand hygiene in this study was attributed to the fact that there was inadequate supplies that hindered utilization of this element. It was observed that there were times when there were no hand towels for drying the hands hence the participants tended to shy away from this practice. Utilization of hand hygiene practice is important in preventing CAUTIs. The WHO has echoed this component of patient care by insisting on healthcare providers ensuring that they adhere to the five moments of hand hygiene that are directly related to this component of patient care related to the utilization of this bundle.

5.2.2: Adherence of nurses to the CAUTI Bundle

The participants' adherence to the bundle was at 49.5% which was similar to a study by Amine *et al* in whose study there was an adherence level of 40% ($P = 0.04$). These findings were contrary to that by Davis *et al* in whose study 90% ($P < 0.05$) of the participants adhered to the bundle. Several studies have shown adherence to this bundle at 43% to 89% universally as reported by the CDC. This study's adherence level is within this CDC range though the IHI has a guideline of adherence of 95% and above to indicate full adherence to the bundle (CDC, 2014; IHI 2011). There was no significant association between adherence to the bundle and the participants' demographic characteristics ($P > 0.05$) in this study. This indicated that the demographic characteristics did not influence adherence to the bundle. Self-reported adherence was higher than that from observation. Adherence to the bundle decreases transmission of infections such as CAUTIs. No nurse adhered to all the elements of the bundle completely over the study period. The utilization was higher with the first encounter during observation and decreased with the subsequent encounters. For there to be complete adherence to this bundle, the nurses should have an adherence level of 95% and above since all the elements of the bundle have to be practiced and utilized on each patient all the time. Each of the elements gets a score of

either done or not done since there is no partial credit and one that is not indicated should be clearly documented. Hence, in this study a score of 95% and above was accepted which was to be similar for each patient that a nurse took care of for the nurse to get the required score indicating full bundle utilization. Any score of below 95% was considered unacceptable hence the low adherence level among the critical care nurses in this study.

5.2.3: Correlation of the Observed with the Reported Bundle Utilization

There is a weak correlation ($r = 0.043$; $P = 0.678$) between the observed and reported utilization of the CAUTI bundle. This was contrary to a study by Amine *et al* in whose study there was a statistically significant strong negative correlation ($r = -0.828$; $P = 0.04$). This suggested their strong role in the prevention of CAUTIs hence, they should become part of a culture of patient safety (Amine *et al*, 2014). Most of the participants reported to be utilizing the bundle which was contrary to the observations that were made during the study. This was attributed to the fact that the respondents reported challenges related to utilization of the bundle. The challenges that were most reported by the participants were supplies, equipment, staffing, workload and absence of continuing medical education within the units. These challenges were also observed during the study period. It was noted that there were few urine jugs used for emptying the drainage bags. The participants practiced hand hygiene but most of the times there were no paper towels to use for drying the hands. There was a high nurse to patient ratio of 2: 3 as opposed to the guideline of 1:1. Nurse staffing and workload has been implicated in the spread of CAUTIs. This was in congruent with a study conducted by Limiotti *et al* who found a significant association between patient to nurse ratio and urinary tract infections at 0.86 ($P = 0.02$). Heavier workload contributes to poor utilization and adherence to the bundle and higher staffing is associated with a 30% reduction in CAUTIs. Approximately 27% of these CAUTIs can be eliminated if the nurse to patient ratios are maintained at adequate levels (Mangnall *et al* 2006).

The null hypothesis was therefore rejected. It was concluded that there was a significant difference between the observed and reported practices related to bundle utilization of the catheter associated urinary tract infection bundle by the critical care nurses at Kenyatta National Hospital.

5.3: Conclusion

The nurses working in the critical care units utilized the CAUTI bundle elements. The utilization of these elements was better for some compared to others. In some instances there was lack of equipment and supplies which led to the underutilization of the elements.

The nurses working in the critical care units adhered to the bundle while caring for catheterized patients. The adherence to this bundle was low which was attributed to the fact that there were challenges as reported by the nurses.

There was a weak correlation between the observed and reported utilization of the CAUTI bundle. The nurses reported a high bundle utilization compared to the actual utilization obtained during observation.

The challenges which hindered utilization and adherence to the bundle were resources, resistance to change, lack of audits, continuing medical education and standardized way of practice that is standard operating procedures, checklist.

5.4: Recommendations

There is need for continuous medical education on CAUTI bundle within the critical care units. This should be instituted by the clinical nurse instructors so as to ensure uniform bundle utilization within the units.

In the CCU there is need for formulation of standard operating procedures and checklist by the managers with incorporation of the nurses who provide direct care. These will be used in the standardization of nursing care related to bundle utilization.

There is need for clinical audits and reaudits to help inform and guide the healthcare providers, managers and policy makers in drafting evidence based policies on CAUTI bundle.

The management should provide the nurses with enough resources to enable them utilize the CAUTI bundle.

5.5: Areas of further research

Studies in different settings to include other institutions both public and private, study design and incorporate other components such as the insertion bundle as well as the culture preventing the transfer of knowledge to practice by the nurses.

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APPENDICES

Appendix 1: Structured Questionnaire

Date Code.....

Title: Utilization of the Catheter Associated Urinary Tract Infection Bundle among Critical Care Nurses - Kenyatta National Hospital.

Instructions: Tick in the appropriate boxes and circle the best choices.

Socio demographic data

1. Gender

a. Male

b. Female

2. Age

a. 20 – 29 years

b. 30 – 39 years

c. 40 – 49 years

d. 50 – 59 years

e. 60 years and above

3. Highest level of education

a. Certificate

b. Diploma

c. Higher diploma

d. Degree

e. Masters

4. Specialty training

a. Critical Care Nurse

b. Other; Specify

c. None

5. Years of experience in the critical care unit

- a) Less than 1 year
- b) 1 – 5 years
- c) 6 – 10 years
- d) More than 10 years

6. What is your cadre

- a) NO III
- b) NO II
- c) NO I
- d) SNO

Knowledge on catheter associated urinary tract infection bundle

Instructions: Tick in the appropriate boxes and circle the best choices.

General knowledge on CAUTI bundle.

| | YES | NO |
|--|-----|----|
| Do you know about CAUTI bundle? | | |
| Are you aware of the elements of the CAUTI bundle? | | |
| Do you utilize the CAUTI bundle in your unit? | | |
| Are you audited on the utilization of the CAUTI bundle | | |

To what extent do you agree with when the urine drainage bag should be emptied?

| | Strongly agree | Agree | Undecided | Disagree | Strongly disagree |
|--------------------------|----------------|-------|-----------|----------|-------------------|
| When full. | | | | | |
| When half full. | | | | | |
| At the end of the shift. | | | | | |
| When necessary. | | | | | |

To what extent do you agree with the following?

| Practices on maintenance bundle | Strongly agree | Agree | Undecided | Disagree | Strongly disagree |
|--|-----------------------|--------------|------------------|-----------------|--------------------------|
| Hand hygiene should be performed for every patient contact. | | | | | |
| A closed drainage system should be maintained always. | | | | | |
| When there is a break in the closed drainage system, the whole system should be changed aseptically. | | | | | |
| Drainage bag should be emptied using a clean and separate container for each patient | | | | | |
| Drainage bag should not touch the floor or surfaces | | | | | |
| There should be maintenance of an unobstructed urinary flow | | | | | |
| Indwelling urinary catheters should be secured. | | | | | |
| There should be initiatives on reminding colleagues and doctors on catheter removal. | | | | | |
| CCU's should have daily checklists for CAUTI maintenance bundle. | | | | | |

Do you practice the following elements of the CAUTI bundle?

| Bundle criteria | Yes | No |
|--|------------|-----------|
| Maintaining the tamper evident seal intact | | |
| Securing the catheter | | |
| Hand hygiene with every patient contact | | |
| Daily meatal care | | |
| Emptying the drainage bag with a clean container | | |
| Ensuring that the drainage bag is not overfilled | | |
| Ensuring that the drainage bag is not touching the floor | | |
| Maintaining an unobstructed urinary flow | | |

- i) How often do you perform meatal care?
- a. Never
 - b. Once per shift
 - c. With every care and when the patient has incontinence

- ii) What solution should be used for meatal care?
 - a. Plain water
 - b. Soap and water
 - c. Antiseptic
- iii) What methods do you use to remind each other that a catheter is in place?
 - a. None
 - b. Putting a date and time for insertion of the catheter on the drainage bag
 - c. Putting a sticker reminder on the patient's chart
 - d. Having a stop order for catheter removal

To what extent do you agree with the following challenges in utilization of the CAUTI bundle at your unit?

| Challenges | Strongly agree | Agree | Undecided | Disagree | Strongly disagree |
|--|-----------------------|--------------|------------------|-----------------|--------------------------|
| Equipment | | | | | |
| Supplies | | | | | |
| Staffing | | | | | |
| Workload | | | | | |
| Lack of infection prevention surveillance | | | | | |
| No audits on CAUTI bundle | | | | | |
| Presence of active resistors to change within the unit | | | | | |
| Lack of CME's on CAUTI prevention care bundle | | | | | |

Appendix 2: Observation Checklist

Adopted and modified from the Comprehensive Unit-based Safety Program: stop CAUTI supplement (2014) (APIC 2014)

Title: Utilization of Catheter Associated Urinary Tract Infection Bundle among Critical Care Nurses - Kenyatta National Hospital.

N/B- A score of 95% and above is considered acceptable while that which is less than 95% is unacceptable.

Date Code.....

| BUNDLE ELEMENTS/ CRITERIA | | | | | | | | |
|---|-------------------------------|---|---|--|---|------------------------------------|---|--|
| Number of observations/ encounters | Ensures/maintains intact seal | Maintains the catheter secured-securement device in place | Performs hand hygiene for every patient contact | Performs daily meatal care with soap and water | Empties the drainage bag using a clean & separate container | The drainage bag is not overfilled | The drainage bag does not touch the floor | Maintains an unobstructed urinary flow |
| 1st | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | No | No | No | No | No | No | No | No |
| 2nd | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | No | No | No | No | No | No | No | No |
| 3rd | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| | No | No | No | No | No | No | No | No |

Appendix 3: The Adopted Care Bundle Checklist

The adopted observational checklist on CAUTI bundle from the comprehensive unit based safety program: stop CAUTI supplement (2014).

| DATE | BUNDLE CRITERIA | | | | | | | |
|------|-------------------------------------|-------------------------------|---|--|--|--|------------------------------|---------------------------|
| | Daily documented assessment of need | Tamper evident seal is intact | Catheter secured-securement device in place | Hand hygiene performed for patient contact | Daily meatal hygiene performed with soap and water | Drainage bag emptied using a clean container | Unobstructed flow maintained | Action Remove or continue |
| | YES NO | YES NO | YES NO | YES NO | YES NO | YES NO | YES NO | REMOVE CONTINUE |
| | YES NO | YES NO | YES NO | YES NO | YES NO | YES NO | YES NO | REMOVE CONTINUE |
| | YES NO | YES NO | YES NO | YES NO | YES NO | YES NO | YES NO | REMOVE CONTINUE |
| | YES NO | YES NO | YES NO | YES NO | YES NO | YES NO | YES NO | REMOVE CONTINUE |
| | YES NO | YES NO | YES NO | YES NO | YES NO | YES NO | YES NO | REMOVE CONTINUE |
| | YES NO | YES NO | YES NO | YES NO | YES NO | YES NO | YES NO | REMOVE CONTINUE |

Appendix 4: Participant Information Sheet and Consent Form

Title: Utilization of the Catheter Associated Urinary Tract Infection bundle among Critical Care Nurses - Kenyatta National Hospital.

Name of Investigator: Phoebe Amesa Assanga,
Mobile No: 0726719837

Name of Institution: University of Nairobi,
College of Health Sciences,
School of Nursing Sciences,
Po Box 19676 - 00202,
Nairobi.

Introduction: I am a student at the University of Nairobi, School of Nursing Sciences undertaking a Master of Science Nursing (Critical Care Nursing) degree. I am conducting a study titled: **Utilization of the Catheter Associated Urinary Tract Infection Bundle among Critical Care Nurses - Kenyatta National Hospital.**

The purpose of this information is to give you details pertaining to the study that will enable you make an informed decision regarding your participation. You are free to ask questions for clarification on any of the aspects that we will discuss in this information and consent form. I will also ask you questions regarding the study before you sign the consent form to ascertain your comprehension of the information provided.

Background and objective: The purpose of the study is to determine the utilization of the Catheter Associated Urinary Tract Infection prevention bundle among Critical Care Nurses working at Kenyatta National Hospital. A care bundle is a set of standards of care that are universally accepted and adopted among care providers with an aim of eliminating morbidity and mortality related to specific disease conditions which in the long run reduce hospital stays. The Catheter Associated Urinary Tract Infections bundle aims at reducing and eliminating the incidences of Catheter Associated Urinary Tract Infections among critical care patients. The data collected from the study will enable the researcher to evaluate how effectively you utilize the catheter associated urinary tract infection prevention care bundle within your units. Since you are charged with catheter care, you have been selected as study participants.

Participant selection: You are being asked to participate as part of the study participants of nurses who are providing care to patients in the Critical Care Units at Kenyatta National Hospital. You have been drawn from the nurses permanently employed and working at the critical care units. You will be grouped into your various units being the acute care, main, cardiothoracic and neurosurgical. The selection process was on a random basis ensuring equal chances.

Study procedure: If you agree to participate in this study, I will administer a questionnaire that you will fill on self-reported information regarding your socio-demographic data, utilization and practices as pertains to the Catheter Associated Urinary Tract Infection bundle. This will be used to rate the level of utilization of the catheter associated urinary tract infection bundle within the units. I will also conduct an observation of your practice related to catheter associated urinary tract infection prevention care bundle utilization. This will be by the use of an observation check list which will be composed of the specific elements of the care bundle. Observation will be done at three different times during your shift as you provide care to the patients. The study will commence with observation after which the questionnaire will be administered. The practices that you will fill in the questionnaires will be correlated with those that will be observed as you care for the patients.

Benefits: There is no direct monetary benefit in participating in this study. However, the results of the study will be useful in gauging the level of utilization of the bundle. This will also be useful in enhancing its utilization of which will help in reducing the incidences of catheter associated urinary tract infections. The findings will be availed to the hospital and other relevant decision makers and stakeholders to aid in putting in place measures that will improve the care given to patients in the critical care units in view of preventing catheter associated urinary tract infection with special emphasis on the prevention care bundle. This will also be beneficial to the patients who will have reduced incidences of catheter associated urinary tract infections reducing the related morbidity, mortality, hospital costs and stay.

Risks: There are no economic or physical risks to participating in the study. However, due to the nature of the questions you need to answer in the questionnaire you might spend quite some time off your busy schedule.

Compensation: There will be no compensation for participating in the study.

Confidentiality: Confidentiality will be maintained and the information you provide will only be used for the intended purpose of the study. In addition, your name will not be required on any form or used during publication of the final report thus ensuring your anonymity. All materials used during the study will be kept under key and lock and only the personnel involved in this study will have access to them. Electronic files will be saved on password and fire-wall protected computers.

Voluntary participation and the right to refuse to participate or withdraw: Your participation in this study is entirely on voluntary basis. You retain the right to withdraw from the study without any consequences. You are free to choose to or not to participate in the study and your decision on this will not affect your current or future relations with Kenyatta National Hospital. You will suffer neither penalties nor loss of any benefits should you decide not to participate.

Conflict of interest: The principal investigator and the supervisors confirm that there is no conflict of interest amongst them.

Your cooperation is highly appreciated and should you have any questions concerning the study feel free to communicate with me on the following address:

Phoebe Amesa Assanga,
Mobile no: 0726719837
Email address: ppamessa@yahoo.com

Or my supervisors

Mrs. Lilian Omondi,
Lecturer,
School of Nursing Sciences,
University of Nairobi.
Mobile No: 0720861317
Email: laomondi@uonbi.ac.ke

Ms. Hannah Inyama,

Lecturer,
School of Nursing Sciences,
University of Nairobi,
Mobile No: 0723065246,
Email:hannahinyama@gmail.com

Or

The Secretary,
Kenya National Hospital/University of Nairobi- Ethics and Research Committee (KNH-UON
ERC)
P.O Box 20723- 00202,
Nairobi.
Email: uonknh_erc@uonbi.ac.ke
Website: <http://www.erc.uonbi.ac.ke>
Tel: 020-2726300 Ext 44355

CONSENT FORM

If you Consent to Participate in the study please sign below:

I hereby consent to participate in this study having been fully informed of the nature of the study by the investigator. I also understand that my participation in the study is voluntary and the decision to or not to participate will not affect my employment status at this facility in any way whatsoever. I may also choose to discontinue my involvement in the study at any stage without any explanation or consequences. I have also been reassured that my personal details and the information I will relay will be kept confidential. I confirm that all my concerns about my participation in the study have been adequately addressed by the principal investigator who has asked me questions to ascertain my comprehension of the information provided.

Participant’s Signature.....Date.....

I Phoebe Amesa Assanga confirm that I have clearly and fully explained to the participant the nature of the study and the contents of this consent form in detail and the participant has decided to participate voluntarily without any coercion or undue pressure.

I hereby undersign

Researcher’s Signature..... Date

Appendix 5: Letter to Ethical Committee

Phoebe Amesa Assanga
University of Nairobi,
College of Health Sciences,
School of Nursing Sciences,
P.O Box, 19676-00200,
Nairobi.

The Chairman,
Kenyatta National Hospital/ University of Nairobi - Ethics and Research Committee,
P.O Box 20723-00202,
Nairobi

Dear Sir/Madam,

RE: PERMISSION TO CONDUCT A STUDY AT KENYATTA NATIONAL HOSPITAL.

My names are Phoebe Amesa Assanga and I'm a second year student at the University of Nairobi, School of Nursing Sciences undertaking a Master of Science Nursing (Critical Care Nursing) degree.

I hereby request for your permission to carry out a research on *Utilization of the Catheter Associated Urinary Tract Infection bundle among Critical Care Nurses - Kenyatta National Hospital*. This is a requirement in partial fulfillment of the award of Master of Science in Nursing (Critical Care Nursing) degree.

The research will take a period of 4 months.

Find attached an introductory letter from the University.

I look forward to a positive reply from you.

Thank you in advance.

Yours faithfully,

Phoebe Amesa Assanga
Reg no. H56/75389/2014

Appendix 6: Approval letter from the KNH-UON ERC



UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
Tel:(254-020) 2726300 Ext 44355



KNH-UON ERC
Email: uonknh_erc@uonbi.ac.ke
Website: <http://www.erc.uonbi.ac.ke>
Facebook: <https://www.facebook.com/uonknh.erc>
Twitter: @UONKNH_ERC https://twitter.com/UONKNH_ERC



KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/205

13th June, 2016

Phoebe Amesa Asanga
Reg. No.H56/75389/2014
School of Nursing Sciences
College of Health Sciences
University of Nairobi

Dear Phoebe

REVISED RESEARCH PROPOSAL- EVALUATION OF THE UTILIZATION OF CATHETER ASSOCIATED URINARY TRACT INFECTION PREVENTION CARE BUNDLE AMONG NURSES WORKING AT THE CRITICAL CARE UNITS, KENYATTA NATIONAL HOSPITAL (P192/03/2016)

This is to inform you that the KNH- UoN Ethics & Research Committee (KNH-UoN ERC) has reviewed and **approved** your above proposal. The approval period is from 13th June 2016 – 12th June 2017.

This approval is subject to compliance with the following requirements:

- Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
- All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH-UoN ERC before implementation.
- Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH-UoN ERC within 72 hours of notification.
- Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH- UoN ERC within 72 hours.
- Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
- Clearance for export of biological specimens must be obtained from KNH- UoN ERC for each batch of shipment.
- Submission of an *executive summary* report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/ or plagiarism.

For more details consult the KNH- UoN ERC website <http://www.erc.uonbi.ac.ke>

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Yours sincerely,



PROF. M.L. CHINDIA
SECRETARY, KNH-UoN ERC

c.c. The Principal, College of Health Sciences, UoN
The Deputy Director, CS, KNH
The Assistant Director, Health Information, KNH
The Chair, KNH- UoN ERC
The Director, School of Nursing Sciences, UoN
Supervisors: Mrs.Lilian A. Omondi, Ms.Hannah Inyama

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Appendix 7: KNH Research & Programs Study Registration Certificate

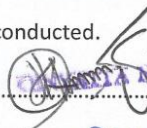
KNH/R&P/FORM/01



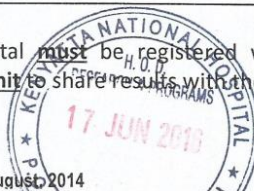
KENYATTA NATIONAL HOSPITAL
P.O. Box 20723-00202 Nairobi

Tel.: 2726300/2726450/2726565
Research & Programs: Ext. 44705
Fax: 2725272
Email: knhresearch@gmail.com

Study Registration Certificate

1. Name of the Principal Investigator/Researcher
PHOEBE ACCANGA AMESSA
2. Email address: Ppamecca@yahoo.com Tel No. 0726719837
3. Contact person (if different from PI) LILIAN OMONDI (SUPERVISOR)
4. Email address: laomondi@uonbi.ac.ke Tel No. 0720861317
5. Study Title
EVALUATION OF THE UTILIZATION OF CATHETER ASSOCIATED URINARY TRACT INFECTION PREVENTION CARE BUNDLE AMONG NURSES WORKING AT THE CRITICAL CARE UNITS, KNH.
6. Department where the study will be conducted CRITICAL CARE UNITS
(Please attach copy of Abstract)
7. Endorsed by Research Coordinator of the Department where the study will be conducted.
Name: Signature Date
8. Endorsed by Head of Department where study will be conducted.
Name: Dr K.O. Mwanjiri Signature  KENYATTA NATIONAL HOSPITAL Date 17/06/2016
9. KNH UoN Ethics Research Committee approved study number P192/03/2016
(Please attach copy of ERC approval)
10. I PHOEBE AMESSA ACCANGA commit to submit a report of my study findings to the Department where the study will be conducted and to the Department of Research and Programs.
Signature Amessa Date 14/06/16
11. Study Registration number (Dept/Number/Year) C.C.U / 23 / 2016
(To be completed by Research and Programs Department)
12. Research and Program Stamp _____

All studies conducted at Kenyatta National Hospital must be registered with the Department of Research and Programs and investigators must commit to share results with the hospital.



Version 2: August 2014

Appendix 8: Time Frame

| | 2015 to 2016 | 2016 | | | | |
|--|---------------|--------------|------|------|--------|-------------|
| Time/ Activity | Sept to March | March to May | June | July | August | Sept to Dec |
| Proposal development & school approval | | | | | | |
| Ethics Approval | | | | | | |
| Pretesting & Data collection | | | | | | |
| Data Analysis & Report Writing | | | | | | |
| Report submission & thesis defence | | | | | | |
| Final report writing & dissemination | | | | | | |

Appendix 9: Budget

| | Item | Units | Unit cost (Ksh) | Total cost(Ksh) |
|--|--|--------------|----------------------------|----------------------------|
| Stationery | Notebook | 3 | 100 | 300 |
| | Pens | 10 | 25 | 250 |
| | Pencils | 4 | 10 | 40 |
| | Erasers | 2 | 30 | 60 |
| | Folders | 8 | 100 | 800 |
| | Sharpeners | 3 | 30 | 90 |
| | Box files | 3 | 200 | 600 |
| | Flash disc | 1 | 1,000 | 1,000 |
| Sub total | | | | 3,140 |
| Services | Photocopy | | | |
| | Study instruments @6 pages | 600 | 2 | 1,200 |
| | Consent form @ 4 pages | 400 | 2 | 800 |
| | <i>Proposals</i> | | | |
| | 4 Drafts @ 50 pages | 200 | 2 | 400 |
| | 5 Final copies @ 50 pages | 250 | 2 | 500 |
| | <i>Thesis reports</i> | | | |
| | 4 Drafts @100 | 400 | 2 | 800 |
| | 1 Draft @100 pages for Ext. Examiner | 100 | 2 | 200 |
| | Printing | | | |
| | <i>Study instruments @ 6 pages</i> | 600 | 10 | 6,000 |
| | <i>Consent form @ 4 pages</i> | 400 | 10 | 4,000 |
| | <i>Proposals</i> | | | |
| | 1 Draft @ 50 pages | 50 | 10 | 500 |
| | 1 Final copy @ 50 pages | 50 | 10 | 500 |
| | <i>Thesis reports</i> | | | |
| | 1 Draft @100 pages | 100 | 10 | 1,000 |
| | 1 Draft @100 pages for Ext. Examiner | 100 | 10 | 1,000 |
| | 6 Final Copies @ 100 Pages | 600 | 10 | 6,000 |
| | Binding | | | |
| | <i>Proposals</i> | 6 | 50 | 300 |
| | <i>Thesis Reports</i> | 6 | 600 | 3,200 |
| | Data Processing and Analysis (statistician) | 40,000 | N/A | 40,000 |
| Communication (internet searches, mobile calls) | 5,000 | N/A | 5,000 | |
| Institutional review board fees | 5,000 | N/A | 5,000 | |
| Purchase of endnote (reference manager) | 5,000 | 1 | 5,000 | |
| Sub Total | | | | 91, 600 |

| | | | | |
|---|-------------------------------|-----------|-----|----------------|
| Transport & allowance | Research assistants | 3×30 days | 200 | 18,000 |
| | Researcher | 1×30 | 200 | 6,000 |
| Sub Total | | | | 24,000 |
| Dissemination of research findings | Journal/ seminars/conferences | N/A | N/A | 10,000 |
| Sub Total | | | | 10,000 |
| Total | | | | 128,740 |
| Contingency | 10% of Total | | | 12,874 |
| Grand Total | | | | 141,614 |