



Assessment knowledge's and practice nurses toward the prevention of catheter associated urinary tract infection at al-Thawra hospital in Sana'a, city, Yemen.

Research proposal submitted to complete the requirements for obtaining bachelor's degree nursing from the Medical College of 21 University.

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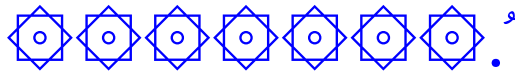
Supervision

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2022

قال تعالى

﴿ فَبَعَثَ اللَّهُ غُرَابًا يَبْحَثُ فِي الْأَرْضِ لِيُرِيَهُ
كَيْفَ يُورِي سَوَاءَ أَخِيهِ ۚ قَالَ يُوَيْلْتَىٰٓ أُعْجَزْتُ
أَنْ أَكُونَ مِثْلَ هَٰذَا الْغُرَابِ فَأُوْرِي سَوَاءَ أَخِي
فَأَصْبَحَ مِنَ النَّادِمِينَ ۝٣١﴾



، سورة: المائدة الآية (٣١)

صدق الله العظيم

Dedication

First, we dedicate this work to Allah Almighty, who gave us life and taught us what we did not know. Secondly, we dedicate this work to the parents and to everyone who helped us, encouraged us and contributed to the completion of this research. And he gave us hope in despair.

ACKNOWLEDGMENT

The inability of the tongue to express and the inability of the pen to write, no matter how we talk and no matter how we write, we will not be able to thank and appreciate, but all thanks and appreciation to

Research Supervisor:

[Dr.Houria AbdulraqibTaher Al-Sabri](#)

a wonderful doctor and the perfect supervisor, and we are very lucky because you were our supervisor and mentor through your constant attention, participation and support to push us towards excellence

Thanks to the 21st September university.

Thank you to all the staff of the Faculty of Nursing for their cooperation.

Thank you to all the nurses at Al Thawra General Hospital who participated in completing this research.

Last but not least, thank you to everyone who helped us by any means during the completion of the research.

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LIST OF ABBREVIATIONS

ABUTI	asymptomatic bacteriuria urinary tract infection
AHA	American Hospital Association
AHRQ	Agency for Healthcare Research and Quality.
AIDS	acquired immunodeficiency syndrome
APIC	Association for Professionals in Infection Control and Epidemiology
BSI	Blood stream infection.
CAUTI	catheter associated urinary tract infection
CDC	Center for diseases control
CLABI	central line associated blood stream infections
HAI	Healthcare associated infections
HAUTI	healthcare-associated urinary tract infection
HCAI/HAI	Healthcare associated infections
ICU	intensive care unit
IUC	indwelling urinary catheter
KP	Knowledge and practice
PNEU	Pneumonia
SPSS	Software Package for Statistical Analysis.
SSI	surgical site infections
SUTI	symptomatic urinary tract infection
UC	urinary catheter
UTI	urinary tract infection
WHO	World health organization

Abstract

Background of the study: Catheter-associated urinary tract infection (CAUTI) is the most prevalent healthcare-associated infection worldwide, according to reports. Nurses are also accountable to acquire appropriate knowledge and practices of catheter care that will prevent UTI. Nurses' knowledge is seen to be one of the most important factors in their practice.

Aim of the study: To assess the nurse's knowledge toward the prevention of catheter-associated urinary tract infection in al-Thawra hospital in Sana'a, city. Yemen.

Methods: A descriptive cross-sectional study was conducted among nurses at al-Thawra hospital in Sana'a, city, Yemen. A convenience sampling technique was of the study consisted of(113) nurses from al-Thawra hospital in Sana'a, city. Self-administered **questionnaire** was used to collect data in 2022.

Results: The distribution of nurses' were male (60%), while Female was (40%) and largely aged between from 20 to 30 years' old by percent (79.6%), Marital status for the majority Married (54.0%), Most of respondents by (62.8%) were holding a Diploma level of education in nursing, most them years of experience of have from 1- 5 years by (62.8%).

majority of ICU nurses have a low level of knowledge (47.27%) regarding CAUTI prevention, their practice was found to be moderate with score of (72.04%), There were no associations relationship between the demographics and the level knowledge of nurses towards catheter indications and CAUTI prevention, Except gender variable, existence of a relationship between the gender variable and the level knowledge of nurses towards catheter indications and CAUTI prevention.

Conclusion: Most of nurses had low knowledge level and moderate practice level regarding toward the prevention of catheter associated urinary tract infection, there were no associations relationship between the demographics and the level knowledge of nurses towards catheter indications and CAUTI prevention, Except gender variable.

Recommendations: 1-we recommend the hospital to increase the knowledge of nursing staff through training courses, workshops and curricula
2- We recommend universities and institutes to pay attention to the cognitive side of their students.
3-provide an updated written evidence-based procedural manual containing indicative steps for the care of It is a urinary catheter with sufficient knowledge and skills for this ،
4-future researchers should compile an evidence-based guide to infection prevention and catheter care, specifically nursing.

Keywords Catheter-associated Urinary Tract Infection: i

الملخص

خلفية الدراسة (مقدمه): تعد عدوى المسالك البولية المرتبطة بالقسطرة أكثر أنواع العدوى انتشارا في جميع أنحاء العالم ، وفقا لتقارير. الممرضين هم كونهم مسؤولين عن اكتساب المعرفة والممارسات المناسبة للرعاية القسطرة التي من شأنها منع التهاب المسالك البولية. نظرا لمعرفة الممرضين على أنها واحدة من أهم العوامل في ممارستهم.

الهدف من الدراسة: تقييم معرفة الممرضين نحو الوقاية من عدوى المسالك البولية المرتبطة بالقسطرة في مستشفى الثورة في مدينة صنعاء ، اليمن.

الطرق: تم إجراء دراسة مقطعية وصفية بين الممرضين في مستشفى الثورة في مدينة صنعاء ، اليمن. وقد شملت الدراسة (113) ممرضا من مستشفى الثورة في صنعاء. تم بناء الاستبيان

المعد بواسطة الباحثين لجمع البيانات في عام 2022.

النتائج: توزيع المرضيين كان الذكور (60%) ، في حين كان الإناث (40%) والذين تتراوح أعمارهم إلى حد كبير بين (20-30) سنة من العمر بنسبة (79.6%) ، والحالة الاجتماعية للأغلبية متزوج /ة (54.0%) ، ومعظم المستطلعين (الذي تم تقييمهم) بنسبة (62.8%) كانوا يحملون مستوى دبلوم التعليم في مجال التمريض ، ومعظمهم سنوات الخبرة لديهم من (1-5) سنوات بنسبة (62.8%).

غالبية ممرضين وحدة العناية المركزة لديهم مستوى منخفض من المعرفة بنسبة (47.27%) فيما يتعلق بالوقاية من العدوى، ووجد أن ممارستهم جيدة مع درجة (72.04%)، ولم تكن هناك علاقة ارتباط بين التركيبة السكانية ومستوى معرفة الممرضين تجاه مؤشرات القسطرة والوقاية من العدوى، باستثناء تغير الجنس ، وجود علاقة بين تغير الجنس ومستوى معرفة كادر التمريض حيث ان مستوى المعرفة لدى الإناث اعلى من الذكور تجاه مؤشرات القسطرة والوقاية من العدوى.

الخلاصة: كان لدى معظم المرضيين مستوى معرفة منخفض ومستوى ممارسة متوسط فيما يتعلق بالوقاية من عدوى المسالك البولية المرتبطة بالقسطرة ، ولم تكن هناك علاقة ارتباط بين التركيبة السكانية ومستوى معرفة التمريض تجاه مؤشرات القسطرة والوقاية من العدوى، باستثناء تغير الجنس (الإناث اعلى من الذكور)

التوصيات:

- 1- نوصي المستشفى بزيادة معرفة طاقم التمريض من خلال الدورات التدريبية وورش العمل والمناهج الدراسية.
- 2-نوصي الجامعات والمعاهد ان يهتموا بالجانب المعرفي لدى طلابهم.
- 3- تقديم دليل اجرائي محدث مكتوب يستند إلى أدلة يحتوي على خطوات إرشادية لرعاية القسطرة البولية مع ما يكفي من المعرفة والمهارات اللازمه لذلك ،
- 4-يجب على الباحثين في المستقبل تجميع دليل قائم على الأدلة للوقاية من العدوى ورعاية القسطرة ، وتحديد التمريض.

الكلمات المفتاحية: عدوى المسالك البولية المصحوبة بالقسطرة.

Chapter one:

Introduction

1.1 Background

Healthcare associated infections (HCAI) or nosocomial infections constituting a major health problem worldwide, World health organization (WHO) report 7.1 million cases of nosocomial infections occurring each year and that cause significant morbidity and mortality in hospitalized patients. (Ramasubramanian et al., 2014; Kaushal, 2015, pp. 282–283).

Urinary tract infection (UTI) is the most common hospital-acquired infection, accounting for 40% of all nosocomial infections (Saint, Kowalski, Forman, Damschroder, Hofer, Kaufman, Creswell & Krein 2008)

Out of all urinary tract infections, an estimated 80% are associated with the use of a urinary catheter (Weber, Sickbert-Bennett, Gould, Brown, Huslage & Rutala 2011). These infections are defined as ‘catheter-associated urinary tract infection’, or CAUTI for short.

The burden that CAUTI places on the healthcare system is undeniable; CAUTI is associated with increased mortality, morbidity, length of hospital stay and cost of care (Bruminhent, Keegan, Lakhani, Roberts & Passalacqua 2010).

Infections reduce the quality and safety of care and cause additional costs (Kanerva 2010). Between 2011 and 2012, there were 3.2 million treatment-related infections in Europe, or an average of 6% (ECDC 2012, 1). The corresponding incidence in the US in 2010 was 1.7 million cases, or 5-6%. In Europe, the direct cost of treatment-related infections in 2008 was € 7 billion (Allegranzi 2010). In the U.S., the cost of treatment-related infections in 2011–2013 was \$ 9.8 billion (Zimlichman et al. 2013).

Urinary tract infections are still common, although they can be partially prevented

by properly implemented practices. (Kainulainen 2010, 147; Lyytikäinen et al. 2005, 3122).

Nurses are considered as the health care providers who are responsible for inserting and maintain urinary catheters, as well as the production of desired outcomes, who are also accountable to acquire appropriate knowledge and practices of catheter care that will prevent UTI. (Abdulnasser A. Haza'a, Abdulfatah Al-Jaradi, Marzoq Ali Odhah, 2021)

In Yemen, there are still very few studies conducted to assess the knowledge and practices of nursing regarding urinary tract infection, and it was found that the level of nursing knowledge is weak and the level of practice is good. Therefore, this study was conducted, which aims to identify the level of nursing knowledge and practices towards preventing urinary tract infection associated with urinary catheterization in Al-Thawra General Hospital in Sana'a.

1.1 Problem Statement

According To The World Health Organization (WHO), 7.1 Million Cases Of HAI Occur Every Year. One Out Of Every 20 People Suffers From Hospital Infection.

In the countries of the Middle East incidence about of 2–15% occurring form infection in Surgical site infections, it this lead to an average increase in the length of hospital stay of 4–7 days and incidence Increasing complications of inpatients.

CAUTI can lead to such complications as prostatitis, epididymitis, and orchitis in males, and cystitis, pyelonephritis, gram-negative bacteremia, endocarditis, vertebral osteomyelitis, septic arthritis, endophthalmitis, and meningitis in patients. Complications associated with CAUTI cause discomfort to the patient, prolonged hospital stay, and increased cost and mortality. It has been estimated that each year, more than 13,000 deaths are associated with UTIs

In Yemen, infection in hospitals is still one of the problems that hospitals and health facilities suffer from, as the infection control assessment reports of the Ministry of Public Health and Population for the year 2020 show that the level of infection control in health facilities is weak. A study in the city of Amran indicated that the level of nursing knowledge regarding the prevention of catheter-related UTIs was medium at 72%, while 18.3% was good. (Abdulnasser A. Haza'a, Abdulfatah Al-Jaradi, Marzoq Ali Odhah, 2021) aim this study seeks to assess the level Assessment knowledge's and practice nurses

toward the prevention of catheter associated urinary tract infection at al-thawra hospital in order to reach results and suggestions that may lead to improving the level of nursing performance and raising level of patient care.

1.2 Significance of the Study:

this study it will provide baseline information on nurses' knowledge level and practice on prevention of CAUTI.

Health care professionals must be skillful and competent enough with their knowledge and skills to prevent UTI among the hospitalized patient under indwelling catheter and give adequate knowledge to patients regarding the prevention of CAUTI Therefore, this study aimed to assess the nurse's knowledge toward the prevention of catheter-associated urinary tract infection in at al-Thawra hospital in Sana'a, city, Yemen and hospitals others.

1.3 Research Question

Major research question

What is the level knowledge's and practice of nurses toward the prevention of catheter associated urinary tract infection at al-Thawra hospital in Sana'a, city, Yemen?

Minor Research Questions.

The following questions arise from it

- What Is Demographic Characteristics of the Nurses.
- What is the level of knowledge of nurses regarding prevention of catheter associated urinary tract infection?
- What is the level practice of nurses regarding prevention of catheter associated urinary tract infection?
- Is There the relation between the demographic characteristics and level knowledge of nurses regarding prevention of catheter associated urinary tract infection?
- Is There the relation between the demographic characteristics and level practice of nurses regarding prevention of catheter associated urinary tract infection?

1.4 Objectives of the Study

General Objective:

To assess knowledge's and practice of nurses toward the prevention of catheter associated urinary tract infection at al-Thawra hospital in Sana'a, city, Yemen.

Specific Objective:

1. To identify the demographic characteristics of the nurses.
2. To describe level of knowledge of nurses regarding prevention of catheter associated urinary tract infection.
3. To determine level of practice of nurses regarding prevention of catheter associated urinary tract infection.
4. To know the relation between the demographic characteristics and level knowledge of nurses regarding prevention of catheter associated urinary tract infection.
5. To know the relation between the demographic characteristics and level practice of nurses regarding prevention of catheter associated urinary tract infection.

1.5 Hypothesis of the Study

The level of nursing knowledge and practice regarding prevention of catheter associated urinary tract infection in the hospital under study high.

Sub hypothesis

1. H0.1: There is no relation between the demographic characteristics and level knowledge of nurses regarding prevention of catheter associated urinary tract infection.
2. H0.2: There is no relation between the demographic characteristics and level practice of nurses regarding prevention of catheter associated urinary tract infection.

1.6 Justification

When we were in the third level of application at Al Thawra General Hospital in the intensive care department, we noticed that most of the diseases lying down were infections in the urinary tract and were widespread, so we decided to do this study to look

for the cause of this prevalence

1.7 Limit of study;

Place Limit study done in **ICU** departments at AL-Thawra hospital in asana, a city-Yemen, The time from

Time limit:-The study was conducted during 2022 AD

1.8 Terminology:

health worker:

refers to any healthcare provider who delivers medical services to patients. Typically, they have received little or no formal training.

Healthcare associated infection:

also known as nosocomial infection; defined as “An infection occurring in a patient during the process of care in a hospital or other healthcare facility which was not present or incubating at the time of admission. This includes infections acquired in the hospital but appearing after discharge and also occupational infections among staff of the facility” (Allegranzi et al., 2007).

Infection control:

the use of procedures and practices to reduce and or eliminate the contracting and spread of healthcare associated infections. Infection control practices utilize systems that include hygiene and protective clothing, disinfection and disposal techniques and standard precautions when dealing with any patient or client (Shaw, 2005).

Standard precautions:

refers to a term that replaces “universal precautions” that expands the coverage of universal precautions by recognizing that any or all body fluid may contain contagious and harmful microorganisms (Wasswa et al., 2008).

Knowledge; Information and skills acquired through experience or education.

Chapter Two:

1.6 Introduction

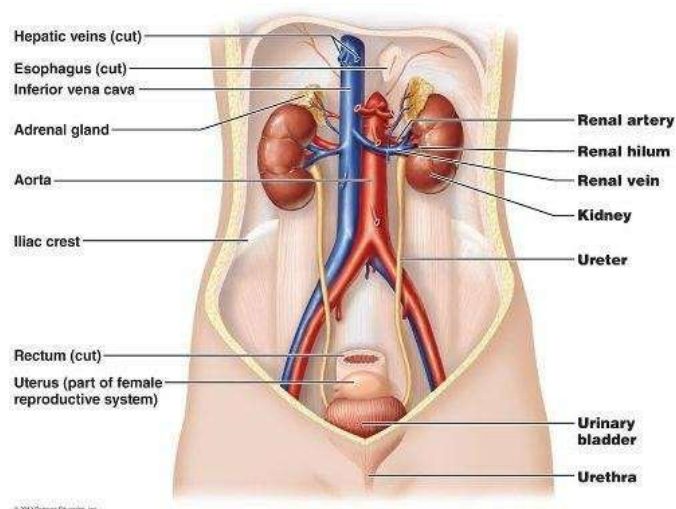
In this chapter the background and the main themes for the Search is discussed. Some of the terms are defined here are since, to prevent CAUTIs, the nurses should have basic knowledge about urinary tract, prevalence of the CAUTIs, different catheterization methods and catheter types and infection prevention. Basic nursing skills and knowledge remain essential in the prevention of nosocomial infections.

1.7 The Urinary Tract

The urinary tract is a part of the human body's urinary system, which consists of the kidneys, ureters, the urinary bladder and the urethra, and The human urinary tract is a contiguous hollow-organ system whose primary function is to collect, transport, store, and expel urine periodically to eliminate metabolic waste products and toxic wastes generated in the kidneys (Shier, Butler & Lewis 2006, 470)

The urinary system is also responsible for maintaining the homeostasis of water, blood pressure, ions, calcium and red blood cells inside the human body.

The human urinary tract contains the kidneys, the ureters, the bladder, and the urethra. The kidneys and the ureters are considered as upper urinary tract and the lower urinary tract includes the bladder and the urethra. In addition, the male lower tract urinary comprises the prostate. (Mangera, Osman & Chappel, 2013).



A diagram depicting the anatomy of the urinary system is shown in figure 1

Figure 1: The urinary system. Anterior view of the female urinary organs. Source: (Marieb & Hoehn, 2013. P 961).

The kidneys are pair of bean shaped organs located in superior lumbar region. Frontal section of a kidney has three main regions, renal cortex, renal medulla and renal

pyramids. (Marieb & Hoehn, 2013. P 962).

Urine formation process is carried out in nephrons, which is the structural and functional unit of the kidney. Each kidney consists of more than millions of nephrons. The filtering process and urine formation occur in the nephrons in three steps, glomerular filtration, tubular reabsorption, and tubular secretion. Within this process the kidney filters nearly 200 liters of fluid daily and eliminate metabolic waste, toxins, and excess ions from the body. (Marieb & Hoehn, 2013. P 969).

The ureters are fibromuscular tubes which arise from the kidney pelvis and descend till renal pelvis then curve forwards and entered to the bladder. The adult ureters are about 25cm long. The main function of the ureters is propelling the urine from the kidneys into the bladder. (Marieb & Hoehn, 2013. P 986)

Human bladder is smooth, collapsible muscular hollow organ. The size and the position of the bladder depends on the volume of the urine accumulated in the bladder. The empty bladder collapses and lies in the pelvic floor and when urine accumulate the bladder expands by stretching the muscles. Normal expanded adult bladder is pear shaped, about 12 cm long and can stores approximately 500ml urine. Human bladder can hold maximum 800ml to 1000ml of urine and extremely full bladder can be palpated abdominally. (Marieb & Hoehn, 2013. P 986). The branches of hypogastric trunk of the internal iliac artery provides the blood supply to the bladder. Bladder receives both parasympathetic and sympathetic nerve stimulus. The primary function of the urinary bladder is to store urine temporally. Apart from that, the urinary bladder supports to expel urine by generating pressure by bladder muscles. (Mangera et al, 2013).

Male urethra is narrow fibromuscular tube which is about 20 cm long. (American Urological Association 2016). The female urethra is relatively short and about 4cm. female urethra emerges at the female external urethral orifice above the vaginal opening. (Mangera et al 2013). The function of urethra is to expel the urine from the body. In addition, the male urethra expels the semen as well. (Marieb & Hoehn, 2013. P 987). In male the prostate is located behind the symphysis, which is about 20 g in weight and

surrounded by tough fibrous tissues. One third of the seminal secretion is produced in prostate . (Mangera et al, 2013). Figure 2 shows the anatomy of female and male lower urinary tract.

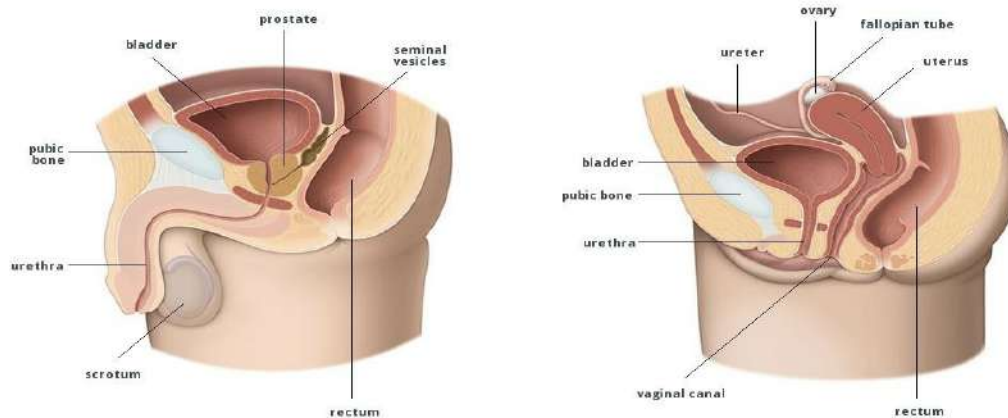


Figure 2: Female and male lower urinary tract. Source:(European association of urology,2017).

1.8 Hospital-Acquired Infections

Hospital-acquired infections, also referred to as healthcare-associated infections (HAI) or nosocomial infections, are defined by the World Health Organization (WHO) as: “an infection occurring in a patient during the process of care in a hospital or other health care facility which was not present or incubating at the time of admission” (WHO, n.d.).

Healthcare-associated infections affect an estimated 1.7 million people annually in the United States, and account for around 99,000 deaths (Bruminhent et al. 2010). Common hospital acquired infections include catheter-related blood stream infections, Clostridium Difficile infection, surgical site infections and ventilator associated pneumonia, although most sources agree that catheter-associated urinary tract infection (CAUTI) is the most prevalent HAI in high-income countries (WHO n.d.)

The prolonged and inappropriate use of invasive devices (such as central lines,

urinary catheters and ventilators), is the main risk factor for acquiring a HAI. Other risk factors include the extended use of antibiotics, the use of high-risk and sophisticated medical procedures, and the poor application of infection control protocols. Immunocompromised patients are also at a greater risk of developing a HAI (WHO n.d.).

The recommendations given by the National Institute for Health and Care Excellence (NICE) for the avoidance of healthcare-associated infections are based on the five following themes:

hospital environmental hygiene, hand hygiene, the use of personal protective equipment (PPE), the safe use and disposal of sharps, and the principles of asepsis (Loveday et al. 2014). Most of these general principles can equally be effectively applied for the prevention of CAUTI.

1.9 Catheter associated urinary tract infections

Between 15% and 25% of hospitalized patients may receive short-term indwelling urinary catheters at some point during their hospital stay. (CDC, 2009). According to the point prevalence survey database (HAI-net) of European Centre for Disease Prevention and Control, in Finland 12% of the HAI are Urinary tract infections and third most frequent infection. (ECDC, 2012).

As Catheter Urinary tract infections are the most common type of healthcare-associated infection, which is more than 30% of nosocomial Infections. (CDC, 2009). 70%–80% of these urinary tract infections are related to an indwelling urethral catheter. (Lo et al., 2014), it is (CAUTI) can define as presence of bacteriuria or funguria with a count of more than 10⁵ CFUs/ml with a maximum of 2 isolated microbial species. (World Health Organization, 2002). Duration of the catheterization plays significant role in risk factors of CAUTI. (EAUN, 2012). The incidence of bacteriuria with catheter is estimated as 3%-10%, increased with the prolonged catheterization and reached to the 100% after 30 days. (CDC, 2009).

Types of Urinary tract infections

Urinary tract infections are divided into two groups as lower urinary tract infections and upper urinary tract infections.

Upper urinary tract infections are pyelonephritis, which is inflammation of the renal pelvis, interstitial nephritis which is the inflammation of the kidney and renal abscesses. Those upper urinary tract infections are considerably less common than the lower urinary tract infections. (Smeltzer et al. 2010, 1359)

Lower urinary tract infections are identified as bacterial cystitis (inflammation of the urinary bladder), bacterial prostatitis (inflammation of the prostate gland) and bacterial urethritis (inflammation of the urethra).

Most common symptoms in urinary tract infections are burning in urination, frequency of urination, urgency, nocturia, incontinence and pelvic pain. (Smeltzer et al. 2010, 1361). Microbes from the urinary tract can spread and cause sepsis, septic shock, and multi-organ failure. (Magnusson, 2019)

CAUTI pathogenesis and epidemiology

CAUTI can be diagnosed from accordingly collected urine sample from the patient, if the one or more pathogens existence is more than 10⁵ cfu/ml. The most common pathogen responsible for CAUTI is *Escherichia coli* and followed by *Enterococcus*, *Pseudomonas*, *Proteus*, *Klebsiella* and *Enterobacter*. (Majumder et al, 2020). Endogenous sources of microorganism such as vaginal or rectal colonization or external sources of microorganism such as contaminated instruments or hands can cause CAUTI. (CDC, 2009)

Biofilm formation along the catheter surface is the most important cause of bacteriuria. Biofilm consists of micro-organisms growing in colonies within an extracellular mucopolysaccharide substance which is self-developed. Biofilm formation begins immediately after catheter insertion. At the beginning of the formation a single organism is usually identified and with the prolonged catheterization polymicrobial bacteriuria is presented. Growing in a biofilm relatively helps microbial to protect from antimicrobials. (Majumder et al, 2020)

Antimicrobial resistance is a significant problem related with CAUTI as most of the CAUTI causing pathogens are highly antibiotic resistance. (CDC, 2009). 70% of the bacteria that cause HAI are resistant to at least one relevant antibiotic. (Magnusson, 2019). pathogens within the biofilm are well protected from antibiotics therefore the CAUTI becomes hard to treated. Treatment of asymptomatic bacteriuria in catheterized patients should be avoided as this can only aggravate the problem of antimicrobial resistance in healthcare. (Köves, Magyar and Tenke, 2017).

1.10 Infection prevention

According to the world health organization's report on prevention of hospital-acquired infections, prevention of nosocomial infections is the responsibility of all individuals.

- According to the world health organization's report on prevention of hospital-acquired infections, prevention of nosocomial infections is the responsibility of all individuals.
- Health authorities are responsible for developing national or regional programs to supports hospitals to prevent infections.
- The prevention is mainly focused on hospitals and healthcare settings.
- Hospitals should have yearly work plan for infection prevention which includes promote good healthcare, sufficient resources and staff training etc.
- Infection control physicians and infection control practitioners together made the infection control team of the hospital and this team is responsible for the infection control, as well as preparing the yearly work plan. (WHO, 2002).

The Association of Professionals in Infection Control and Epidemiology has introduced six core competencies for infection perfectionists. They are identification of infectious disease processes, surveillance, and epidemiologic investigations, preventing and controlling the transmission of infectious agents, employee-occupational health, management and communication and education and research. (Gase, Leone, Khoury and Babcock, 2015).

And The following are practices for preventing CAUTIs (Perry et al., 2014):

- Insert urinary catheters using sterile technique.
- Only insert catheters when essential, and remove as soon as possible.
- Use the narrowest tube size (gauge) possible.
- Provide daily cleansing of the urethral meatus with soap and water or perineal cleanser, following agency policy.
- Ensure a closed drainage system.
- Ensure that no kinks or blockages occur in the tubing.
- Secure the catheter tube to prevent urethral damage.
- Avoid use of antiseptic solutions on the urethral meatus and/or in the urinary bag

1.11 Urinary Catheter

urinary catheter is a tube placed in the body to drain and collect urine from the bladder, Catheters come in many sizes, materials (latex, silicone, Teflon), and types (straight or coude tip). A Foley catheter is a common type of indwelling catheter. It has soft, plastic or rubber tube that is inserted into the bladder to drain the urine, There are 3 main types of catheters: (<https://medlineplus.gov/ency/article/003981.htm>)

- Indwelling catheter
- Condom catheter
- Intermittent self-catheter
- indwelling urethral catheters

Indwelling Urinary Catheters

Urinary catheterization is a very common procedure found in hospitals, and is even more common in intensive care units (ICU). Approximately 15-25% of all hospitalized patients will receive a catheter at some point during their stay (Loveday et al. 2014).

An indwelling urinary catheter, commonly known as a Foley catheter, is a thin,

flexible tube that is generally made from rubber, plastic (PVC), silicone or latex. The catheter tube is inserted into the bladder via the urethra, in order to drain urine. A Foley catheter is a double lumen (tube) catheter; the larger lumen drains urine from the bladder, and the smaller lumen is used to inflate the small balloon at the tip of the catheter. The inflated balloon anchors the catheter tube inside the bladder. A 22cm long catheter is used for females, and for males, a 40cm catheter (Berman, Snyder, Kozier & Erb 2008).

Indwelling urinary catheters are connected to a closed, gravity drainage system comprised of the catheter, tubing and a urine collection bag. These types of systems rely on the force of gravity to drain the bladder (Berman et al. 2008).

The catheterizations of females is generally considered to be less complicated than males, due to the shorter length of the urethra. As the urethra in male patients is longer and more twisting, there is a greater risk for urethral trauma (Berman et al. 2008).

Urinary catheters are inserted in hospitals for a variety of reasons, however the most widely accepted and standardized list of indications is that which is provided by the United States Centers for Disease Control and Prevention (CDC):

The appropriate indications for catheterization are defined as acute urinary retention, bladder outlet obstruction, the accurate measurement of urinary output in critically ill patients, continuous bladder irrigation for urinary hemorrhage, urinary incontinence posing a high risk for the patient, palliative care for the terminally ill and the preoperative and postoperative use in some surgeries (Gould, Umscheid, Agarwal, Kuntz & Pegues 2009).

Transurethral indwelling catheterization or urinary catheterization is defined as “passage of a catheter into the urinary bladder via the urethra” (European association of urological nurses, 2012).

Indications for urinary catheterization

Acute or chronic urinary retention is the main indication for urinary catheterization. In addition to that urinary catheterization is using to empty the bladder prior to surgery, maintain a continuous outflow of urine for neurological patients, to instill medication,

irrigate the bladder, to collect a sterile specimen of urine, to assist in healing of open sacral or perineal wounds in incontinent patients and to determine accurate fluid balance. (EAUN, 2012 & the Australian and New Zealand Urological Nurses Society, 2013)

Intermittent catheterization, short term, and long-term catheterization

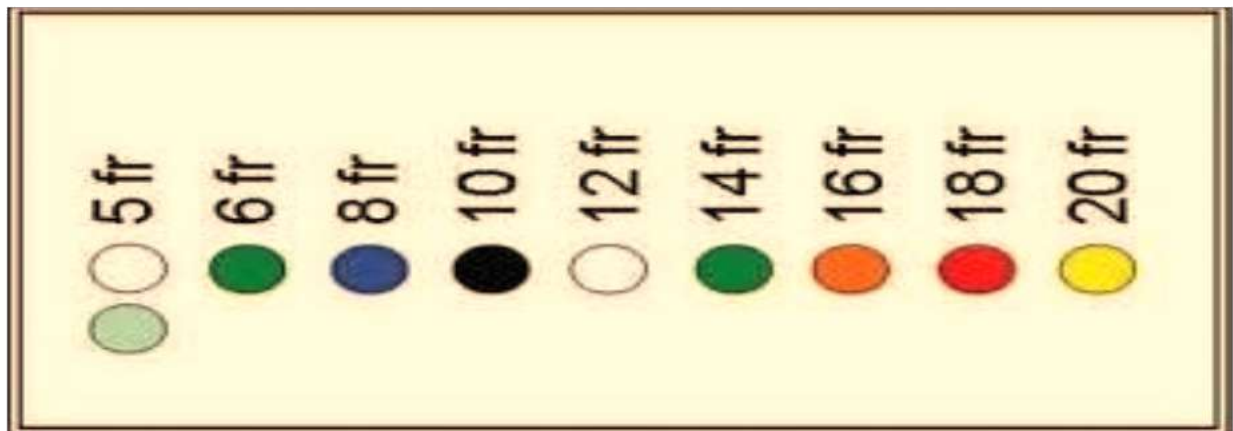
In intermittent catheterization the catheter removes immediately after insertion and has very few contraindications. In the hospital intermittent catheterization should be sterile and should be performed by trained healthcare workers. Short term catheterization is mostly using in surgical setting and keep for less than 7 days. If the catheter remains in the patient more than a week it is considered as long-term catheters and they are mostly used in urinary retention. (EAUN, 2012 & ANZUNS, 2013)

Catheter type, size, and length

Catheters are available as one way, two ways and three ways. In intensive care and surgical rooms, the catheters with integrated temperature sensor are used for certain procedures. External diameter of the catheter is measured as the catheter size in Charriere (Ch), French Fg or Fr. 1mm is equal to 3ch. Adult catheter size varies from size 6-24 fr and the standard male catheter length is 41cm-45cm and female catheter length is 20cm-25cm. (ANZUN,2013). Female catheters should not use for men due to the trauma occurs, if the balloon inflated within the urethra. The inflated balloon size varies from 5-30 ml, but standard size is 10ml. (EAUN, 2012). Figure 3 shows the catheter size and international color codes.

Figure 3: Catheter size and international color codes :(Australian and New Zealand Urological Nurses Society).

There are different drainage systems are available and selection of the drainage bag system depends on the various reasons such as duration of catheterization, patient's mobility. When the sterile aseptic technique is used to insert the catheter to the patient, the catheter must be connected to the sterile bag to minimize the risk of



catheter associated urinary tract infections. (EAUN, 2012)

Possible Complications

Complications of catheter use include:

- Allergy or sensitivity to latex
- Bladder stones
- Blood infections (septicemia)
- Blood in the urine (hematuria)
- Kidney damage (usually only with long-term, indwelling catheter use)
- Urethral injury
- Urinary tract or kidney infections
- Bladder cancer (only after long-term indwelling catheter)

(<https://www.healthline.com/health/urinary-catheters>)

Use of Urinary Catheters

Urinary elimination is a basic human function that can be compromised by illness, surgery, and other conditions. Urinary catheterization may be used to support urinary elimination in patients who are unable to void naturally. Urinary catheterization may be required:

- In cases of acute urinary retention
- When intake and output are being monitored
- For preoperative management
- To enhance healing in incontinent patients with open sacral and perineal wounds
- For patients on prolonged bedrest
- For patients needing end-of-life care . (EAUN, 2012).

1.12 Urinary catheter insertion practices

Practices about urinary catheterization are carried out through two basic steps, the first is the insertion of the urinary catheter and the second is the removal of the urinary catheter. These two steps will be explained in detail as follows:

Urinary catheter insertion practices

The steps for inserting an intermittent or an indwelling catheter are the same, except that the indwelling catheter requires a closed drainage system and inflation of a balloon to keep the catheter in place. Indwelling catheters may have two or three lumens (double or triple lumens). Double-lumen catheters comprise one lumen for draining the urine and a second lumen for inflating a balloon that keeps the catheter in place. Triple-lumen catheters are used for continuous bladder irrigation and for instilling medications into the bladder; the additional lumen delivers the irrigation fluid into the bladder.

Indwelling urinary catheters are made of latex or silicone. Intermittent catheters may be made of rubber or polyvinyl chloride (PVC), making them softer and more flexible than indwelling catheters (Perry et al., 2014). The size of a urinary catheter is based on the French (Fr) scale, which reflects the internal diameter of the tube. Recommended catheter size is 12 to 16 Fr for females, and 14 to 16 Fr for males. Smaller sizes are used for infants and children. The balloon size also varies with catheters: smaller for children (3 ml) and larger for continuous bladder irrigation (30 ml). The size of the catheter is usually printed on the side of the catheter port.

An indwelling catheter is attached to a drainage bag to allow for unrestricted flow of urine. Make sure that the urinary bag hangs below the level of the patient's bladder so that urine flows out of the bladder. The bag should not touch the floor, and the patient should carry the bag below the level of the bladder when ambulating.

how to insert an indwelling catheter?

Insertion of an Intermittent or Indwelling Urinary Catheter, always most used review and follow your hospital policy regarding this specific skill

.(<https://opentextbc.ca/clinicalskills/chapter/10-3-urinary-catheters/>)

▪ Safety considerations:

- Perform hand hygiene.
- Check room for additional precautions.
- Introduce yourself to patient.
- Confirm patient ID using two patient identifiers (e.g., name and date of birth).
- Explain process to patient; offer analgesia, bathroom, etc.
- Listen and attend to patient cues.
- Ensure patient's privacy and dignity.
- Assess ABCCS/suction/oxygen/safety.
- Apply principles of asepsis and safety.
- Check vital signs.

- Complete necessary focused assessments.

▪ Steps of Indwelling a Urinary Catheter

- Verify physician order for catheter insertion. Assess for bladder fullness and pain by palpation or by using a bladder scanner.
- Position patient prone to semi-upright with knees raised; apply gloves; and inspect perineal region for erythema, drainage, and odor. Also assess perineal anatomy.
- Remove gloves and perform hand hygiene.
- Gather supplies:
 - Sterile gloves
 - Catheterization kit
 - Cleaning solution
 - Lubricant (if not in kit)
 - Prefilled syringe for balloon inflation as per catheter size
 - Urinary bag
 - Foley catheter
- Check for size and type of catheter, and use smallest size of catheter possible.
- Place waterproof pad under patient.
- Positioning of patient depends on gender.
 - *Female patient:* On back with knees flexed and thighs relaxed so that hips rotate to expose perineal area. Alternatively, if patient cannot abduct leg at the hip, patient can be side-lying with upper leg flexed at knee and hip, supported by pillows.
 - *Male patient:* Supine with legs extended and slightly apart.
- Place a blanket or sheet to cover patient and expose only required anatomical areas.
- Apply clean gloves and wash perineal area with warm water and soap or perineal cleanser according to agency policy.
- Ensure adequate lighting.

- o Perform hand hygiene.
- o Add supplies and cleaning solution to catheterization kit, and according to agency policy.
- o If using indwelling catheter and closed drainage system, attach urinary bag to the bed and ensure that the clamp is closed.
- o Apply sterile gloves using sterile technique.
- o Drape patient with drape found in catheterization kit, either using sterile gloves or using ungloved hands and only touching the outer edges of the drape. Ensure that any sterile supplies touch only the middle of the sterile drape (not the edges), and that sterile gloves do not touch non-sterile surfaces. Drape patient to expose perineum or penis.
- o Lubricate tip of catheter using sterile lubricant included in tray, or add lubricant using sterile technique.
- o Check balloon inflation using a sterile syringe.
- o Place sterile tray with catheter between patient's legs.
- o Clean perineal area as follows.
 - Female patient: *Separate labia with fingers of non-dominant hand (now contaminated and no longer sterile). Using sterile technique and dominant hand, clean labia and urethral meatus from clitoris to anus, and from outside labia to inner labial folds and urethral meatus. Use sterile forceps and a new cotton swab with each cleansing stroke.*
 - Male patient: *Gently grasp penis at shaft and hold it at right angle to the body throughout procedure with non-dominant hand (now contaminated and no longer sterile). Using sterile technique and dominant hand, clean urethral meatus in a circular motion working outward from meatus. Use sterile forceps and a new cotton swab with each cleansing stroke.*
- o Pick up catheter with sterile dominant hand 7.5 to 10 cm below the tip of the catheter.
- o Insert catheter as follows.
 - *Female patient.*

- Ask patient to bear down gently (as if to void) to help expose urethral meatus.
- Advance catheter 5 to 7.5 cm until urine flows from catheter, then advance an additional 5 cm.
- *Male patient:*
 - Hold penis perpendicular to body and pull up slightly on shaft.
 - Ask patient to bear down gently (as if to void) and slowly insert catheter through urethral meatus.
 - Advance catheter 17 to 22.5 cm or until urine flows from catheter.
- Place catheter in sterile tray and collect urine specimen if required.
- Slowly inflate balloon for indwelling catheters according to catheter size, using prefilled syringe.
- After balloon is inflated, pull gently on catheter until resistance is felt and then advance the catheter again.
- Connect urinary bag to catheter using sterile technique.
- Secure catheter to patient's leg using securement device at tubing just above catheter bifurcation.
- *Female patient:* Secure catheter to inner thigh, allowing enough slack to prevent tension.
- *Male patient:* Secure catheter to upper thigh (with penis directed downward) or abdomen (with penis directed toward chest), allowing enough slack to prevent tension. Ensure foreskin is not retracted.
- Dispose of supplies following agency policy.
- . Remove gloves and [perform](/clinicalskills/chapter/1-6-hand-hygiene/) hand hygiene.
- Document procedure according to agency policy, including patient tolerance of procedure, any unexpected outcomes, and urine output.

Removing a Urinary Catheter

A urinary catheter should be removed as soon as possible when it is no longer needed. For post-operative patients who require an indwelling catheter, the catheter should be removed preferably within 24 hours.

When a urinary catheter is removed, the health care provider must assess if normal bladder function has returned. The health care provider should report any hematuria, inability or difficulty voiding, or any new incontinence after catheter removal. Prior to removing a urinary catheter, the patient requires education on the process of removal, and on expected and unexpected outcomes (e.g., a mild burning sensation with the first void) (VCH Professional Practice, 2014). The health care provider should instruct patients to

- Increase or maintain fluid intake (unless contraindicated)
- Void when able and within six to eight hours after removal of the catheter
- Inform the health care provider when he or she has voided, and measure the amount, colour, and any abnormal findings; ensure first void (urine output) is measured as per agency policy
- Report any burning, pain, discomfort, or small amount of urine volume
- Report an inability to void, bladder tenderness, or distension
- Report any signs of a CAUTI

how to insert an indwelling catheter?

Always review and follow your hospital policy regarding this specific skill. (<https://opentextbc.ca/clinicalskills/chapter/10-3-urinary-catheters/>)

▪ **Safety considerations:**

- Perform hand hygiene.
- Check room for additional precautions.
- Introduce yourself to patient.
- Confirm patient ID using two patient identifiers (e.g., name and date of birth).
- Explain process to patient; offer analgesia, bathroom, etc.

- Listen and attend to patient cues.
 - Ensure patient's privacy and dignity.
 - Assess ABCCS/suction/oxygen/safety.
 - Apply principles of asepsis and safety.
 - Check vital signs.
 - Complete necessary focused assessments.
- **Steps of Removing an Indwelling Catheter**
 - Verify physician orders, perform hand hygiene, and gather supplies.
 - Identify patient using two identifiers. Create privacy and explain procedure for catheter removal.
 - Educate patient on catheter removal and post-urinary catheter care.
 - Perform hand hygiene and set up supplies.
 - Apply non-sterile gloves.
 - Measure, empty, and record contents of catheter bag. Remove gloves, perform hand hygiene, and apply new non-sterile gloves.
 - Remove catheter securement/anchor device.
 - Perform catheter care with warm water and soap or according to agency protocol.
 - Insert syringe in balloon port and drain fluid from balloon. Verify balloon size on catheter to ensure all fluid is removed from balloon.
 - Pull catheter out slowly and smoothly. Catheter should slide out slowly and smoothly.
 - Wrap used catheter in waterproof pad or gloves. Unhook catheter tube from urinary bag. Discard equipment and supplies according to agency policy.
 - Provide perineal care as required and reposition patient to a comfortable position.
 - Review post-catheter care, fluid intake, and expected and unexpected outcomes with patient.
 - Lower bed to safe position, remove gloves, and perform hand hygiene.
 - Document procedure according to agency policy.
 - If a patient is unable to void after six to eight hours of removing a urinary catheter, or has the sensation of not emptying the bladder, or is experiencing small voiding

amounts with increased frequency, a bladder scan may be performed. A bladder scan can assess if excessive urine is being retained. Notify the health care provider if patient is unable to void within six to eight hours of removal of a urinary catheter. If a patient is found to have retained urine in the bladder and is unable to void, an intermittent/straight catheterization should be performed (Perry et al., 2014).

- o Critical Thinking Exercises

- Describe the different techniques for cleansing a female and a male patient prior to catheterization.
- Your male patient complains of pain while you are inserting a urinary catheter. Describe your next steps.

1.13 Nursing Interventions

Nurses insert up to 50% of catheters and subsequently are responsible for the majority of catheter care (Leaver 2007). Nurses therefore are in a prime position to make a positive impact on the care of patients with catheters, and on the prevention of CAUTI, through the effective use of appropriate nursing interventions.

A nursing intervention is defined by Berman et al as “any treatment based on clinical judgement and knowledge, that a nurse performs to enhance patient/client outcomes” (Berman et al. 2008, 2008). A nurse, in providing care for her patients, follows a typical nursing process. It is explained by Berman et al. as a systematic and client-centred method of planning and delivering nursing care. The stages of the nursing process include assessing, diagnosing, planning, implementing and evaluating. Through this nursing process, problems will be defined, a nursing diagnosis will be decided, a care plan will be drawn up and implemented, and the outcomes will be evaluated (Berman et al. 2008. 2008).

Nursing interventions are decided during the planning phase, and performed during the implementation phase. The decision to use one particular nursing intervention over another is based on sound nursing knowledge. In addition, evidence-based rationale

helps nurses to decide which interventions are likely to lead to the desired patient outcomes after considering the risks and benefits of all options (Berman et al. 2008).

Berman et al. propose that there are three different types of nursing interventions. Independent interventions are those activities that nurses are licensed to initiate independently, according to their own knowledge and training. These include physical care, emotional support and assessment. Dependent interventions are nursing interventions which are carried out under physicians' orders or supervision, for example, medication, tests or treatments. The final type of nursing interventions are collaborative interventions. This is where nurses carry out actions in collaboration with the multi-disciplinary team, for example physiotherapists and dieticians, to work towards a common goal. The types of nursing interventions employed by a nurse depends heavily on the department where she is working, the individual needs of the patient, and the experience of the nurse (Bali R, 2014).

Approximately 2–5% of all surgical patients tend to acquire surgical site infections (SSIs) (Bali R, 2014).

In developed & high-income countries (HICs), SSIs are the second most common cause of healthcare-associated infections (Bratzler DW, 2005), whereas in Low- & Middle-Income Countries (LMICs) or underdeveloped & developing countries these infections are the most common ones. Thus, to reduce the risk of surgical site infections, a more systematic approach has to be adopted, based on proper knowledge regarding the status of the patient, type, & time of the operation, personnel involved and the health care facilities available during a surgical procedure. The main pathogenic source of surgical site infections is the endogenous flora (usually aerobic gram positive cocci) of the patient present in the skin, the mucous membranes, or the hollow viscera. The exogenous sources of infection include members of the surgical team, environment of the operating theater and tools, materials & instruments brought to the sterile zones during the surgical procedure. Various strategies employed to prevent or control the occurrence of surgical site infections include reducing the contamination by microorganisms on the sterile surgical instruments as well as the body of the patient,

prophylactic preoperative antibiotic coverage, carrying out the surgical procedure carefully, proper handling of the operating room.

1.14 The role of education and training of nursing in promoting infection control

The implementation of evidence-based strategies designed to reduce the rate of CAUTI is hindered by the reluctance of nursing staff to change well-established habits and beliefs (Meddings, Krein, Fakih, Olmsted & Saint 2013). Targeted nurse education is essential to overcome these barriers and to improve the uptake of new methods and interventions. Bernard et al. (2012), Quinn (2015), Madeo et al. (2005), Gray et al. (2016), Godfrey & Fraczyk (2005) and Buckley et al. (2015) mutually reiterate the importance of nurse education in the prevention and reduction of CAUTIs.

The CDC (2009) recommend that care-givers must be provided with “education about CAUTI, other complications of urinary catheterization, and alternatives to indwelling catheters.”

Gray et al. (2016) suggest as a method of reducing CAUTI rates in hospital , a multi disciplinary education and training campaign is highly effective. In this case study, the education focussed on teaching the latest evidence-based practices, including implementing tightly defined indications for indwelling catheter use, the importance of a daily review, and a discussion of the alternatives to catheterization. This education was successful in not only reducing the incidence of CAUTI, but also increased the awareness of healthcare workers about the consequences of CAUTI, and the importance of CAUTI prevention (Gray et al. 2016).

A study performed by Quinn (2015), assessed the impact of a CAUTI reduction program in combination with targeted nurse education. The study took place in a 301-bed community hospital in New York City, over a period of 5 years. This included the implementation of varied and diverse education sessions, in large groups in the hospital auditorium, as well as small information sessions on all of the wards. These sessions

were led by clinical nurse specialists during morning, evening and night shifts, and covered a wide variety of topics relating to CAUTI prevention. These nurse education sessions, in combination with other CAUTI prevention tactics, were shown to have dramatically reduced the incidence of hospital acquired CAUTI within the first year. Furthermore, the rate of CAUTI continued to decrease year on year from 110 cases of CAUTI in 2008, to only 2 cases in 2013 (Quinn 2015).

Buckley et al. (2015) highlights the importance of teaching pre-registration nursing students about the risks and consequences of CAUTI, and ways of preventing CAUTI from occurring. They suggest to use peer teaching as an effective form of learning for students on clinical placements (Buckley et al. 2015). Alternatively, Bernard et al. (2012) recommends that the teaching of CAUTI could be integrated into the students' learning of the catheterization skill.

Bernard et al. (2012) reported in their findings that after a period of time, nurses are likely to regress to old habits and practices. This highlights the importance of continuing education, and on-going support for nursing staff. It is also mentioned in the CDC Guidelines for CAUTI prevention (2009) to "ensure that healthcare personnel and others who take care of catheters are given periodic in-service training regarding techniques and procedures for urinary catheter insertion, maintenance, and removal."

As professionals, nurses have responsibility for their own ongoing learning. According to the United Kingdom Nursing and Midwifery Council (NMC) Code of Conduct for Nurses (2015), all nurses have an obligation to keep their knowledge and skills up to date, and to take part in learning and continued professional development (CPD) activities to maintain and develop their competency.

In addition, employers have a degree of responsibility to provide training opportunities for their staff. Despite there being no legal obligation to provide time for CPD-related learning for their staff (Royal College of Nursing 2016), the NMC (2016) suggests it is good practice for employers to provide training opportunities for their continued education and improvement of competency.

1.15 Studies on Preventive Measures of Catheter Associated Urinary Tract Infections

Ljubovic et al; (2009) conducted a study on catheter-related urinary tract infection in patients suffering from spinal cord injuries. In this study the researchers selected 145 patients suffering from spinal cord injuries, admitted to the Institute for physical medicine and rehabilitation, Centre for paraplegia of the Clinical Centre of the University of Sarajevo. The objective of this study was the update of etiology and antimicrobial susceptibility in urinary tract infections in this group of patients. In addition, possible correlations between UTI and the type of bladder management were examined. The patients were divided in three groups according to the method of bladder drainage: Group A (n=61) consisted of patients on clean intermittent catheterization; Group B (n=54) consisted of patients with indwelling catheters; Group C (n=30) consisted of patients who had performed self-catheterization. From a total of 4539 urine samples, 3963 (87,3%) were positive and 576 (12,7%) were sterile. More than 90% of the infected patients were asymptomatic. The overall rate of urinary infection amounted to about 2;1 episodes, and bacteriuria to 8;1 episodes per patient. 77% of infections (113/145) were acquired within seven days from catheterization. Infection was usually polymicrobial; the greatest number of urine samples 1770/3943 (44.9%) included more than one bacterium. The vast majority of cases of urinary tract infection and bacteriuria were caused by Gram-negative bacilli and enterococci, commensal organisms of the bowel and perineum, representative of those from the hospital environment. *Providencia stuarti* (18.9%) being the most common, followed by *Proteus mirabilis* (16.3%), *Escherichia coli* (11.8%), *Pseudomonasaeruginosa* (10.2%), *Klebsiella pneumoniae* (8.1%), *Morganella morganii* (5.4%), *Acinetobacter baumannii* (4.6%), *Providencia rettgeri* (3.5%). 15.7% of isolates were Gram-positive with *Enterococcus faecalis* (8.6%) as the most common. 55.3% of isolates were multidrug-resistant, and the highest rates of resistance were found among *Acinetobacter baumannii* (87.8%), *Providencia rettgeri* (86.7%), *Pseudomonas aeruginosa* (85.4%), *Providencia stuarti* (84.3%) and *Morganella morganii* (81.0%). Lower rates of resistance were found in Group C, i.e. patients on intermittent self-catheterisation. Eradication of organisms was achieved in only 53

(%10.05) of patients; hence, antibiotic therapy had no or very low effect. Significant correlations were found between the method of catheterization and the frequency of bacteriuria and urinary tract infections. The analysis of Group C showed a rate of lower urinary tract infection and bacteriuria than the other two Groups of patients.

Saint S et al; (2008) conducted a study to Preventing Hospital-Acquired Urinary Tract Infection in the United States to examine the current practices used by hospitals to prevent UTI. The researchers mailed written surveys to infection control coordinators at a national random sample of non federal US hospitals with an ICU (n=600) and to all Veterans affairs(VA)hospitals (n=119). The survey asked about practices to prevent hospital-acquired UTI and other device associated infections. In the result the response rate was 72%. Overall, 56% of hospitals did not have a system for monitoring which patients had urinary catheters placed, and 74% did not monitor catheter duration. Thirty percent of hospitals reported regularly using antimicrobial urinary catheters and portable bladder scanners; 14% used condom catheters, and 9% used catheter reminders. VA hospitals were more likely than non-VA hospitals to use portable bladder scanners (49% vs. 29%; $P > .001$), condom catheters (46% vs. 12%; $P > .001$), and suprapubic catheters (22% vs. 9%; $P > .001$); non-VA hospitals were more likely to use antimicrobial urinary catheters (30% vs. 14%; $P = .002$).the researchers concluded as a strong link between urinary catheters and subsequent UTI, but no strategy that appeared to be used to prevent hospital-acquired UTI. Most hospital-acquired UTIs are associated with urinary catheters. Up to 25% of hospitalized patients have a urinary catheter placed during their stay these catheters often cause considerable discomfort and embarrassment to patients The substantial morbidity associated with nosocomial UTI generates additional health care costs.

Hazelett et al;(2006) conducted a study to determine the frequency and appropriateness of indwelling urinary catheter (IUC) use in the Emergency 10 Department, in elderly patients admitted to an acute care hospital, the percentage of elderly patients with an IUC who were discharged from the hospital with a diagnosis of UTI, the percentage of patients with IUCs who were diagnosed and treated for UTI in the ED or who had admission bacteriuria $\geq 10^5$ organisms/ml indicating preexisting UTI, and

the percentage of patients with no indication of UTI on admission who had inappropriately placed IUCs and subsequently were diagnosed with a UTI. The result was Seventy three percent of patients who received an IUC in the ED were elderly (≥ 65 years old). During the study period, 277 elderly patients received an IUC prior to admission. Of these, 77 (28%) were diagnosed with UTI during their hospitalization. Fifty-three (69%) of those diagnosed with a UTI by discharge either had the UTI diagnosed in the ED or had bacteriuria $\geq 10^5$ organisms/ml prior to IUC placement. Of the 24 elderly patients who developed a catheter-associated UTI, 11 of the IUCs were placed inappropriately. Thus, 4% of elderly patients with no indication of UTI on admission who received an inappropriate IUC in the ED had a primary or secondary diagnosis of UTI by discharge. The overall rate of nosocomial UTI due to an inappropriately placed IUC was the same in males and females. The researchers concluded that the strong association between IUC use and UTI might partly be explained by the high prevalence of preexisting UTI prior to IUC placement. Further prospective studies are needed to clarify the true risk vs benefit ratio for IUC use in acutely ill elderly patients.

Stephan et al; (2006) conducted a prospective study on reduction of urinary tract infection and antibiotic use after surgery. In a controlled, prospective, before and after intervention trial with 1328 adult patients scheduled for orthopedic or abdominal surgery, nosocomial infection surveillance was conducted until hospital discharge. A multifaceted intervention including specifically tailored, locally developed guidelines for the prevention of urinary tract infection was implemented for orthopedic surgery patients, and abdominal surgery patients served as control subjects. Infection and non-infectious complications, adherence to guidelines and antibiotic use were monitored before 11 and after the intervention and again two years later. The result was the incidence of urinary tract infection decreased from 10.4 to 3.9 episodes per 100 patients in the intervention group (incidence density ratio 0.41; 95% CI 0.20-0.79; $p=0.004$). Adherence to guidelines was 82.2%, both the frequency and the duration of urinary catheterization decreased following the intervention. Re-course to antibiotic therapy after surgery dropped in the intervention group from 17.9 to 15.6 defined daily doses per 100 patient days ($p>0.005$) because of a reduced need for the treatment of urinary tract

infection ($p>0.001$). Follow up after two years revealed a sustained impact of the strategy and a subsequent low use of antibiotics, consistent with stable adherence to guidelines 80.8%. The researchers concluded a multifaceted prevention strategy could dramatically decrease postoperative urinary tract infection and contribute to the reduction of the overall use of antibiotics after surgery.

1.16 Studies on Knowledge and Practice of Catheter Associated Urinary Tract Infections

Dreconja et al; (2010) conducted an internet survey on the foley catheter practices and knowledge among Minnesota physicians including indications for Foley catheter placement, effectiveness of interventions for preventing CAUTI, and knowledge of and response to the changed reimbursement policy in Minnesota physicians. The results were a good knowledge regarding indications for catheterization, with the 2 indications most widely accepted as being valid (critical illness with tenuous volume status and urinary obstruction) receiving the highest appropriateness scores. Most respondents reported awareness of the changed reimbursement policy for CAUTI; fully one-third indicated that because of this change, they now removed catheters earlier than previously. The responses from primary care physicians and surgeons differed significantly in terms of indications for catheterization, methods to prevent CAUTI, and the impact of the policy change on their practice patterns. The researchers concluded that the physicians have good knowledge regarding Foley catheter use, and most 12 were aware of the changed CAUTI reimbursement policy. Surgeons. Efforts are needed to translate catheter-related knowledge into good clinical practice.

Drekonja et al; (2010) conducted an internet survey of foley catheter practices and knowledge among minnesota nurses and selected a random sample of registered nurses (RNs) in Minnesota. The survey contained demographic questions and 5-point Likert-scale questions regarding indications for Foley catheter placement and effectiveness of various interventions for preventing CAUTI. Nurses perceived early catheter removal as the most effective intervention to prevent CAUTI (mean score, 4.5;

range 1-5). Compared with other RNs, those reporting additional catheter education were more likely to rate interventions to prevent CAUTI as effective, regardless of whether the interventions actually reduce the incidence of symptomatic CAUTI or a symptomatic bacteriuria/funguria. Intensive care unit RNs were significantly more likely than other RNs to endorse that a Foley catheter was indicated for any given clinical scenario and to endorse antimicrobial-coated catheters as effective in preventing CAUTI. Most respondents reported no institutional guidance regarding catheterization. The researchers concluded that the Minnesota RNs demonstrated high-level awareness of the utility of early Foley catheter removal for preventing CAUTI.

Chapter three:

Methodology

1.17 Introduction

This chapter explains the study methods that guided the study from the onset till its completion. These include the area of study, research design, study population, sample size estimation, selection criteria, sampling method, data collection methods, data collection instrument, data analysis, ethical considerations, limitations of the study, rigors of research and dissemination of the findings.

1.18 Study design.

This study used a descriptive cross-sectional design consisting of a self-administered questionnaire to collect data on nurses' knowledge and practice towards CAUTI prevention.

1.19 Study setting

A study setting or study area is the area in which the Study was done. In this case, the current study was conducted in AL-Thawra general hospital in Sana'a, City, Yemen.

1.20 Study population.

All nurses working in ICU of AL-Thawra general hospital in Sana'a, City, Yemen. ICU nurses were included in this study because they are in the first line of defense in preventing bacterial colonization of the genital-urinary tract during routine nursing care delivered to patients like urinary catheterization, bed bath, and urine sample collection.

The total number of nurses who were working in ICU of ICU of AL-Thawra general hospital was 129 nurses.

Inclusion criteria

Having a minimum of 6 months working experience in ICU.

Working as full time nurses in ICU

Exclusion criteria

ICU nurses who did not consent to participate in the study

All nurses who were not at work during the time of data collection like those on leave.

1.21 Sampling methods

Sampling procedure or strategy

In this study total population sampling was used, that is one of purposeful sampling method used when the population to be studied is small and used as a whole without selecting some units of it was used. In this case all the participants that met the criteria were included in the study.

Sample size

All registered nurses working in ICUs of Al -Thawra general Hospital that fulfilled the inclusion criteria and who were available during the whole period of data collection, were included in the study.

Then among 129 nurses who were working in ICU of hospital at the time of data collection, only 113 filled well and returned back the questionnaire.

1.22 Data collection

Data collection tool

A structured questionnaire and were used as instrument to collect data.

The study questionnaire was made of 3sections including the first section dealing with demographic characteristics of respondents including age, gender, education level, years of experience

The second section of 10 questions related to catheter indications, maintenance, and care and removal time, risk factors for CAUTI and complications of CAUTI to assess nurses' knowledge towards CAUTI prevention.

In Knowledge section each correct answer was scored 1 and each wrong answer was scored 0.

the third section included of 20 individual items to assess the practice of nurses

towards CAUTI prevention, each (Yes) answer was scored 1, each (No, I don't know) answer was scored 0).

Validity and Reliability of the tool.

The tools used was prepared based on WHO standard precaution of infection control and Centers for Disease Control (CDC, 2009) guidelines for the indication of catheterization and measures for prevention of CAUTI.

Also the questionnaire developed and was adopted and modified based on literature.

Validity of the questionnaire and checklist was determined by matching the questions, study objectives and constructs of the conceptual framework.

In addition to this the content of the questionnaire was given to different experts in critical care who agreed that the questionnaire is suitable to be used for the current study.

To test the reliability of the questionnaire, Cronbach alpha was calculated after a test-retest by administering the questionnaire to 10 participants and the value was 86% that is in acceptable range.

Pilot study:

The pretest of the questionnaire was performed before data collection, a pilot study was done in study sitting on (10%) of sample nurses working in the ICU to assess reliability and validity of questionnaire to identify practical or local problems that might be potentially affect the research process.

Some questions WAS omitted, some added and others rephrased. The pilot study samples were excluding from the study samples.

Data collection procedure

After obtaining the permission from From the From the College of Nursing, 21 September University, and Chairman of the Al-Thawra General Hospital Authority in Sana'a for the study settings to conduct the study.

was explained the need and the purpose of the study to the unit ICU managers, Afterwards the researchers was given the permission to meet staff nurses to continue with data collection. Next, the participants who agreed to participate in the study were

informed of the aim of the study and explained the process of data collection, then after they were requested to sign a consent form. Data were collected using a questionnaire to evaluate the knowledge and practices of nurses while manipulating the urinary catheter.

The questionnaire was prepared in English and translated in Arabic to facilitate participants.

The questionnaire was administered to ICU nurses from 2022.

1.23 Data analysis

Study data were captured via a computer software Statistical Package for Social Sciences (IBM SPSS statistic 26) and analyzed using descriptive and inferential statistics.

frequency distribution were used to present demographic data. Descriptive and inferential statistics like chi-square and Fischer exact test were used for the data analysis and testing relationship among selected variables (demographic characteristics and knowledge, practices and practice), and data were presented in the form of tables, graphs, and diagrams. Pearson chi-square was used when expected frequency for each cell in the association was greater than five while Fisher's exact test was used when each cell in the association of variables had expected frequency equal or less than five.

Cronbach's alpha coefficient was used to test the reliability of the data collection tool.

1.24 Ethical consideration

Initially ethical clearance was obtained from University of 21 September, College of Medicine.

Then the letter was taken to Al -Thawra general Hospital. this hospital approved the proposal and the approval letter provided was submitted to the unit ICU managers to be allowed to start the data collection from nurses of the unit.

The purpose and nature of the study was explained to the nurse participants and then a written informed consent was obtained from all of them.

Each ICU nurse was free to participate or not in the study and had the right to

withdraw from it at any time without any pursuit.

Also, nurses were informed that obtained data were only to be used for the research purpose and not for their assessment.

Chapter four:

Findings

1.25 Introduction

This chapter included a presentation of data analysis and testing hypotheses of the study, by answering the study questions and reviewing the most prominent results of the questionnaire, which were reached by describing and analyzing the characteristics of the study sample members, and the questionnaire items were analyzed using appropriate statistical methods such as frequency, percentage, and others.

1.26 Demographic Data Analysis

This Section description the descriptive statistics of the demographic variables for the sample of the study members, which are as follows: -

4.2.1 Gender of participants

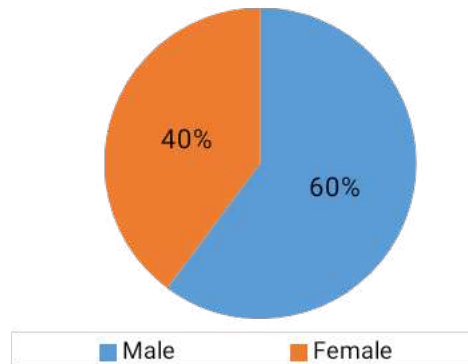
In the following table, the descriptive statistics of the gender variable of the sample members will be reviewed.

Table 4 1: Distribution of respondents according to gender

sex	frequency	Percent
Male	68	60.2%
Female	45	39.8%
Total	113	100.0%

The table (4-1) showed that the majority of the sample members were from the Male (60%), while Female was (40%), For more details, see Figure (4).

Figure 4: Distribution of respondents according to gender



4.2.2 Age of participants

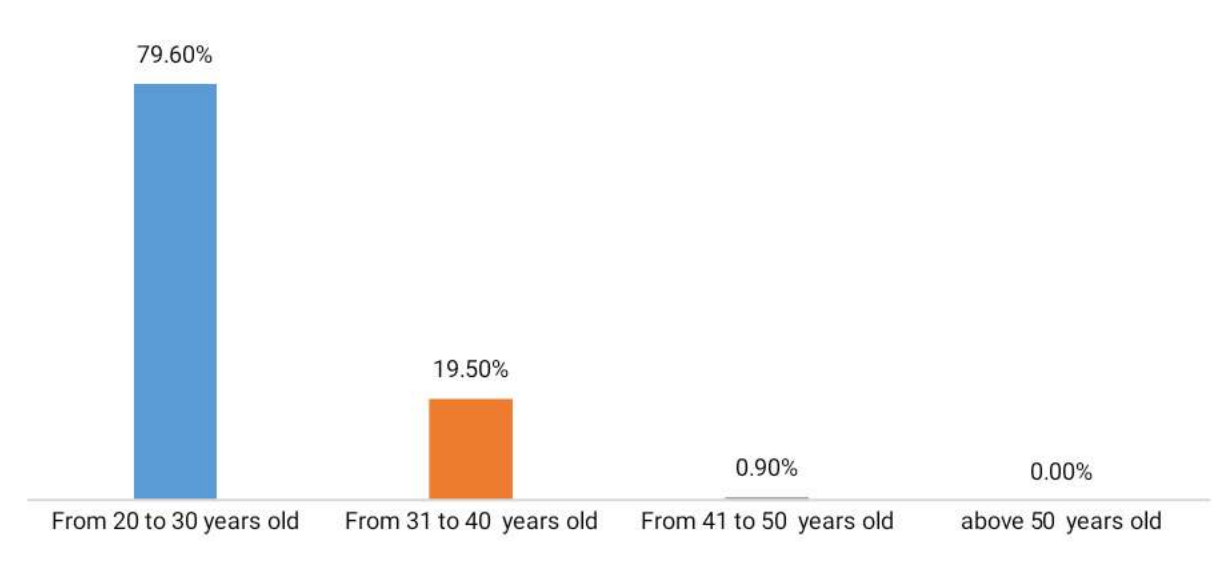
In the following table, the descriptive statistics of the age variable of the sample members will be reviewed.

Table 4 2: Distribution of respondents according to Age

Age	frequency	Percent
From 20 to 30 years old	90	79.6%
From 31 to 40 years old	22	19.5%
From 41 to 50 years old	1	0.9%
above 50 years old	0	0.0%
Total	113	100.0%

The table (4-2) showed that the majority of the sample members were aged from 20 to 30 years' old by percent (79.6%), while (19.5%) were from 31 to 40 years old and (0.9%) of them were aged from 41 to 50 years old. For more details, see Figure (5).

Figure 5: Distribution of respondents according to gender



4.2.3 Marital status of participants

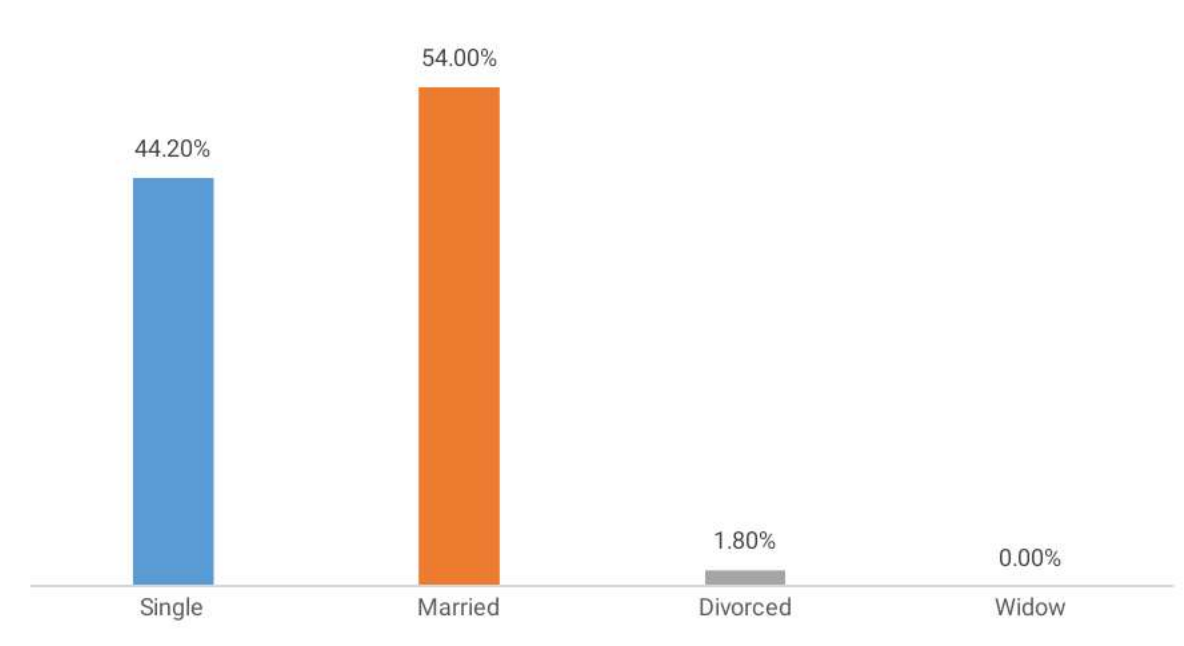
In the following table, the descriptive statistics of the Marital status variable of the sample members will be reviewed.

Table 4 3: Distribution of respondents according to marital status

Marital status	frequency	Percent
Single	50	44.2%
Married	61	54.0%
Divorced	2	1.8%
Widow	0	0.0%
Total	113	100.0%

The table (4-3) showed that the majority of the sample members were Marital status for them Married by (54.0%), followed of the sample members were Marital status for them Single by (44.2%), while (1.8%) were Divorced. For more details, see Figure (6).

Figure 6: Distribution of respondents according to marital status



4.2.4 Educational level of participants

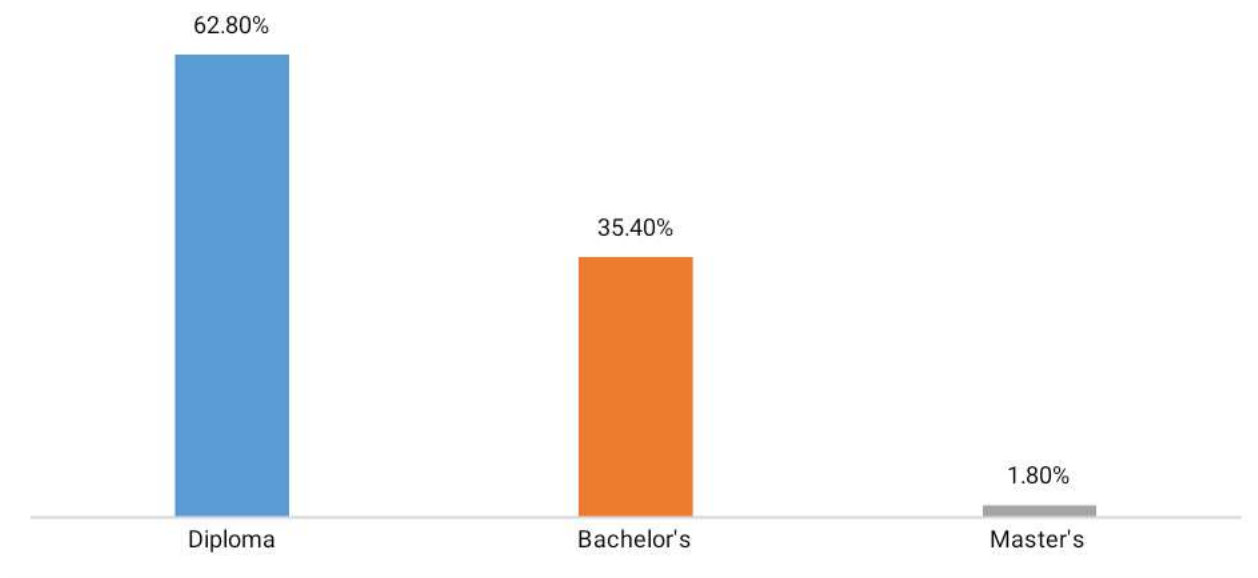
In the following table, the descriptive statistics of the Educational level variable of the sample members will be reviewed.

Table 4 4: Distribution of respondents according to educational level

Educational level	frequency	Percent
Diploma	71	62.8%
Bachelor's	40	35.4%
Master's	2	1.8%
Total	113	100.0%

The table (4-4) showed that The sample members who Educational diploma occupied the largest part in the sample with by (62.8%), followed of sample members who obtained the educational Bachelor's by (35.4%), followed of sample members who obtained the educational Master's by (1.8%). For more details, see Figure (7).

Figure 7:Distribution of respondents according to educational level



4.2.5 Years of experience of participants

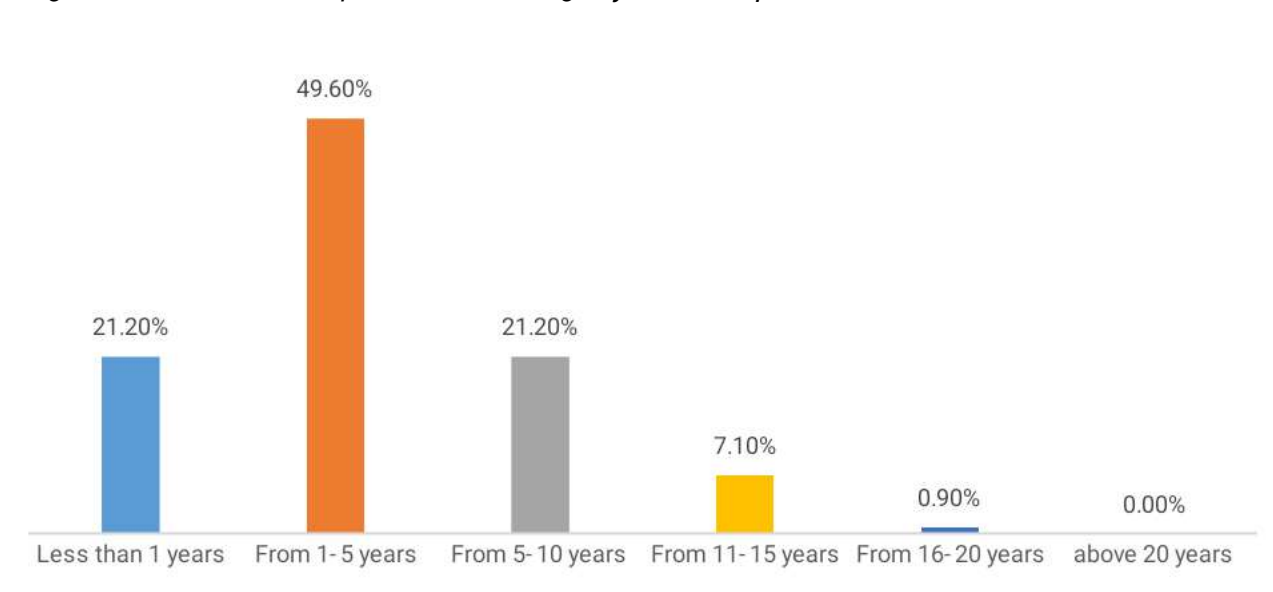
In the following table, the descriptive statistics of the Years of experience variable of the sample members will be reviewed.

Table 4 5: Distribution of respondents according to years of experience

Years of experience	frequency	Percent
Less than 1 years	24	21.2%
From 1- 5 years	56	49.6%
From 5- 10 years	24	21.2%
From 11- 15 years	8	7.1%
From 16- 20 years	1	0.9%
above 20 years	0	0.0%
Total	113	100.0%

The table (4-5) showed that (62.8%) of the sample members years of experience of them from 1- 5 years, (21.2%) them years of experience were from 5- 10 years and less than 1 years, (7.1%) them years of experience were from 11- 15 years, (0.9%) years of experience for them were from 16- 20 years.

Figure 8:Distribution of respondents according to years of experience



4.3 Knowledge of ICU nurses towards catheter indications and CAUTI prevention

The following table presents the descriptive statistics for the items that measure the extent of nurses' knowledge of the indications for urinary catheterization and the prevention of urinary tract infection (CAUTI).

Table 4 6: Frequency distribution of nurses based on the way they answered correctly each knowledge question.

Knowledge section variables		Yes		No	
		n	%	n	%
Among the following what is an inappropriate indication for indwelling urinary catheterization?	Obtaining urine for culture when the patient can voluntarily void	7	6.3%	106	93.8%
Which is an appropriate indication of urinary catheterization among the following?	Patients expected to receive large-volume infusions or diuretics during surgery.	38	34.5%	75	66.4%
Read the following carefully and select the proper technique used for indwelling urinary catheter Insertion?	Using aseptic technique with sterile equipment	98	86.7%	15	13.3%
Based on CDC 2009 Guidelines for prevention of Catheter associated urinary tract infection, operative patients who have been catheterized, it is advised to remove the catheter as soon as possible post operatively,	24 hours	59	53.6%	54	47.8%
As a nurse in critical care unit, you find that the indwelling urinary catheter is obstructed during your patient assessment, what are you going to do?	Change the catheter immediately	83	73.5%	30	26.5%
One of the following is not a nursing action to prevent infections from urinary catheter?	Changing indwelling catheters or drainage bags only at routine, fixed intervals	23	20.7%	90	79.6%
Which one among the following is a risk factor for CAUTI?	Prolonged time of catheterization	73	65.8%	40	35.4%
Among the following category of patients, who is at high risk of mortality or developing CAUTI?	Elderly patients of more than 65 years and women	72	64.9%	41	36.3%
Prior to inserting urinary catheter a nurse has to perform all of the following to prevent CAUTI except:	None of the above	43	38.4%	70	61.9%
All the following are complications of CAUTI except:	Hypertension	32	28.3%	81	71.7%
Overall Knowledge		52.8	47.27%	60.2	53.27%

The table (4-6) showed that overall knowledge of nurses was (7.27%) indicating that nurses' knowledge towards CAUTI prevention was at low level.

The results related to the use of the technique used in the catheter showed that

86.7% of the respondents know that the urinary catheter should be inserted using sterile techniques with sterile equipment, and 61.9% of the respondents know that the procedures to protect against urinary tract infection should be performed before the urinary catheter is inserted.

As for the results related to urinary catheter maintenance, 73.5% know that the catheter must be changed immediately when it is clogged, and 20.7% of the respondents know that urinary catheter maintenance needs to be changed routinely or at fixed intervals once the catheter is inserted.

Regarding the appropriate use of urinary catheters, it was found that 53.6% of the respondents knew that the CDC guidelines for catheter indications and CAUTI prophylaxis advised removal of the catheter within 24 hours in postoperative patients, in addition (93.8%) did not know that Obtaining urine for culture when the patient can voluntarily void. is an inappropriate indication for indwelling urinary catheterization, and 66.4 did not They know did not They know Patients expected to receive large-volume infusions or diuretics during surgery. that is an appropriate indication of urinary catheterization.

With regard to the respondents' knowledge of the risk factors for urinary catheterization, 65.8% of the respondents know that long-term catheterization is one of the risk factors for patients who have urinary catheters, and 65.8% of the respondents know that elderly patients over 65 years of age and women are at high risk of death or infection with CAUT.

Finally, the results related to the identification of catheter complications showed that 28.3% of the respondents know that high blood pressure is not among the complications of CAUTI.

Regarding the distribution of respondents based on the correct answers on knowledge questions, the most frequent correct answer was the question about proper technique used for indwelling urinary catheter Insertion 86.7%.

As shown in the figure below, the study results indicated that less than half [n=113;

(47.27%)] nurses working in ICU have knowledge towards catheter indications and CAUTI prevention.

Figure 9: Distribution of respondents according to their knowledge



Total knowledge level regarding catheter indications and CAUTI prevention

The following table describes Descriptive Statistics of total knowledge level for nurse's regarding catheter indications and CAUTI prevention.

Table 4 7: Descriptive Statistics of total knowledge level regarding catheter indications and CAUTI prevention

Descriptive Statistics	N	Min	Max	M	S. D	level
Total Knowledge	113	0.00	0.90	0.47	0.17	low

the results have shown that the level of total knowledge regarding catheter indications and CAUTI prevention was at the very low level ($M = 0.47$, $SD = 0.17$) with the minimum scores of (0.00) and the maximum scores (0.90)

And The following table describes Frequency and percentage of nurse's knowledge according to level of total knowledge regarding catheter indications and CAUTI prevention.

Table 4 8: Level of total knowledge regarding catheter indications and CAUTI prevention

Knowledge level	N	%
Very high	1	0.90%
High	2	1.80%
Moderate	15	13.30%
low	0	0.00%
Very low	95	84.10%
Total	113	1.00

Table (4-8) shows that the level of total knowledge regarding catheter indications and CAUTI prevention were (95) of responders by percentage (84.10%) had knowledge of catheter indications and CAUTI prevention at the Very low level, (15) of responders by percentage (13.30%) had knowledge at the moderate level, followed had knowledge at the High by percentage (1.80%) and had knowledge at the Very high level by percentage (0.90%).

4.4 Practice of ICU nurses towards Catheter indication and the prevention of CAUTI

The following table presents the descriptive statistics for the items that measure the extent of nurses' Practice of ICU nurses towards Catheter indication and the prevention of CAUTI

Table 4 9: Distribution of nurses according to their practice score.

Elements performed by nurses to prevent CAUTI		YES		NO		I don't know	
		N	%	N	%	N	%
Catheter indications	The patient meet at least one of the appropriate indications	76	67.3%	32	28.3%	5	4.4%
	Being familiar with the use of catheter alternatives like condom or adsorbent pads.	65	57.5%	45	39.8%	3	2.7%
Hand hygiene	Wash hand before and after insertion	107	94.7%	5	4.4%	1	0.9%
	Hand washing before catheter manipulation	51	45.1%	62	54.9%	0	0.0%
	Hand washing after catheter insertion	52	46.0%	61	54.0%	0	0.0%
Inserting the catheter	Use sterile equipment like sterile gloves, drape, sponges and solution.	91	80.5%	21	18.6%	1	0.9%
	Use aseptic technique to insert the catheter	89	78.8%	24	21.2%	0	0.0%
	Use a single used bottle for lubricant	81	71.7%	31	27.4%	1	0.9%
	Secure indwelling catheter properly after insertion to prevent movement and urethral	106	93.8%	7	6.2%	0	0.0%

Elements performed by nurses to prevent CAUTI		YES		NO		I don't know	
	traction						
Catheter maintenance	Keep the catheter and collecting tube free from kinking	80	70.8%	31	27.4%	2	1.8%
	Always keep the collecting bag below the bladder.	90	79.6%	22	19.5%	1	0.9%
	Empty the collecting bag regularly and use a separate, clean urine collecting jug for each patient	71	62.8%	40	35.4%	2	1.8%
	Maintain the closed system all the time	87	77.0%	25	22.1%	1	0.9%
	Keep the urine collecting bag out off the floor	82	72.6%	24	21.2%	7	6.2%
	Avoid contact of the drainage spigot with the collecting container.	90	79.6%	20	17.7%	3	2.7%
	Perform routine hygiene (cleansing of the perianal area during daily bathing or showering)	91	80.5%	19	16.8%	3	2.7%
	Use of gloves and gown as appropriate, during any manipulation of the catheter or collecting system.	63	55.8%	47	41.6%	3	2.7%
Catheter removal	The facility has any catheter removal protocol.	94	83.2%	19	16.8%	0	0.0%
	Protect yourself during catheter removal	81	71.7%	32	28.3%	0	0.0%
	Removed date recorded	81	71.7%	32	28.3%	0	0.0%
Overall Practice		81	72.04%	30	26.50%	2	1.48%

The table (4-9) showed that The overall practice of nurses towards urinary catheter indications and CAUTI prevention was moderate (72.04%).

All the practice test score was illustrated and 72.04% of nurse's implement CAUTI prevention practice during catheter insertion, maintenance and removal as well as respecting catheter indications for each patient in the hospitals reviewed.

This number is followed by 26.50% nurses who did not do some of CAUTI prevention practices and only 1.48% of nurse did not know if some of CAUTI prevention practices are done or not. From the table 6 below, respondents are described based on their daily practice to prevent CAUTI.

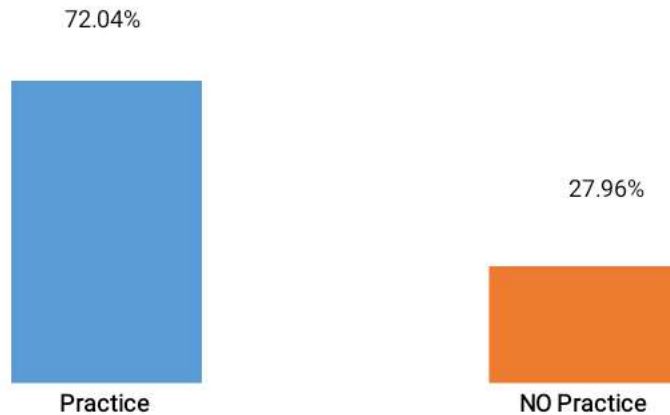
In table (4-9) showed that 94.7% of respondents know Use sterile equipment like sterile gloves, drape, sponges and solution, 93.8% of respondents agreed that Secure

indwelling catheter properly after insertion to prevent movement and urethral traction, 83.2% of respondents agreed that The facility has any catheter removal protocol., 80.5% of respondents agreed that Perform routine hygiene (cleansing of the perianal area during daily bathing or showering).

Showed data that few respondents 45.1% knew that they had to Hand washing before catheter manipulation, 46.0% knew that they had to Hand washing after catheter insertion, 55.8% of respondents knew that they had to Use of gloves and gown as appropriate, during any manipulation of the catheter or collecting system, 57.5% knew that they had to Being familiar with the use of catheter alternatives like condom or adsorbent pads.

As shown in the figure below, the study results indicated that 72.04% nurses working in ICU have Practice towards catheter indications and CAUTI prevention.

Figure 10: Distribution of respondents according to their Practice



4.5 Relationship between knowledge and practice of nurses towards catheter indications and CAUTI prevention

There is no relationship between knowledge and practice of the of nurses towards catheter indications and CAUTI prevention

Table 4 10: knowledge and practice of nurses towards catheter indications and CAUTI prevention

		level knowledge												Chi-square	Sig.
		Very low		low		Moderate		High		Very high		Total			
		N	%	N	%	N	%	N	%	N	%	N	%		
level practice	Very low	29	96.7%	0	0.0%	1	3.3%	0	0.0%	0	0.0%	30	100.0%	16.626	0.164
	low	5	100.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	5	100.0%		
	Moderate	14	66.7%	0	0.0%	7	33.3%	0	0.0%	0	0.0%	21	100.0%		
	High	28	84.8%	0	0.0%	4	12.1%	1	3.0%	0	0.0%	33	100.0%		
	Very high	19	79.2%	0	0.0%	3	12.5%	1	4.2%	1	4.2%	24	100.0%		
	Total	95	84.1%	0	0.0%	15	13.3%	2	1.8%	1	0.9%	113	100.0%		

Table (4-10) shows the association between nurse's knowledge and practice towards catheter indications and CAUTI prevention, Results showed there are no

association between nurse's knowledge and practice nurses towards catheter indications and CAUTI prevention (Chi-square: 16.626; p-value: 0.164).

Based on the previous results and the level of significance of (0.164), the results of testing this hypothesis led to the rejection of the hypothesis, which states that: There is Relationship between knowledge and practice of nurses towards catheter indications and CAUTI prevention.

4.6 Factors influencing nurses' KP towards the prevention of CAUTI

4.6.1 Demographic characteristics and nurses' knowledge towards CAUTI prevention

There is a statistically significant relationship at the level (0.05) between demographic data and level knowledge of nurses towards catheter indications and CAUTI prevention.

Table 4 11: Relationship between demographic data and level Knowledge of nurses

demographic data		Level of knowledge										Chi-square	P value
		Very low		low		Moderate		High		Very high			
		N	%	N	%	N	%	N	%	N	%		
Age	From 20 to 30 years	78	86.7%	0	0.0%	10	11.1%	1	1.1%	1	1.1%	3.822	0.701
	From 31 to 40 years	16	72.7%	0	0.0%	5	22.7%	1	4.5%	0	0.0%		
	From 41 to 50 years	1	100.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%		
	above 50 years	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%		
Sex	Male	53	77.9%	0	0.0%	13	19.1%	2	2.9%	0	0.0%	7.990	0.046
	Female	42	93.3%	0	0.0%	2	4.4%	0	0.0%	1	2.2%		
Marital status	single	45	90.0%	0	0.0%	3	6.0%	1	2.0%	1	2.0%	5.935	0.43
	married	48	78.7%	0	0.0%	12	19.7%	1	1.6%	0	0.0%		
	divorced	2	100.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%		
	widow	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%		
Educational level	Diploma	58	81.7%	0	0.0%	10	14.1%	2	2.8%	1	1.4%	2.257	0.895
	Bachelor's	35	87.5%	0	0.0%	5	12.5%	0	0.0%	0	0.0%		
	Master's	2	100.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%		
Years of experience	Less than 1 years	20	83.3%	0	0.0%	4	16.7%	0	0.0%	0	0.0%	3.311	0.993
	From 1- 5 years	46	82.1%	0	0.0%	8	14.3%	1	1.8%	1	1.8%		
	From 5- 10 years	21	87.5%	0	0.0%	2	8.3%	1	4.2%	0	0.0%		

	From 11- 15 years	7	87.5%	0	0.0%	1	12.5%	0	0.0%	0	0.0%		
	From 16- 20 years	1	100.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%		
	above 20 years	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%		

The table (-) showed that the level of significance for the demographic variables (age, marital status, educational level, years of experience) were ($p = 0.701, 0.43, 0.895, 0.993$), respectively, which is greater than (0.05), which indicates that there is no relationship between the variables demographics (age, marital status, education level, years of experience) and level knowledge of nurses towards catheter indications and CAUTI prevention

it was also found that the significance level of the variable (sex) was ($p = 0.046$), which is less than (0.05), which indicates the existence of a relationship between the gender variable and the level knowledge of nurses towards catheter indications and CAUTI prevention

based on what was previously explained, the results of the validity of the hypothesis led to the acceptance of the hypothesis that states that there is a relationship between sex and the level knowledge of nurses towards catheter indications and CAUTI prevention, and rejecting the hypothesis that states that there is a relationship between demographic variables (age, marital status, educational level, years of experience) and the level knowledge of nurses towards catheter indications and CAUTI prevention.

4.6.2 Demographic characteristics and respondents' practice towards the prevention of CAUTI

There is a statistically significant relationship at the level (0.05) between demographic data and level practice of nurses for catheter indications and CAUTI prevention.

Table 4 12: Demographic characteristics of respondent and their practice level towards catheter indications and CAUTI prevention.

Demographic characteristics		level of practice										Chi-square	P-value
		Very low		low		Moderate		High		Very high			
		N	%	N	%	N	%	N	%	N	%		
Age	From 20 to 30	27	30.0%	5	5.6%	16	17.8%	26	28.9%	16	17.8%	8.586	0.378

Demographic		level of practice											
	From 31 to 40	3	13.6%	0	0.0%	5	22.7%	6	27.3%	8	36.4%		
	From 41 to 50	0	0.0%	0	0.0%	0	0.0%	1	100.0%	0	0.0%		
	above 50	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%		
Sex	Male	19	27.9%	2	2.9%	11	16.2%	23	33.8%	13	19.1%	3.117	0.539
	Female	11	24.4%	3	6.7%	10	22.2%	10	22.2%	11	24.4%		
Marital status	single	14	28.0%	4	8.0%	10	20.0%	12	24.0%	10	20.0%	8.131	0.421
	married	16	26.2%	1	1.6%	11	18.0%	19	31.1%	14	23.0%		
	divorced	0	0.0%	0	0.0%	0	0.0%	2	100.0%	0	0.0%		
	widow	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%		
Educational level	Diploma	22	31.0%	2	2.8%	10	14.1%	20	28.2%	17	23.9%	8.006	0.433
	Bachelor's	8	20.0%	3	7.5%	11	27.5%	12	30.0%	6	15.0%		
	Master's	0	0.0%	0	0.0%	0	0.0%	1	50.0%	1	50.0%		
Years of experience	Less than 1 years	8	33.3%	1	4.2%	2	8.3%	7	29.2%	6	25.0%	17.810	0.335
	From 1- 5 years	14	25.0%	4	7.1%	9	16.1%	20	35.7%	9	16.1%		
	From 5- 10 years	6	25.0%	0	0.0%	9	37.5%	2	8.3%	7	29.2%		
	From 11- 15 years	2	25.0%	0	0.0%	1	12.5%	3	37.5%	2	25.0%		
	From 16- 20 years	0	0.0%	0	0.0%	0	0.0%	1	100.0%	0	0.0%		
	above 20 years	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%		

The table (4-12) showed that the level of significance for the demographic variables (age, sex, marital status, educational level, years of experience) were ($p = 0.378, 0.539, 0.421, 0.433, 0.335$) respectively, which is greater than (0.05), which indicates that there is no relationship between the variables demographics (age, sex, marital status, education level, years of experience) and level practice of nurses for catheter indications and CAUTI prevention.

based on what was previously explained, the results of the validity of the hypothesis led to the rejecting the hypothesis that states that there is a relationship between demographic variables (age, sex, marital status, educational level, years of experience) and level practice of nurses for catheter indications and CAUTI prevention.

Chapter five:

Discussion and Conclusion

1.27 Introduction

This chapter presents a summary of the findings from the study, the conclusions that have been arrived at, the recommendations made by the researcher based on the findings and suggestions on the areas the researcher felt may require further investigation through research activity.

1.28 Summary of main findings

revealed by the current study, the majority of respondents were male (60%), while Female was (40%) and largely aged between from 20 to 30 years' old by percent (79.6%), Marital status for the majority Married (54.0%), Most of respondents by 62.8% were holding a Diploma level of education in nursing, most them years of experience of have from 1- 5 years by (62.8%).

These findings revealed that the majority of sample are males similar to findings of Ginny Kaushal et al, 2015 in the study to assess nurses' knowledge, attitude and practices regarding infection control standard precautions at the ICU of selected super specialty hospital, A descriptive study to assess knowledge and practices of nurses on infection control in the use of urethral catheters in a private hospital in Iloilo City show different findings with the current study. Among 30 nurses included in the study, the majority 90% were between 21 to 29 years old, 56.7% were males, and most of them 76.7% were bachelors' degree holder (Opina and Oducado, 2014).

Nurses' knowledge Regarding the Prevention

After computing the correct responses of knowledge questionnaire as they were provided by respondents and then compare them with McDonald's standards of practice measured criteria, the findings of this study revealed that the majority of ICU nurses have a low level of knowledge (47.27%) regarding CAUTI prevention. The results are consistent with those found by Kose et al 2016 that nurses have inadequate level of knowledge concerning catheter care, the use of drainage bags and the urinary catheterization.

the study results indicated that less than half [n=113; (47.27%)] nurses working in ICU have knowledge towards catheter indications and CAUTI prevention, was at the very low level (M =0.47, SD=0.17) with the minimum scores of (0.00) and the maximum scores (0.90)

the level of total knowledge regarding catheter indications and CAUTI prevention were (95) of responders by percentage (84.10%) had knowledge of catheter indications and CAUTI prevention at the Very low level, (15) of responders by percentage (13.30%) had knowledge at the moderate level, followed had knowledge at the High by percentage (1.80%) and had knowledge at the Very high level by percentage (0.90%).

Specifically, the study findings revealed an excellent knowledge of proper techniques to insert the UC as 86.7% of the respondents know that the urinary catheter should be inserted using sterile techniques with sterile equipment, this result similar results to study (Gould et al., 2010, p. 12) and study (Jacqueline MUKAKAMANZI,2017) which showed that respondents have excellent knowledge of proper techniques to insert the UC in the hospitals is was selected for study.

The results study that 61.9% of the respondents know that the procedures to protect against urinary tract infection should be performed before the urinary catheter is inserted.

With regard to the respondents' knowledge of the risk factors for urinary catheterization, 65.8% of the respondents know that long-term catheterization is one of the risk factors for patients who have urinary catheters, and 65.8% of the respondents know that elderly patients over 65 years of age and women are at high risk of death or infection with CAUT, this result It does not agree with the results of the study (Jacqueline MUKAKAMANZI,2017) which showed that respondents have did not perceive the risk factors for urinary catheterization and believed that it is there are not a serious disease form urinary catheterization.

This is not different from what was explained by different authors stating that bleeding is seen in newly catheterized patients or those with prolonged catheterization (Osamu, 2008; Taleschian-tabrizi et al., 2015).

As for the results related to urinary catheter maintenance, 73.5% know that the catheter must be changed immediately when it is clogged, and 20.7% of the respondents know that urinary catheter maintenance needs to be changed routinely or at fixed intervals

once the catheter is inserted.

Regarding the appropriate use of urinary catheters, it was found that 53.6% of the respondents knew that the CDC guidelines for catheter indications and CAUTI prophylaxis advised removal of the catheter within 24 hours in postoperative patients,

Nurses' practices Regarding the Prevention

While nurses have low knowledge, their practice was found to be moderate with a total average score of 72.04% and 26.50% nurses who did not do some of CAUTI prevention practices and only 1.48% of nurse did not know if some of CAUTI prevention practices are done or not.

Showed results that 94.7% of respondents know Use sterile equipment like sterile gloves, drape, sponges and solution, 93.8% of respondents that Secure indwelling catheter properly after insertion to prevent movement and urethral traction, 83.2% of respondents that The facility has any catheter removal protocol, 80.5% of respondents that Perform routine hygiene (cleansing of the perianal area during daily bathing or showering).

Showed results that few respondents 45.1% knew that they had to Hand washing before catheter manipulation, 46.0% knew that they had to Hand washing after catheter insertion, 55.8% of respondents knew that they had to Use of gloves and gown as appropriate, during any manipulation of the catheter or collecting system, 57.5% knew that they had to Being familiar with the use of catheter alternatives like condom or adsorbent pads.

the relationship between nurse's knowledge and practice nurses towards catheter indications and CAUTI prevention, Results showed that there are no association between nurse's knowledge and practice nurses towards catheter indications and CAUTI prevention (Chi-square: 16.626; p-value: 0.164).

relationship between Demographic characteristics and respondents' knowledge towards the prevention of CAUTI prevention

Results showed that the level of significance for the demographic variables (age, marital status, educational level, years of experience) were ($p = 0.701, 0.43, 0.895, 0.993$), respectively, which is greater than (0.05), which indicates that there is no relationship between the variables demographics (age, marital status, education level, years of experience) and level knowledge of nurses towards catheter indications and CAUTI prevention, Similar findings were in the study done by Prasanna et al 2015 as the author

found that there is no association between the level of knowledge of staff nurses regarding catheter care and between demographic variables (Jain et al., 2015; Prasanna and M, 2015), this result agree with the results (Jacqueline MUKAKAMANZI,2017) which showed that there is no impact of socio demographic characteristics on nurse's knowledge, attitude and practice towards catheter indication and CAUTI prevention as the p values for all the results are above 0.05.

Results showed that it was also found that the significance level of the variable (sex) was ($p = 0.046$), which is less than (0.05), which indicates the existence of a relationship between the gender variable and the level knowledge of nurses towards catheter indications and CAUTI prevention, this result agree with the results of the studies conducted respectively by Sessa, Wicks and Kosse revealed that demographic features like level of education and years of experience has an impact on the level of nurses KAP towards catheter care ($p=0.047$; $p<0.05$)

relationship between Demographic characteristics and respondents' practice towards the prevention of CAUTI prevention.

the relationship between Demographic characteristics and respondents' practice towards the prevention of CAUTI , Showed results that the level of significance for the demographic variables (age, sex, marital status, educational level, years of experience) were ($p = 0.378, 0.539, 0.421, 0.433, 0.335$) respectively, which is greater than (0.05), which indicates that there is no relationship between the variables demographics (age, sex, marital status, education level, years of experience) and level practice of nurses for catheter indications and CAUTI prevention.

1.29 Conclusion

Catheter associated urinary tract infections is one of the most common health care associated infections as literature said but can be prevented. According to the results of this study, some nurses have shown a good implementation of different practices towards catheter indications and CAUTI prevention, but their knowledge was not satisfactory.

There were no associations relationship between the demographics and the level practice of nurses towards catheter indications and CAUTI prevention, also There were no associations relationship between the demographics and the level knowledge of nurses

towards catheter indications and CAUTI prevention, Except gender variable, existence of a relationship between the gender variable and the level knowledge of nurses towards catheter indications and CAUTI prevention.

1.30 Recommendations

Based on the results of the present study, the following can be recommended:

1-we recommend the hospital to increase the knowledge of nursing staff through training courses, workshops and curricula.

2-Provide written updated guidelines based on evidence to promote urinary catheterization with enough knowledge, and high safe nursing practice to ensure the reduction of the CAUTI rate.

3-Future researchers should compile an evidence-based guideline of CAUTI prevention and catheter care, specifically for nurses.

4-Replication of the study on a larger probability sample acquired from the different geographical areas in a general and private hospitals to figure out the main aspects of these problems

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استبيان حول

() استبيان رقم

تقييم معارف وممارسات الممرضين تجاه الوقاية من عدوى المسالك البولية المصحوبة
بالقسطرة البولية في مستشفى الثورة العام في العاصمة صنعاء

Assessment Knowledges and practices of nurses Toward
The prevention of catheter associated urinary tract infection
at Althowra hospital in Sana'a City.

الموافقة الرسمية

Informed consent

اسم

المستشفى.....

الملاحظات :

.....

.....

.....

أؤكد ان الاستبيان قد تم تعبئته بالكامل
التاريخ :

اسم المقابل.....

التوقيع.....

زملائي الممرضين الأعزاء نحن الباحثون طلاب جامعة
21 سبتمبر للعلوم الطبية والتطبيقية قد التحقنا بكلية
التمريض العالي بكالوريوس عام.
ولإستكمال مرحلة الدراسة نطلب منا النزول الميداني
لجمع المعلومات الخاصة بالدراسة وعنوانها.
(تقييم المعارف والممارسات التمريضية المتعلقة بـ
الوقاية من عدوى المسالك البولية الناتجة عن القسطرة
البولية) وذلك بموافقة كلية التمريض العالي للجامعة
حيث ستكون المعلومات التي سيتم جمعها في طبي
الكتمان وفقاً لأخلاقيات البحث العلمي ولن يطلع عليها
احد بما سيدي به من معلومات وسيتم استخدامها فقط
في الدراسة من أجل رفع الكادر التمريضي معرفياً
وعملياً بهدف المساهمة في تحسين مستوى الرعاية
الصحية للمجتمع.

استكمال البحث

اوافق

.....

.....

تعليمات عامة:

تنقسم هذه الاداة الى ثلاثة أقسام: القسم الاول: يتعلق بالبيانات الديموغرافية ،

اولا : البيانات الديموغرافية

-املئ الفراغات التالية بوضع علامة (صح) في الفراغ المناسب :
1- العمر (.....)

من 20 الى 30 سنة	
من 30 الى 40 سنة	
من 40 الى 50 سنة	
اكثر من 50 سنة	

2- الجنس: ضع علامة (/) في الفراغ المناسب:

ذكر	انثى

3- الحالة الاجتماعية :

عازب/ة	
متزوج /ة	
مطلق /ة	
ارمل /ة	

4- المستوى التعليمي ومزاولة العمل:

دبلوم تمريض	
بكالوريوس تمريض	
ماجستير تمريض	

4- الخبرة العملية في العناية المركزة والتدريب في أحد اقسام التحكم بالعدوى:
الخبره العملية في العناية المركزة بالتحديد.....

الاجابة	سنوات الخبرة في وحدة العناية المركزة
	اقل من سنه
	من 1-5 سنوات
	من 6-10 سنوات
	من 11-15 سنة
	من 16-20 سنة
	اكثر من 20 سنة

مكان العمل في العناية المركزة

	<u>عناية الجراحة</u>
	<u>عناية الباطنية</u>
	<u>عناية المخ والاعصاب</u>
	<u>عناية الطوارئ</u>
	<u>عناية الكلى</u>

القسم B

مدى معرفة الممرضين بمؤشرات القسطرة البولية والوقاية من التهاب المسالك البولية (CAUTI).

التعليمات: يرجى قراءة البيان بعناية ووضع علامة (✓) امام الإجابة الصحيحة.

1- من بين ما يلي ما هو المؤشر الغير مناسب للقسطرة البولية المثبتة؟	
أ. احتباس البول الحاد وانسداد المثانة.	
ب. اخذ عينه من البول بإرادة المريض للفحص المخبري	
ج. الحاجة إلى قياسات دقيقة للنتائج فحص البول لدى المرضى المصابين بأمراض خطيرة.	
د. ضمان الراحة والرعاية الصحية التامة	
2 - ما هو المؤشر المناسب للقسطرة البولية من بين ما يلي؟	
أ. قياس إخراج البول الذي يمكن الحصول عليه بوسائل أخرى غير القسطرة البولية.	
ب. كبديل عن الرعاية التمريضية للمريض أو المقيم المصاب بسلس البول	
ج. لفترة طويلة بعد العمليات الجراحية دون مؤشرات مناسبة	
د. يتوقع المرضى تلقي كمية كبيرة من الحقن أو مدرات البول أثناء الجراحة	
3. اقرأ ما يلي بعناية وحدد التقنية المناسبة المستخدمة لإدخال القسطرة البولية؟	
أ. استخدام تقنية نظيفة مع معدات نظيفة.	
ب. استخدام تقنية نظيفة مع معدات معقمة	
ج. استخدام تقنية التعقيم مع المعدات المعقمة	
د. استخدام تقنية التعقيم بمواد نظيفه	
4. استنادًا إلى إرشادات CDC لعام 2009 للوقاية من عدوى المسالك البولية المرتبطة بـ القسطرة، والمرضى الذين يخضعون للعمليات ولديهم قسطرة ، يُنصح بإزالة القسطرة في أسرع وقت ممكن بعد الجراحة، ويفضل أن يكون ذلك خلال	
أ. 24 ساعة	
ب. 6 ساعات	
ج. ٣٦ ساعة	
د. ١٢ ساعة	
5. بصفتك ممرض / ممرضه في وحدة العناية المركزة ، تجد أن القسطرة البولية	

المثبتة مسدودة أثناء تقييم المريض ، ماذا ستفعل؟	
أ. قم بتغيير القسطرة على الفور	
ب. اخبر الطبيب	
ج. تعبئت القسطرة بمكانها وانتظر أمر الطبيب	
د. قم بتقطير المحاليل المطهرة أو المضادة للميكروبات في كيس الصرف البولي.	
6. ليس من بين الإجراءات التالية إجراء تمريضي للوقاية من التهابات القسطرة البولية؟	
أ. الحفاظ على استمرار تدفق البول.	
ب. تغيير القسطرة البولية أو أكياس الصرف فقط على فترات منتظمة وثابتة	
ج. احتفظ بكيس التجميع تحت مستوى المثانة في جميع الأوقات.	
د. قم بإفراغ كيس التجميع بانتظام باستخدام حاوية تجميع منفصلة ونظيفة لكل مريض	
7. أي واحد من التالي هو عامل خطر ل-CAUTI؟	
أ.عدم الحركة لفترة طويلة	
ب. استخدام تقنيات التعقيم أثناء إدخال القسطرة	
ج. استمرار القسطرة لفترة طويلة	
د. لا شيء مما ذكر	
8. من بين الفئات التالية، أي المرضى معرض لخطر كبير للوفاة أو الإصابة ب-CAUT	
أ. الأطفال أقل من 12 سنة	
ب. الشباب الذين تتراوح أعمارهم بين 18-25 سنة	
ج. المرضى البالغين من 30-50 سنة	
د. المرضى كبار السن فوق 65 سنة والنساء	
9 - قبل إدخال القسطرة البولية ، يجب على الممرض القيام بكل ما يلي لمنع الإصابة بعدوى المسالك البولية ، باستثناء:	
أ. نظافة اليدين مباشرة قبل وبعد الإدخال أو أي تلاعب بـ القسطرة .	
ب. يتم إعطاء هذه المسؤولية فقط للأشخاص المدربين بشكل صحيح الذين يعرفون التقنية الصحيحة لإدخال القسطرة المعقمة والمحافظة عليها.	
ج. تأمين القسطرة المثبتة بشكل صحيح بعد إدخالها لمنع الحركة أو الأزاحه من مجرى البول.	
د. لا شيء مما سبق	

10-	كل ما يلي هو من مضاعفات التهاب المسالك البولية (CAUTI) باستثناء :
أ.	الموت
ب.	الإنتان (Sepsis)
ج.	ارتفاع ضغط الدم
د.	نزيف داخلي

القسم D: تقييم ممارسة ممرضي وحدة العناية المركزة تجاه الوقاية من التهاب المسالك البولية :

تعليمات: يرجى قراءة البيان بعناية ووضع علامة (✓) امام الاجابه المناسبة:

لا اعرف	لا	نعم	الإجراءات التي يقوم بها الممرضين للوقاية من التهاب المسالك البولية الناتج عن القسطرة البولية CAUTI
			دواعي استخدام القسطرة
			1. من دواعي استخدام القسطرة على المريض يطبق واحد على الأقل من الدواعي المناسبة 2. التعرف على استخدام بدائل القسطرة مثل الواقي الذكري أو الحفاظات القطنية
			نظافة اليد
			1. غسل اليدين قبل وبعد إدخال القسطرة
			2. غسل اليدين قبل تركيب القسطرة
			3. غسل اليدين بعد إدخال القسطرة
			ادخال القسطرة
			1. استخدم معدات معقمة مثل القفازات المعقمة والجاون و المحلول.
			2. استخدم تقنية التعقيم لإدخال القسطرة
			3. تأمين القسطرة المثبتة بشكل صحيح بعد ادخالها لمنع الحركة والأزاحه من مجرى البول
			فحص القسطرة
			1. ا حافظ على القسطرة وأنبوب التجميع خاليين من الالتهاب
			2. احتفظ دائماً بكيس التجميع أسفل المثانة.
			3. أفرغ كيس التجميع بانتظام واستخدم إبريق تجميع البول نظيفاً منفصلاً لكل مريض
			4 ا حافظ على انبوب التحكم المغلق طوال الوقت
			5. احتفظ بكيس جمع البول بعيداً عن الأرض
			6. اتجنب ملامسة حنفية المياه مع وعاء التجميع.

			7. يقوم بالنظافة الروتينية (تطهير المنطقة المحيطة بـ الشرج أثناء الاستحمام اليومي)
			8. استخدام القفازات والجاون حسب الاقتضاء، أثناء أي فحص أو تركيب للقسطرة أو نظام التجميع.
			إزالة القسطرة
			1. لدى القسم أي بروتوكول أو دليل لإزالة القسطرة.
			2. احم نفسك أثناء إزالة القسطرة
			3. تسجيل تاريخ الإزالة

Annex B: Questionnaire (English).

General instruction: This instrument is divided into 3 sections. Section A is related to your personal data. Section B is your knowledge about Catheter Associated Urinary Tract Infections (CAUTI) prevention. Section c is your practices regarding CAUTI prevention.

section A

SOCIODEMOGRAPHIC CHARACTERISTIC OF RESPONDANTS

Instruction: Please fill in the provided space or put an ✓ in the area provided.

1. Age:years

2. Sex (Put a ✓ in the appropriate place)

Male	Female

3. Level of education and have a license to practice.

Associate Nurse (A2 level)	
Nursing Diploma (A1 level)	
Bachelors' degree in Nursing	
Masters' degree in Nursing	

Professional experience in ICU and training in one area of infection control practices

Years of experience in ICU	Answers	Training Yes/No
Less than 1 year		
1-5 years		
6-10 years		
11-15 years		
16-20 years		
Above 21 years		

SECTION B: Knowledge of nurses on urinary catheter indications and CAUTI prevention.

Instruction: Please read carefully the statement and circle the most correct answer.

1. Among the following what is an inappropriate indication for indwelling urinary catheterization?

- a. Acute urinary retention and bladder obstruction.
- b. Getting urine for culture when the patient can void voluntarily.
- c. Need for accurate measurements of urinary output in patients who are severely ill.
- d. To ensure comfort for end of life care.

2. Which is an appropriate indication of urinary catheterization among the following?

- a. Measurement of the urine output that can be obtained by means other than urinary catheter.
- b. As a replacement for nursing care for the patient or resident with incontinence
- c. For prolonged postoperative duration without appropriate indications
- d. Patients expected to receive a great amount of infusions or diuretics during surgery

3. Read the following carefully and select the proper

3-technique used for indwelling urinary catheter Insertion?

- a. Using clean technique with clean equipment.
- b. Using clean technique with sterile equipment.
- c. Using aseptic technique with sterile equipment.
- d. Using aseptic technique with clean materials

4. Based on CDC 2009 Guidelines for prevention of Catheter associated urinary tract infection, operative patients who have been catheterized, it is advised to remove the catheter as soon as possible post operatively, preferably with in

- a. 24 hours
- b. 6 hours
- c. 36 hours
- d. 12 hours

5. As a nurse in critical care unit, you find that the indwelling urinary catheter is obstructed during your patient assessment, what are you going to do?

- a. Change the catheter immediately
- b. Notify the physician
- c. Clamping indwelling catheters and wait for the physician order
- d. Perform instillation of antiseptic or antimicrobial solutions into urinary drainage bag.

6. One of the following is not a nursing action to prevent infections from urinary catheter?

- a. Maintain continuous urine flow.
- b. Changing the urinary catheters or drainage bags only at routine and fixed intervals
- c. Keep the collecting bag under the level of the bladder at all times.
- d. Empty the collecting bag regularly using a separate, clean collecting container for each patient

7. Which one among the following is a risk factor for CAUTI?

- a. Prolonged immobility
- b. Using aseptic techniques during catheter insertion
- c. Prolonged time of catheterization
- d. None one of the above

8. Among the following category, which patient is at high risk of mortality or developing CAUTI?

- a. Children less than 12 years old
- b. Young adult between 18-25 years old
- c. Adult patients of 30-50 years old
- d. Elderly patients of more than 65 years and women

9. Prior to inserting urinary catheter a nurse has to perform all of the following to prevent CAUTI except:

- a. Hand hygiene immediately before and after insertion or any manipulation of the catheter device or site.
- b. Only properly trained persons who know the correct technique of aseptic catheter insertion and maintenance are given this responsibility.
- c. Properly secure indwelling catheters after insertion to prevent movement and urethral traction.
- d. None of the above

10. All the following are complications of CAUTI except:

- a. Death
- b. Sepsis
- c. Hypertension
- d. Hemorrhage

SECTION c: Checklist to assess the Practice of ICU

nurses towards CAUTI prevention Observational checklist on ICU nurses practice regarding CAUTI prevention.

Instruction: Please read the statement carefully and put an ✓ in the box that most closely reflects your answer to the following questions.

Elements performed by nurses to prevent CAUTI	Yes (Y)	No (N)	NOT APPLIED (X)
catheter indications			
1. The patient meet at least one of the appropriate indications 2. Being familiar with the use of catheter alternatives like condom or adsorbent pads.			
Hand hygiene			
1. Wash hand before and after insertion 2. Hand wshing before catheter manipulation 3. Hand washing after catheter insertion			

Inserting the catheter			
1. Use sterile equipment like sterile gloves, drape, sponges and solution. 2. Use aseptic technique to insert the catheter 3. Use a single used bottle for lubricant 4. Secure indwelling catheter properly after insertion to prevent movement and urethral traction			
Catheter maintenance			
1. Keep the catheter and collecting tube free from kinking 2. Always keep the collecting bag below the bladder. 3. Empty the collecting bag regularly and use a separate, clean urine collecting jug for each patient 4. Maintain the closed system all the time 5. Keep the urine collecting bag			

out off the floor 6. Avoid contact of the drainage spigot with the collecting container. 7. Perform routine hygiene (cleansing of the perianal area during daily bathing or showering) 8. Use of gloves and gown as appropriate, during any manipulation of the catheter or collecting system.			
Catheter removal			
1. The facility has any catheter removal protocol. 2. Protect yourself during catheter removal 3. Removed date recorded			

